Centre for Geo-Information

Thesis Report GIRS-2014-23

Social media: The citizens view

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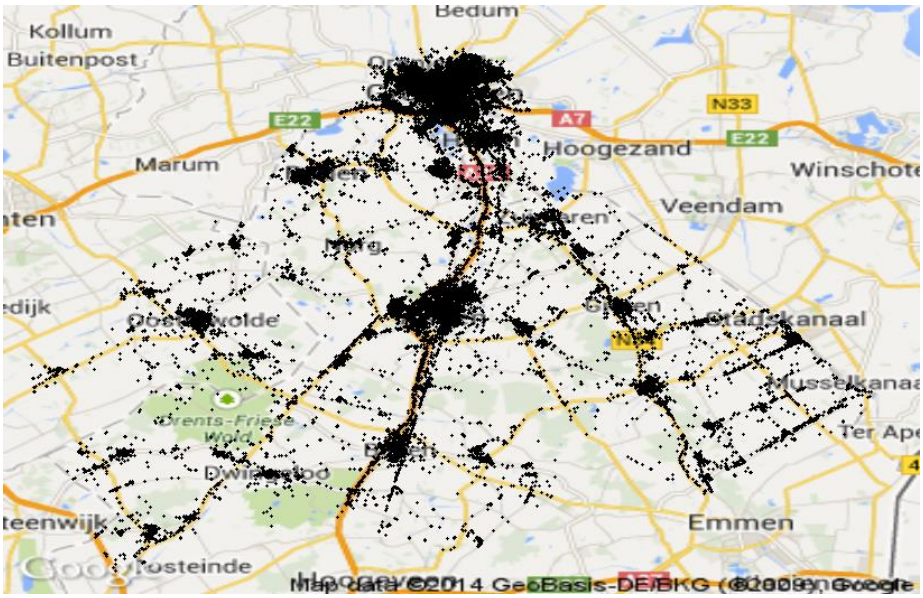

July 2014

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Social media: The citizens view

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A thesis submitted in partial fulfilment of the degree of Master of Science
at Wageningen University and Research Centre,
The Netherlands.

July 2014
Wageningen, The Netherlands

Thesis code number: GRS-80436
Thesis Report: GIRS-2014 -23
Wageningen University and Research Centre
Laboratory of Geo-Information Science and Remote Sensing

Acknowledgements

Doing a thesis as a part of your studies is an individual process. Especially if you choose an own subject where the staff of the study is less familiar with. It was my personal choice to go into this process, where I was well aware of the probability of issues in the process. Going into this thesis I was eager to show my qualities within my own fields of interest. I am happy that the master MGI has given me the opportunity to take this road. Especially dr. ir. A. Ligtenberg who has been involved in setting up this thesis. I have told him what my view and ideas were and got feedback that gave me the knowledge to think in a wider picture. I believe that this wider picture has helped me to come to this research which I even in the final moments find very interesting and I am happy with.

When the first set up of the overall thesis was made, dr. ir. A. Ligtenberg and me decided to involve dr. ir. R. van Lammeren. Dr. ir. R. van Lammeren has a different way of looking at this thesis and is more familiar with spatial planning, which is the background I am coming from. We have had intensive discussions where endless possibilities of the subjects of this thesis have come up. For me it was the challenge to grasp a part of the possibilities and create a nice full proof thesis research. I want to thank both my supervisors in giving me the knowledge of thinking in a wider picture about these subjects. I think I have learned a lot.

In several courses of our study we make use of the scripting language R which we use in the RStudio environment. I have worked with ArcGIS in my bachelor and former work, but within this study I have found that scripting geo-processes is way more useful. In my opinion scripting geo-processes forces you to think and thoroughly understand the geo-processing that you are executing. Every table or figure of this research is made in open source software or within a Microsoft office package. All maps are made in the RStudio environment.

I would also like to thank my classmates for giving me the a nice social environment in the Gaia building in the Wageningen University campus. Also in discussing the process of each other thesis's. Especially B. Brede who has helped me through scripting problems and also enriched my knowledge in scripting.

Abstract

The goal of this research is to analyse links between the sentiments of citizens and the (spatial and social effects of) demographics in shrinkage regions. These regions are experiencing the demographic developments population shrinkage, aging population, declining working population and a changing household composition. Citizens are the best observers of the social and spatial effects of a changing demographic. They could be a useful participating party in guiding the changes an area is going through. In order to measure the sentiment of citizens, twitter messages (tweets) are analysed. Municipalities where shrinkage is indicated are compared to non-shrinking municipalities. Tweets are converted in such a way that the tweets can be explored and related to the level of shrinkage of the municipalities. In order to link tweets to the sentiment of a population three possible relations are set up. The first relation aims at the type of locations mostly tweeted about in a municipality. The second relation inspects tweets containing words that indicate spatial effects of shrinkage. As a third relation the overall sentiment is grasped by executing a questionnaire, and letting people categorize the gathered tweets in to sentiment categories. Relations between the content of tweets and the shrinkage level indicate that there are differences in sentiment in different municipalities. A part of these differences appear to be related to shrinkage. In municipalities that are characteristic to shrinkage regions (shrinkage municipalities), people more often tweet about smaller scaled locations. Also, there is less diversity in locations tweeted about. The second relation indicates that more tweets in shrinkage municipalities are about vacant buildings and forced moving's. The third relation indicates that people in shrinkage municipalities post tweets that in general are more negative, more about the past and less about themselves. The relations found between sentiment and shrinkage give insight in the sentiment of the population in shrinkage regions compared to the sentiment in other municipalities. For governments, organizations and citizens understanding the sentiment can be of importance. Policies can be set up, supported or criticized that aim on these regions. Understanding the sentiment of a population could also influence the finding of a location to start or close an establishment, or to find a location to live. Additionaly the methods executed to derive the sentiment of a population by exploring tweets can give insight in to the increasing amount of research that includes online communication.

Keywords: shrinkage regions, social media, georeferenced tweets, sentiment, Netherlands, Social Media Analytics (SMA).

Terms used

Shrinkage region	A region that experiences shrinkage of the population which often is accompanied with a population that on average is getting older, a shrinking working population and a smaller composition of the average households.
Shrinkage	Shrinkage of the population.
Aging	A population that on average is becoming older over a period of time.
Working population	The part of the population that is working. In this thesis an indication is made of this population by looking at the part of the population in the age category 20 to 65 years.
Household change	A change of the composition and amount of households of a population.
region of interest	A region with municipalities that have characteristic demographic developments of shrinkage regions, together with municipalities that are the opposite and are uncharacteristic to shrinkage regions.
Shrinkage score municipalities of the Netherlands	A score for municipalities indicating the level of shrinkage relative to the other municipalities of the Netherlands.
Shrinkage score municipalities region of interest	A score for municipalities indicating the level of shrinkage relative to the other municipalities in the region of interest.
Citizen science	Citizen science is a form of research collaboration involving members of the public in scientific research projects to address real-world problems (Crowston 2011).
Sentiment	The feeling or emotion a person or a group of people have.
Online communication	Communication through social media.
Tweets	Twitter messages
Social media	A conversational, distributed mode of content generations, dissemination, and communication among communities (Zeng 2010).
Social Media Analytics (SMA)	A new and growing research field that aims on the usage of methods to analyse social media data (Stieglitz 2014).
Sentiment analysis within social media	The content of messages posted online are further looked into and linked to a certain sentiment.
findAssocs	A function that finds the most associated words with other words in sentences.
Shrinkage municipalities	Municipalities that have demographics characteristics to shrinkage regions
Non-shrinkage municipalities	Municipalities that have demographics uncharacteristic to shrinkage regions

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1. Introduction

1.1 Background

In some regions of the Netherlands there are demographic developments that cause these regions to be in need of attention. Studies show that several regions in the Netherlands will experience a shrinkage of the population and an on average older population (Statline 2013). This is partly the effect because of a lowering birth-rate and people that on average live a longer life (Duin 2010). Shrinkage is a trend that changes our view and contradicts many of the Dutch growth based policies. For a more stagnant or shrinking demographic development policies cannot be growth based anymore (Schwarz 2012).

> *Quote: Social inclusion is important within the social dynamics of demographic change for local development to allow local populations to take an active part in the economic and social life of their community (Weyman 2012).*

For the regions that do experience shrinkage and/or aging, ways of life will change. The closure of a public facility could be an effect of shrinkage (Bontje 2011). These closures could have an enhancing effect on the shrinkage. The 'experts/victims' about the direct effects caused by these demographically effects in an area are the citizens. To guide these changes in the living environment these 'experts/victims' could be a good source and participating party (Martinez-Fernandez 2012). Shrinkage and aging are demographic developments that are expected in multiple regions within the Netherland (Statline 2013). The process following these developments could be similar in multiple areas and thus the possible guiding measurements could be compared and discussed. The one region, city or neighbourhood can inspire the other if they would communicate.

In projects ran by municipalities it is possible that choices have been made which are undesirable by the citizens. More often, citizens would like to have had influence on such processes but did not have it (Verhoeven 2009). Either because there was no opportunity to, or because they were for a reason not able to take a given opportunity. Even though in the Netherlands municipalities try to involve the citizens (Veiligheid 2012). On the other hand there is not much room for giving ideas. A citizen could have an idea to improve his or her environment and municipality. To share and get this idea executed takes a lot of effort for the citizens.

Citizens have ideas about their environment. Some of these ideas are good and some are not good or not realistic. It is obviously impossible to analyse all these ideas as a municipality (Renée A Irvin 2004). Unfortunately good ideas of citizens will get lost because of this. Only when good ideas are promoted and supported by a large amount of people, they will be taken into account. It takes a lot of effort to prove that an idea is popular among the citizens. Technology is making communication easier and might be an easier method to raise awareness and opinions or support about ideas.

> *Quote "The technology is bringing people closer to their worlds and empowering them to define a future that reflects their values, hopes and dreams" (Dangermond 2002)*

1.2 Problem definition

In the Netherlands the word of the year 2013 in the political category was 'participatiesamenleving', which means: A society where the citizens welfare is not, or not only dependent on the government, but is stimulated by the initiatives of citizens (Dale 2013). It is expected that citizens take responsibility and participate in society in order to manage changing situations.

Because of the decreasing growth of population, or even shrinking population, in multiple regions of the Netherlands the spatial development of cities and villages is changing. Instead of adding facilities to an existing area, more often an area has to be changed using and adapting only the existing facilities. This is a change in approach (Jong 2013).The areas that are experiencing a decreasing growth or shrinking population often also experience the demographic development aging (Jong 2013, Statline 2013). In this case it is likely that the houses are designed to be used by a younger generation than the people that currently live in these houses. An obvious solution could be the restructuring of these areas where some of these houses are converted to be suitable for a different age category. Also social facilities, transport and other factors have to be adapted to the changing characteristics of the populations. It can be expected that there are more public facilities needed for the elderly and less for the younger generation. So the amount of schools will probably decrease and the amount of nursing facilities increase in shrinkage regions (Jong 2013).

The influence of these demographic developments also depends on the scale level of an area. A small town or an neighborhood can be influenced heavily by shrinkage. A threat is an exponential effect. An area with many empty houses or with a decrease of public facilities could possibly become a more unattractive area to live in. Which then again could lead to more citizens moving out of the area and even more empty houses.

For municipalities and/or local organizations it is becoming a challenging issue to manage the effects of the influential demographics developments shrinkage and aging in such a way that strengths and values of an area are not lost. The inevitable changes that will come in multiple areas will have influence on the way of life of the population of this area. Because of this, it seems to be wise to involve the population in order to create a future situation that is desirable for population and municipality. This also appears to be an aim of the Dutch government. Which can be indicated out of the political word of the year 2013: ‘participatiesamenleving’ (Dale 2013).

In each municipality in the Netherlands citizens experience their living environment different, in their neighbourhoods and municipalities. It could be possible that aspects of the perceptions of citizens are linked to the demographics of a municipality or neighbourhood. Policies of governmental institutions are often based on other policies, or are based on guidelines that are set up by a governmental institution of a higher scale. An example of that in the Netherlands are ‘the Vogelaarwijken’ (Zwam 2011). This is a policy implemented in multiple neighbourhoods based on a national set up policy. In order to implement such policies it is probably useful to know the sentiment of the citizens that are living in the area the policy is meant for.

As a tool for citizens to participate in the planning of the changes an area is going through, social media could play an important role. Nowadays almost everybody is active on the internet (Oosterveer 2013). There are also many different social media available, like the well-known and large Facebook, Twitter and LinkedIn. There are also other online places for communication like fora and chat boxes. It is not generally known in what type of social media platform what type of communication is established.

1.3 Research objectives

The overall goal of this research is to compare the resulting effects of demographic developments and the sentiment of citizens in and about municipalities in a chosen demographic region of interest. This is done to analyse links between the sentiment of citizens and the (effects of) demographics in a region.

The following research questions are rising from above/given:

1. Which regions in the Netherlands are experiencing shrinkage, aging and household changes which can be seen as demographic influential developments (van Eck 2013)

Result of research question: Choice for a region of interest that will be used in the follow up research. Indicate a level of shrinkage for each municipality in the region of interest relative to the other municipalities.

2. In what ways and with what social media platforms are citizen perceptions online gathered or shared, and what are the differences in platforms and messages?

Result of research question: Inventory and analyses of social media. Gathered messages of social media.

3. How can messages of social media be linked with spatial and social effects of shrinkage regions?

Result of research question: The set-up of relations that are likely to link the messages to (effects in) shrinkage regions.

4. Can certain categories of sentiment of citizens, following the set-up of research question 3, be related with the level of shrinkage of the municipalities in the region of interest?

Result of research question: Relations between the level of shrinkage and the results of the tests that categorize citizen perceptions/sentiment.

1.4 Thesis outline

This introduction chapter is followed by a review chapter, in which the two research fields 'demographic developments' and 'online communication' are described. As a third chapter the methodology of this research follows. Then the execution of the first research question follows, which goes into the research field demographic developments. This can be found in chapter 4: Influential demographic developments in the Netherlands. The next chapter goes into the research field online communication. In chapter 5: analysing online communication the second research question is answered. To link the results of research question 1 and 2, and chapter 4 and 5, a chapter 6 follows answering research question 3 and 4 by linking online communication to shrinkage. The chapter discussion and the chapter conclusions follow and wrap up this research.

2. Review

Introduction chapter

In this chapter important topics of this research are further looked into. The goal of this chapter is to describe on what information this research continues, what methods are already being used and could be used in this research and what this research adds to the research fields. The main research fields where this thesis is aiming at are demographic developments and online communication.

2.1 Demographic developments

In the summary of the report 'Demographic developments 2010-2040' (Jong 2013) of the PBL multiple demographic developments are mentioned that may have influence on the spatial development of the Netherlands for and during the period of time 2010-2040. It is expected that for most areas of the Netherlands it is not clear if the population will grow or shrink. In a few other areas it can be expected that the population will shrink. But for all areas, also for which can be expected that the population will grow, the demographic characteristics of the area will change. The average age of the population will in most areas increase and the amount of young households and the average size of households will decrease in practically every municipality in the Netherlands. In areas that experience shrinkage it is likely that the aging effect will be more noticeable. This is because of the migration patterns which include the moving of students and the younger generation towards more heavily populated areas that often still have a growing population (Jong 2013).

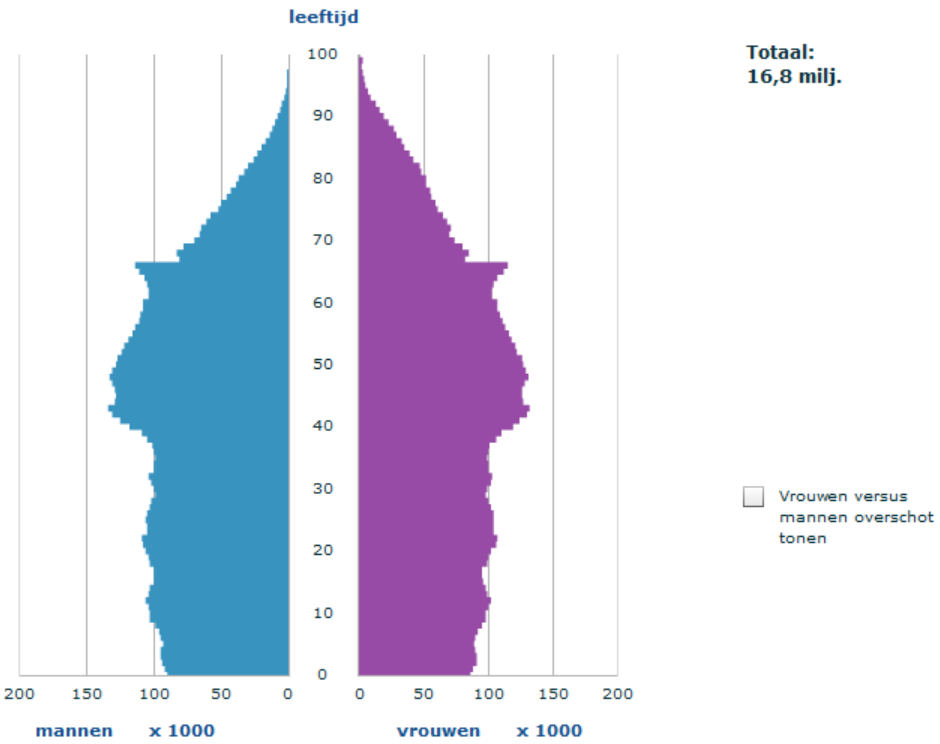

Figure 1: Age distribution Netherlands showing 'the bubble' between 40 and 70 years (CBS 2013)

2.1.1 What researches are done already?

The governmental organisation KDT (Kennisplatform Demografische Transitie) (Transitie 2014) has made an inventory of the researches executed to shrinkage (Transitie 2014). This is done because it is a topic where currently many different organizations are doing research to. The reviewed researches have been placed in five different subjects. The subjects are: 1. population decline as a phenomenon, 2. Quality of life, 3. Economic vitality, 4. Funding and managing real estate, 5. Policy and control issues (Transitie 2014). All subjects are divided in "knowledge questions". After exploring the 'knowledge questions' given in the five subjects it seems to generally follow a top-down approach. The challenging situations as an effect of shrinkage are described and the policies in order to guide these changes. There is one subchapter in the main subject 'quality of life' that is aiming on active citizens. However, in this subchapter it is emphasized how the government can stimulate and use active citizenship.

2.1.2 Spatial impact

The NIDI (Nederlands Interdisciplinair Demografisch Instituut) has executed a research to the shrinkage regions of the future (Verwest 2013). In this report the spatial effects in shrinkage regions are described. When besides the population shrinkage there is a decrease in amount of households, the housing market will change. It can lead to vacant houses, and with that lower prices for houses. Also an concentration of citizens with a low income can be expected. Because of the surplus in houses the middle class can afford to move out of the low income neighbourhood to a more rich neighbourhood. This leaves the citizens that are not able to do this together. Another effect of shrinkage regions is a possible excessive amount of space for public and economic facilities like restaurant and shops. This can lead to vacant buildings and a decay of the environment. In the report "Demographic developments 2010 – 2040" of (PBL) they add the spatial changes in social facilities and mobility. Social facilities will change because of the change of the population. Aging will lead to more social facilities for the elderly and less facilities aimed on the younger generations. For the subject mobility, shrinkage could influence the usage of cars. It is not possible to create an expectation of this change, because of the fluently changing amount of kilometres driven per person (Jong 2013, Verwest 2013).

2.1.3 Social impact

Shrinkage and aging in a region has effects on the social situation of an area. According to Matthijs Uyterlinde of Platform 31 social networks could disintegrate and lifestyles can be changing (Uyterlinde 2011). In rural areas the involvement of citizens in local changes and activities is often high. Because of necessary demolitions as an effect of shrinkage it is possible that citizens are forced to move to other neighbourhoods, where they probably will feel less connected to the area. This results in less participation in local changes and activities. Social structures and local communities could degrade as an effect of shrinkage. In the report "Krimp in beeld" of a Dutch Ministry (Ministerie van Volksgezondheid 2012) the municipality of Borger-Odoorn is analysed to social effects of shrinkage. An interesting finding in this research is that within the areas that have an on average older population there is a more extreme effect of degrading social contact.

2.2 Online communication

The internet is a relative new global system that has obviously integrated in the modern world. In the Netherlands in 2011-2012 7,9 million people are using Facebook. From these users 5 million of them are using it on a daily basis (Oosterveer 2013). Within Facebook, and other online social media, a lot of information is shared. Other social media platforms like Twitter and LinkedIn generate a lot of information about any topic people decide to talk about. For more specific perceptions and information exchange fora, websites and chat boxes are (also) used. As a generic term in this research 'social media' is used for all online platforms which people use to communicate. In this research social media are used as a source for gathering and establishing citizen perceptions/sentiment.

2.2.1 SMA (Social Media Analytics)

This research can be placed in the research field social media analytics (SMA). SMA is a new and growing research field that aims on the usage of methods to analyse social media data (Neuberger 2014). According to the article "Social Media Analytics and Intelligence (Li 2010) social media refers to " a conversational, distributed mode of content generations, dissemination, and communication among communities". An increasing number of sectors involve social media in academic research. In the article "Social Media Analytics" (Neuberger 2014) it is stated that "from a research perspective, social media can be understood as a kind of living lab, which enables academics to collect large amounts of data generated in a real-world environment". Companies see opportunities in analysing social media on behalf of advertising, personal reflection, social customer relationship management and business intelligence. Also political institutions are interested in social media. Social media platforms are used to monitor the public opinion, detecting popular topics and to influence/detect someone's reputation. There are also opportunities in intercultural studies. By analysing the messages in social media the sentiment of citizens in countries can be compared. It also changes public participation. Social media creates more possibilities to communicate, but also makes it more complicated. Within communication in social media the geographical component is of importance. The article "Social Media Analytics" (Neuberger 2014) states that "geo-data are another highly promising data source which can be effectively included in social media analytics procedure". Possibly, analysing social media data could define the sentiment of citizens in different demographical changing areas.

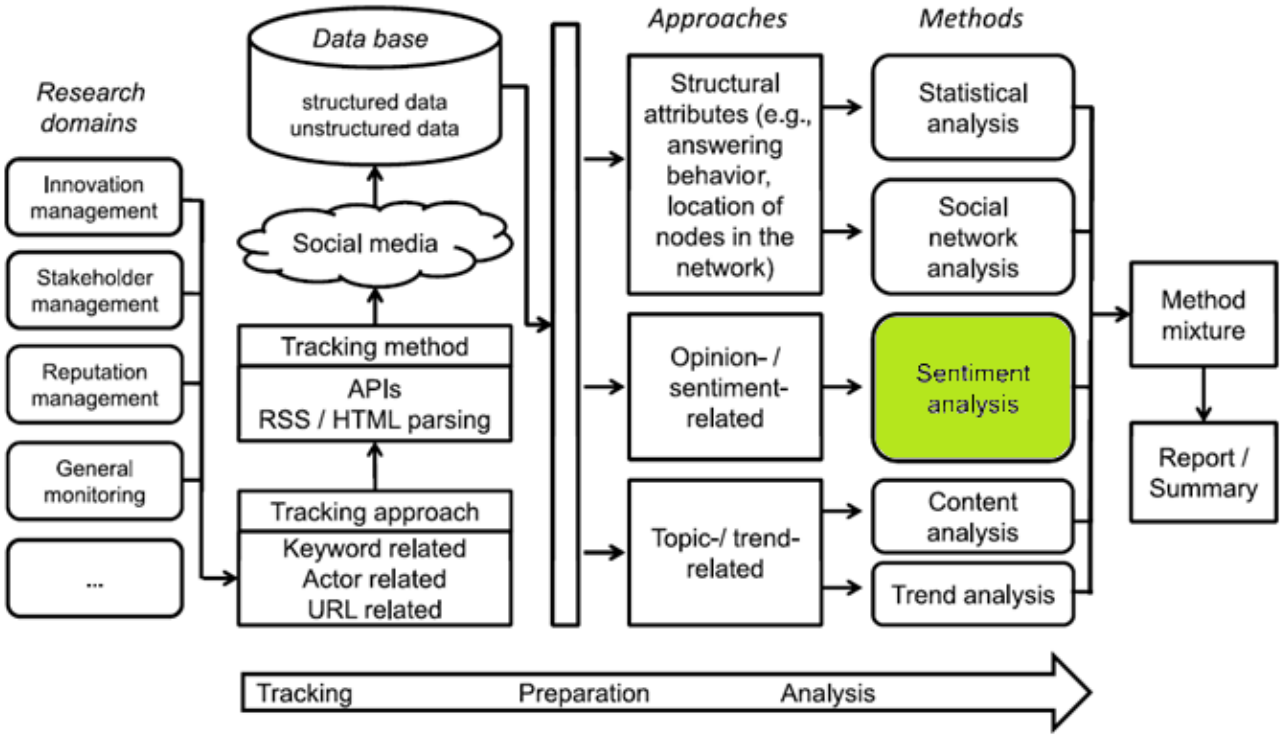

Figure 2: Social Media Analytics Framework. Copied from: Social Media Analytics (Neuberger 2014)

Data from social media can be involved in a wide variety of researches. One of the subjects it can aim on is sentiment analysis. Sentiment analysis of communication within social media means that the content of messages posted online are further looked into and linked to a certain sentiment. Based on these links the sentiment can be recognized or further analysed. When connecting the geographical location of the social media messages with the sentiment it is probably possible to establish assumptions towards the sentiment of people within a certain living area.

2.2.2 Bottom up participation

In the western democratic countries, including the Netherlands, ways of participation and the level of participation has increased since the 1950s and 1960s. Citizens on average are more willing and have more skill and knowledge to participate. Also the separation of political and non-political subjects is blurring. In general, participation in governmental activities and political choices is increasing in methods and ways for Dutch citizens (Deth 2009). In this research the social media LinkedIn is tested for getting advise on the process and content of this thesis. One of the chances social media offers is that continuous communication could be possible. There does not have to be a direct question to the citizens in order for them to respond. Citizens could raise topics that reflect on the matters that are important to the citizens. In the near future it can be expected that there are more possibilities for bottom up participation when social media are used.

2.2.3 Citizen science

This research is dependent on the participation of citizens in online communication media the Netherlands and follows the concept of citizen science *(Crowston 2011)*. The messages that citizens are posting in online communication media are gathered and used to create a link between the sentiment of citizens and the demographics of a neighbourhood or municipality. In order to create this relation, it is necessary to have messages that are posted by citizens in social media. Another way of involvement of citizens in this research is by posting questions in social media groups. The social media LinkedIn is used to get response on set up categories. Citizens of the Netherlands that are interested in the posted subjects can respond. The responds of these citizens is used in order to review the set up research.

> *Quote: Citizen science is a form of research collaboration involving members of the public in scientific research projects to address real-world problems (Crowston 2011).*

3. Methodology

Introduction chapter

This chapter shows the overall methodology and tested hypotheses of this research. In the next subchapters the hypotheses and the methods to answer the research questions are described. Together it describes the overall process of this thesis testing the hypotheses. The methods to answer the research questions are all connected in a methodology flowchart, Figure 4. The conceptual methodology, showing the overall process, is given underneath in Figure 3.

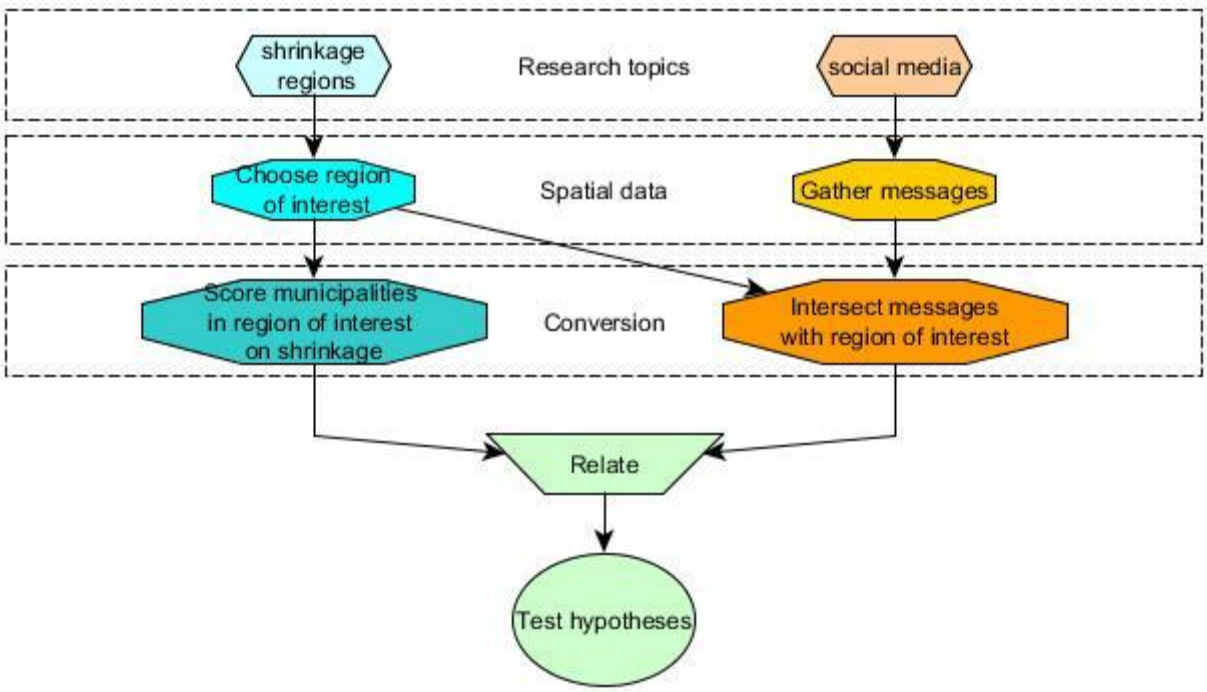

Figure 3 Conceptual methodology

Answering the research questions

In order to answer the first research question a research is executed to demographic trends of shrinkage regions in the Netherlands. A region of interest including multiple municipalities is chosen. For each municipality in this region of interest a shrinkage score is calculated that is relative to the other municipalities in the region of interest. The shrinkage score indicates a level of shrinkage.

For the second research question an analysis of social media is executed. These social media are found by executing an online search. This is followed by analysing these media and describing them based on characteristics of social media. Also, freely accessible messages are gathered from social media.

The third research question aims on setting up possible relations that relate the shrinkage score of the municipalities in the chosen region of interest with the content of the messages gathered from social media. These tests have the potential to grasp the sentiment of the citizens out of the messages.

The execution of the last research question consists out of the execution of the relations set up in research question three. The gathered messages of social media are analysed in such a way that they represent a sentiment out of the municipality. These sentiments found are linked with the shrinkage score of the municipalities in order to find links between shrinkage and the sentiment of citizens of a municipality.

Overall methodology in a flowchart

The overall methodology visualizes the steps taken in the research in order to come to the conclusions that can be drawn at the end. Boxes with a yellow colour visualize raw data or the establishment of orientation on topics of this research. Orange boxes represent a method or conversion of data used. The boxes with a green colour show results. Boxes with combined colours could fit in both meanings of the colour and are thus given a double colour.

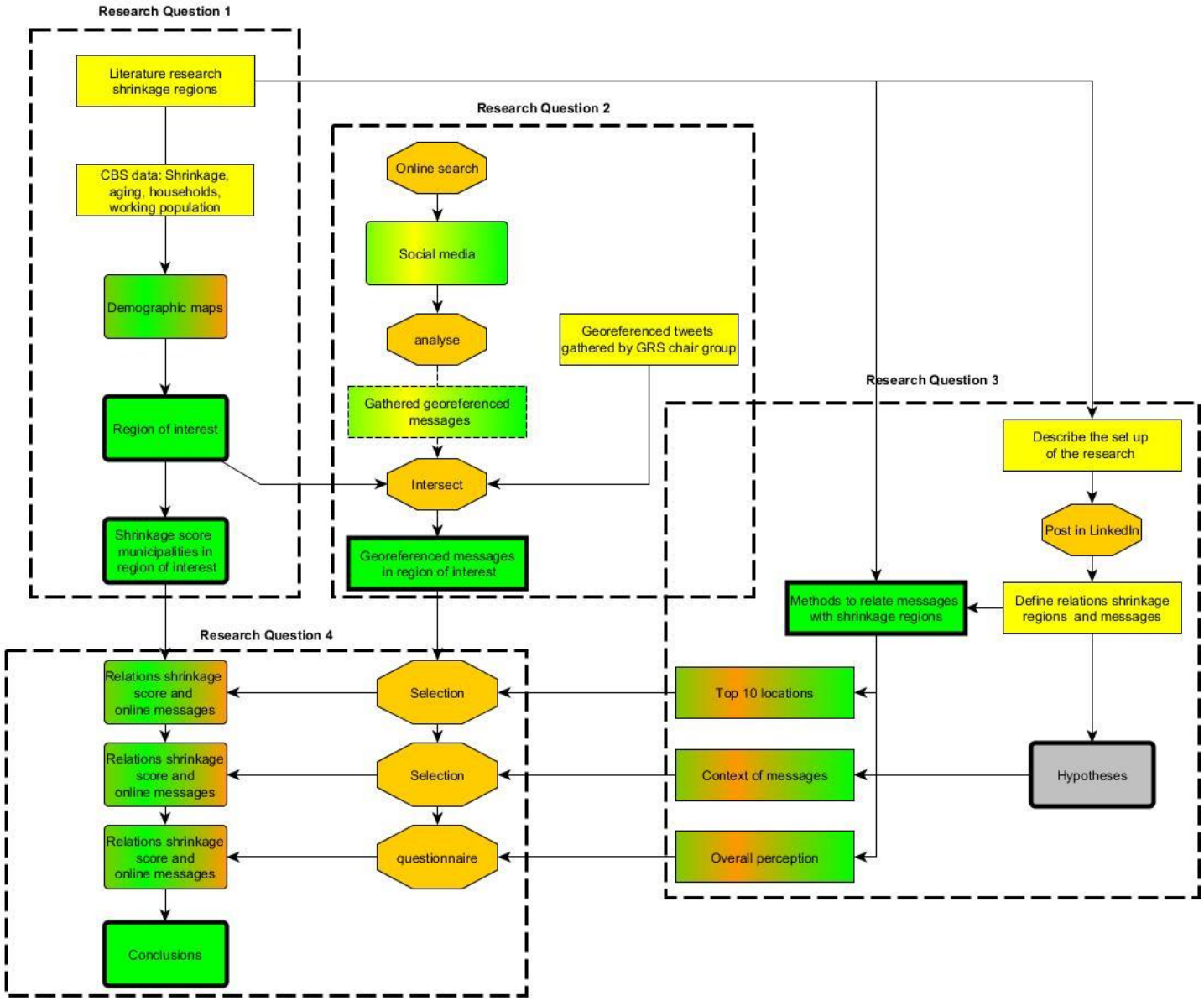

Figure 4: Overall methodology and workflow

3.1 Hypotheses

The hypotheses that are tested attempt to grasp the sentiment of the population of different municipalities with a different shrinkage level. Nine hypotheses are set up and divided under three different topics. The first three hypothesis aim on the type of locations the people seem to care about, and if these locations can be related to the shrinkage level of the municipalities in the region of interest. The next three hypothesis test the context of messages about certain topics that are related to spatial effects in shrinkage municipalities. Then the context of these spatial effects are related to the shrinkage level of the municipalities, indicating what the messages are saying about the spatial effects. The last three hypothesis aim on the overall perception of the citizens living in the different municipalities.

The hypotheses are based on literature research, the working experience of the author of this thesis and contributions of interested people in discussions posted online within topic related groups in the social media LinkedIn, appendix 3. In this thesis the following hypothesis are tested:

Hypotheses
Locations people seem to care about
1. In non-shrinkage municipalities people tend to talk about locations of a larger scale.
2. Because social facilities are changing as a spatial effect in shrinkage regions, relatively more tweets are about social facilities in shrinkage regions.
3. In shrinkage regions there is less diversity in the type of locations they talk about.
Context of messages about spatial effects in shrinkage regions
1. Typical spatial effects of shrinkage are more tweeted about in shrinkage municipalities.
2. Tweets about social facilities in shrinkage municipalities have a more negative context.
3. More tweets in shrinkage regions are about vacant buildings and forced moving's, and the context indicates that the word forced fits in these spatial effects of shrinkage.
Overall perceptions of citizens
1. People in shrinkage municipalities are more negative than people in non-shrinkage municipalities.
2. People in shrinkage municipalities tweet more about the past than in non-shrinkage municipalities.
3. People in shrinkage municipalities tend to talk about other people or subjects and not that much about themselves compared to non-shrinkage municipalities.

Table 1: Hypotheses

3.2 Region of interest & shrinkage score

In this subchapter it is explained how in this research a region of interest is chosen and a shrinkage score is calculated.

Characteristic demographic developments

The first step in coming to a region of interest and a shrinkage score is understanding shrinkage regions. This is done by reading reports on shrinkage. The most characteristic demographic developments are taken out. These are: household change, population shrinkage, decreasing working population and aging (Jong 2013). For these four demographic developments data is searched in the Central Bureau of Statistics of the Netherlands (Statline 2014). This data is used to visualize the data on the CBS municipality map (CBS 2014).

Shrinkage score municipalities Netherlands

To calculate a shrinkage score for the municipalities of the Netherlands in 2012, these are scored based on the four characteristic demographic developments of shrinkage regions. The twenty most characteristic municipalities get a score of -1 for each demographic value and the twenty least characteristic to shrinkage regions +1. Eleven demographic values are chosen: Relative household difference 2005-2012, difference in population 1995-2005, difference in population 2005-2012, expected difference in population 2012-2025, expected difference in population 2012-2040, working population in 2012, expected working population in 2025, expected working population in 2040, percentage population older than 65 in 2012, percentage population older than 65 in 2025, expected percentage population older than 65 in 2040.

Choice for region of interest

The shrinkage scores of all municipalities are plotted on the CBS municipality map (CBS 2014). An area in the Netherlands including multiple municipalities is chosen where extreme shrinkage scores, positive as well as negative, are located. This area is called the region of interest and will be used in the follow up of this research. The region of interest exists out of ten municipalities.

Shrinkage score region of interest

For the ten municipalities in the region of interest a new shrinkage score is calculated. The municipalities are scored based on the four characteristic demographic developments of shrinkage regions. For each demographic value the municipality with the most characteristic value gets 3 subtracted of the score, the second most 2 and the third most 1. The least characteristic municipality gets 3 added to the score, the second least 2 and the third least 1. Five demographic values are chosen: Relative household difference 2005-2012, difference in population 1995-2005, difference in population 2005-2012, percentage population older than 65 in 2012, working population in 2012

3.3 Social media & online communication

In this subchapter it is explained how social media platforms are analysed and what online communicated messages are gathered.

Characteristics social media platforms

In order to compare social media platforms to each other common characteristics of platforms are listed. These are based on the exploration of social media platforms and literature. The common characteristics where social media platforms are tested on aim on the characteristics of the messages: Date of messages, location of messages, privacy of messages (Sirkunnen 2008). And the interpretation of the communication: subjects of messages, proactive or reactive, community forming (Sirkunnen 2008).

Find social media platforms

By exploring the internet social media platforms are chosen to compare to each other. Dutch keywords indicating social media platforms and citizen participation are used in Google searches to find and list platforms. Also generally known social media platforms are added to the list. The following social media platforms are described based on the common characteristics of social media platforms: National social media: Buurbook, verbeterjebuurt, voordebuurt, eparticipatiemonitor. Local social media: De Amstel Verandert, timor plein community. Global social media: Facebook, twitter.

Describe the platforms

In coming to a description of types of social media platforms groups of the found platforms are described based on the common characteristics of social media platforms. National, local and global social media are tested on the characteristics of the messages and the interpretation of the communication.

Common characteristics		National social media	Local social media	Global social media
Characteristics of the data	Date	5.1.1	5.1.2	5.1.3
	Location	5.1.1	5.1.2	5.1.3
	Privacy	5.1.1	5.1.2	5.1.3
Interpretation of the communication	Subjects	5.1.1	5.1.2	5.1.3
	Proactive/reactive	5.1.1	5.1.2	5.1.3
	Community form	5.1.1	5.1.2	5.1.3

Table 2: Table to score social media platforms in

Gathered online communicates messages

At the chairgroup GRS a database containing a large amount of tweets is available and freely accessible. The database used in this research contains 8.039.695 georeferenced tweets. The tweets have been gathered in the time period 05-11-2013 until 12-03-2014. The location of origin of each tweet is used to intersect them with the municipal borders of the municipalities in the region of interest. This is done in the Rstudio environment using the function gIntersects of the package rgeos (Rundel 2012) . This results in ten databases of georeferenced tweets. These databases are used in the follow up of this research.

3.4 Linking online communication to shrinkage

In order to define relations between the shrinkage score of the municipalities in the region of interest and the content of the tweets three possible relations are set up. These relations are answering the nine hypotheses set up in this research. The three tests executed aim on the following subjects: the locations tweeted about, the context of tweets about spatial effects in shrinkage regions, the overall sentiment of citizens.

Linking tweets to shrinkage score

Top 10 locations

As a first test the most often used words within the tweets in a municipality of the region of interest are found and listed by using the function findFreqTerms of the package text mining (tm) in the Rstudio environment (inside-R 2012). The ten words that define a spatial location with the most encounters are taken out. These ten locations are selected by manually going through the most often used words. The words that do not define a spatial location are manually filtered out by deleting the words. The found spatial locations are, if possible, categorized in types of locations. These category types are set up by exploring the overall locations found. Links are attempted to be made between category types of the top ten spatial locations per municipality and the shrinkage scores of the municipalities. In this way certain types of locations can be linked to the shrinkage level of the municipalities in the region of interest.

Context of messages

The second test is executed by searching messages that contain predefined words that are chosen by inspecting the spatial effects of shrinkage regions. Six spatial effects in shrinkage regions found in literature are: forced moving, more vacant buildings, degradation, change of social facilities, change of economic facilities, less public transport (Jong 2013, Verwest 2013). Words are chosen for each spatial effect. By using the function grepl of the package base in the RStudio environment, the messages in each municipality in the region of interest are scanned for that predefined list of words. The messages found containing the searched for words will be compared to the total amount of messages in the municipality to relatively show how much is communicated about these words. Based on the results of this test the words that are used often in multiple municipalities are further inspected. The tweets containing the searched for words are ran through the function findAssocs in R of the package text mining (tm) in the RStudio environment (inside-R 2012), in order to find the most associated words with the searched for words.

Overall sentiment

In order to define the sentiment of a message, a questionnaire is made to place messages in predefined sentiment categories. These categories are tone of the tweet, aimed on what time and subject of the tweet. For each municipality there are randomly five messages chosen out of the dataset. In this way fifty messages are gathered in the region of interest. For each questionnaire different messages are randomly chosen by using the function sample of the package base in the RStudio environment (inside-R 2012). Then these fifty messages are listed besides the categories. The people filling in the questionnaires categorize the messages. The result out of these filled in questionnaires are linked to the shrinkage score of the municipalities and possibly show connections between the shrinkage score and the categories of the questionnaire.

4. Influential demographic developments in the Netherlands

Introduction chapter

In this research shrinkage regions have the main focus. Demographic developments that are characteristic for a shrinkage region does not only include the **shrinkage of the population**. Also other demographic developments are characteristic in a shrinkage region. According to the report Demografische ontwikkellingen 2010-2040 of the PBL (Jong 2013) there often is a **low and decreasing working population**, **high and increasing elderly generation** and, less often, **a decreasing amount of households** in shrinkage regions. The municipalities that are experiencing these demographic developments are located in the Netherlands by creating maps out of demographic data from Statline (Statline 2013) on the municipality map of 2012 of the CBS (CBS 2014). Beside the maps it is described what can be indicated out of the map. The data that is used to create these maps is used to score the municipalities. The municipalities score high if the demographic development is not characteristic for a shrinkage region and low if it is characteristic. The following demographic values are scored: Relative household difference 2005-2012, difference in population 1995-2005, difference in population 2005-2012, expected difference in population 2012-2025, expected difference in population 2012-2040, working population in 2012, expected working population in 2025, expected working population in 2040, percentage population older than 65 in 2012, percentage population older than 65 in 2025, expected percentage population older than 65 in 2040. Based on these scores a new map is created which is used to choose a region of interest that consists of municipalities with high scores as well as low scores. All maps in this chapter have a continuous colour scale between two colours that represent the maximum and minimum value present.

4.1 Change of households

In Figure 5 the relative difference in the amount of households is given for each municipality in the Netherlands. Purple indicates a growth while yellow indicates a decrease of households. The north east and south east show a yellow color indicating a decrease of households in these parts of the Netherlands.

In the image there are extremes visible. Fully yellow filled municipalities indicate a decrease of approximately 2% while fully filled purple municipalities show an approximately 4% increase of households. After further inspection it shows that in general the purple extremes are representing the more heavily populated municipalities. The yellow municipalities represent on the other hand population wise less concentrated municipalities.

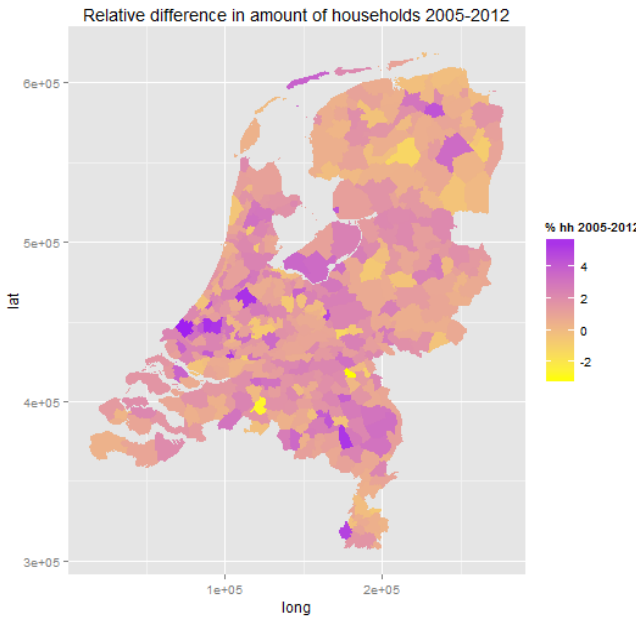

Figure 5: Relative difference households

In the Netherlands the amount of households is increasing. On the other hand the type of households is changing. The size of the average household is decreasing to less persons. This has effects on the social state of the Netherlands and the necessary housing of households in the Netherlands (Groningen 2013).

4.2 Shrinkage

Shrinkage regions

Figure 6 shows municipalities that are shrinkage. In the period of time 2005-2012 there are obviously more municipalities that are shrinking than in the time period 1995-2005. Another point standing out is that some areas of the Netherlands are shrinking in both images. In the north east and in the south east it shows in both images that there are shrinking municipalities.

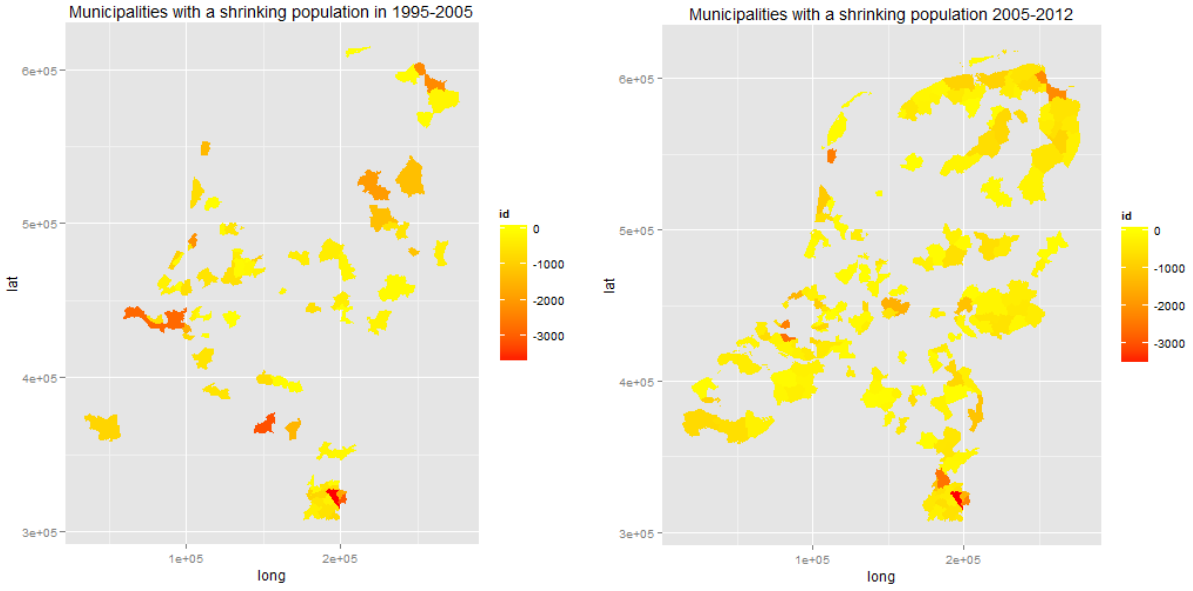

Figure 6: Municipalities shrinking population 1995-2005 / 2005-2012

In Figure 7 the shrinking municipalities after calculating the expected difference in population between 2012-2025 and 2012-2040 are visualized. In 2012-2025 a large amount of the municipalities are shown on the map and are thus shrinking. The map of 2012-2040 is similar in municipalities but consists of more extreme values. Also in these maps the north east, south east and south west are standing out.

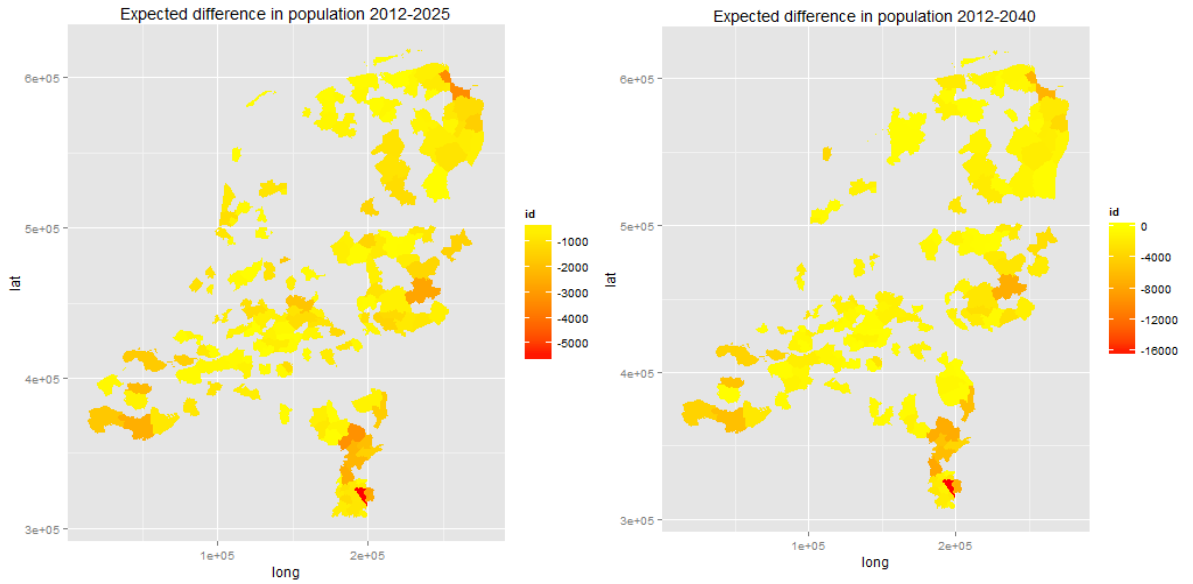

Figure 7: Municipalities shrinking population 2012-2025 / 2012-2040

4.3 Working population

In the Figure 8a, 8b and 8c the percentage of the population that is in the age category of 20-65 is shown for 2012, 2025 and 2040. The maps have the matching characteristics that there are a few municipalities scattered over the Netherlands that show a higher value. After further inspection it shows that these are the most heavily populated municipalities in the region. In the north east and south east of the Netherlands in all three maps there is one light green municipality representing a high value. In the north east this is the municipality of Groningen. In the south east this is Maastricht.

The trend that the three maps are showing is that the working population is decreasing. Red areas show a lower value of the working population and overall the maps are becoming more red. Also the legend is automatically adjusted to lower values which means that there are lower values in the datasets.

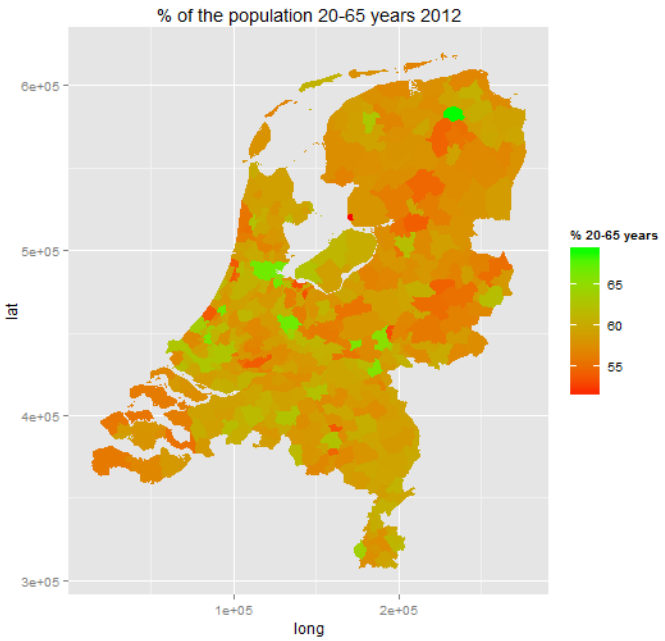

Figure 8a: Percentage population 20-65 in 2012

In all three maps the north east region, east, south east and south west regions are showing most reddish municipalities. Indicating that the working population will be the lowest here. In the centre of the Netherlands and in the middle west a more greenish concentration exists.

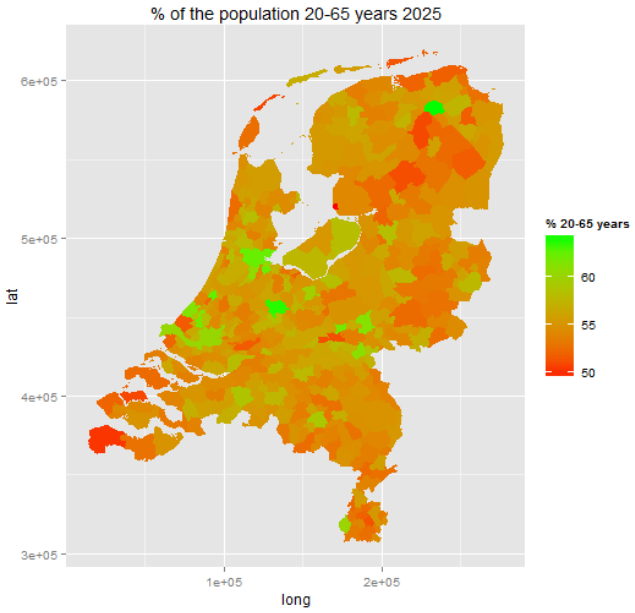

Figure 8b: Percentage population 20-65 in 2025

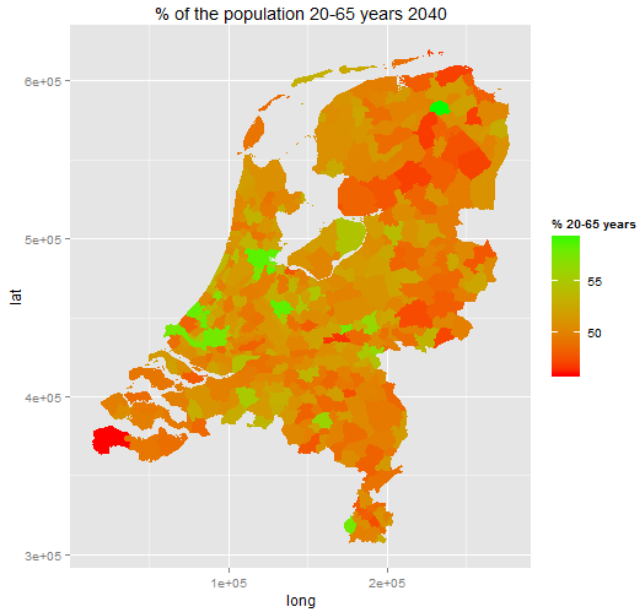

Figure 8c: Percentage population 20-65 in 2040

4.4 Aging of population

In Figure 9a: Percentage population 65+ 2012, 9b and 9c the percentage of the population that is in the age category of 65+ is shown for 2012, 2025 and 2040. The blue municipalities are showing a high value and the grey a low value. In all three maps the south west, south east and north east show more blue color and thus high values.

Overall the maps show that the percentage of the population that is 65 years or older is increasing. A more distinguished blue colour and up scaling legend are indicating this. The South and the west of the centre of the Netherlands most municipalities consist of a grey colour and thus a low value. This is similar in all maps of figure 5.

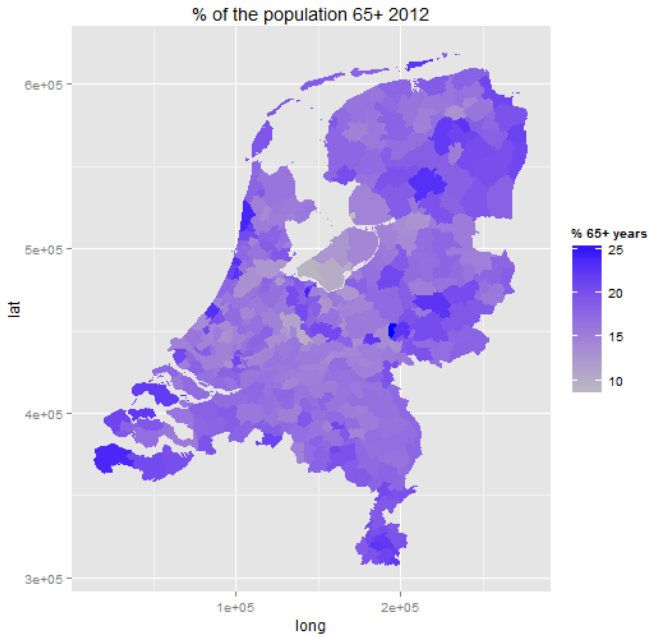

Figure 9a: Percentage population 65+ 2012

In all three maps the north east region, east, south east and south west regions are showing the most blue municipalities. This indicates that the age category 65+ will be the highest here. From the centre of the Netherlands to the south and west a more municipalities are coloured grey.

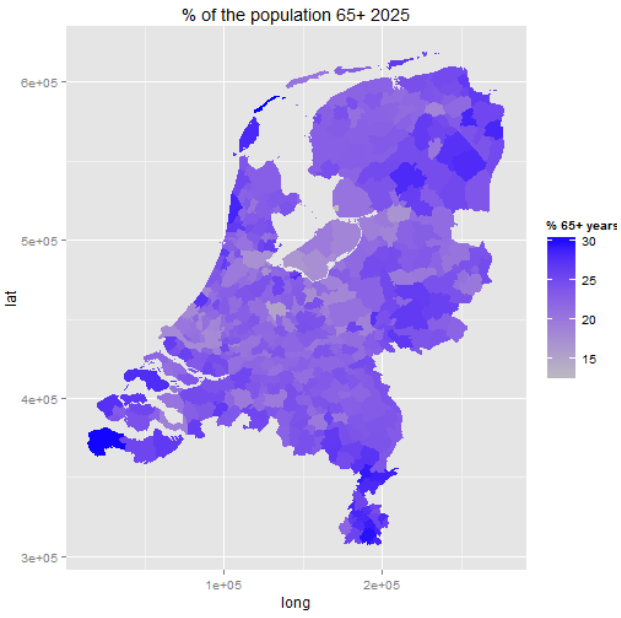

Figure 9b: Percentage population 65+ 2025

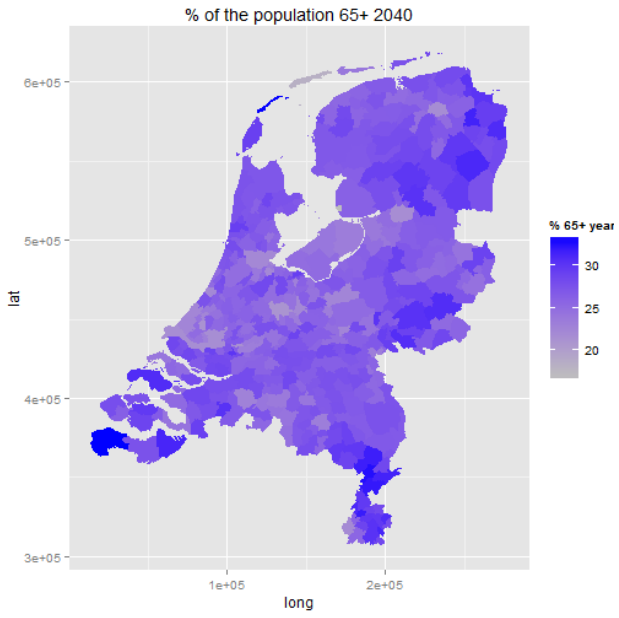

Figure 9c: Percentage population 65+ 2040

4.5 Region of interest

4.5.1 Choice for region of interest

The region of interest that will be used as a case study, is chosen based on the extreme values in the demographic developments shown in this chapter. The four demographic developments inventoried in this chapter are used to score the municipalities on shrinkage. The twenty municipalities that rate the highest value of a demographic value get a score of +1 and the twenty indicating the lowest values a score of -1. After scoring the municipalities a map is made visualizing the high and low scores. Eleven demographic values have been scored: Relative household difference 2005-2012, difference in population 1995-2005, difference in population 2005-2012, expected difference in population 2012-2025, expected difference in population 2012-2040, working population in 2012, expected working population in 2025, expected working population in 2040, percentage population older than 65 in 2012, percentage population older than 65 in 2025, expected percentage population older than 65 in 2040.

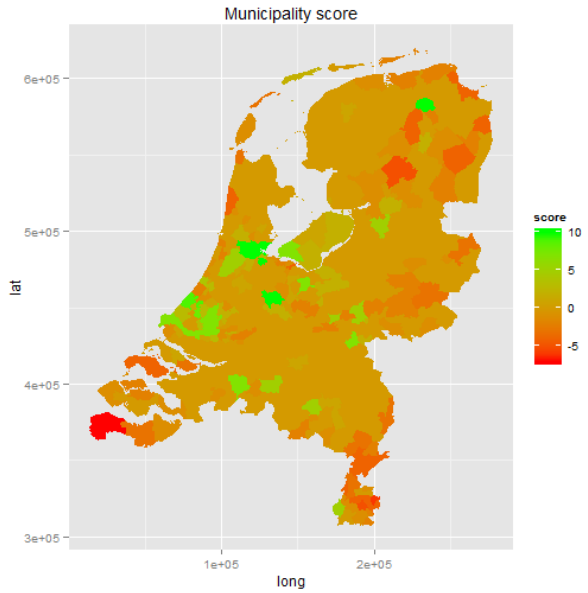

Figure 10: Municipality shrinkage score

When exploring the scores of the municipalities in Figure 12, two regions fit in the characteristics of the region of interest aimed for in this research. The region of interest aimed for, is a region with municipalities that have characteristic demographic developments of shrinkage regions together with municipalities that are the opposite and are uncharacteristic. There are two areas matching the aimed for regions. The first area is in the south east of the Netherlands where municipalities with multiple colours are close to each other. The second area is in the north east. Because the writer of this thesis is born and has lived the biggest part of his life within region 1 it is chosen to take region 2. This prevents the possibility of being biased.

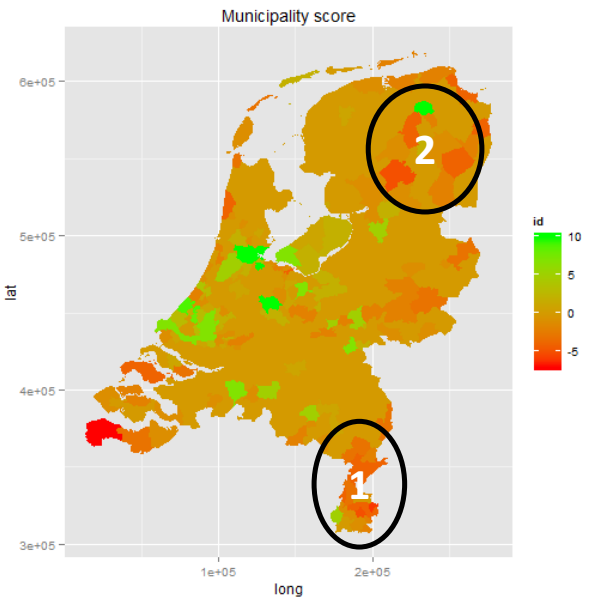

Figure 12: Choice for region of interest

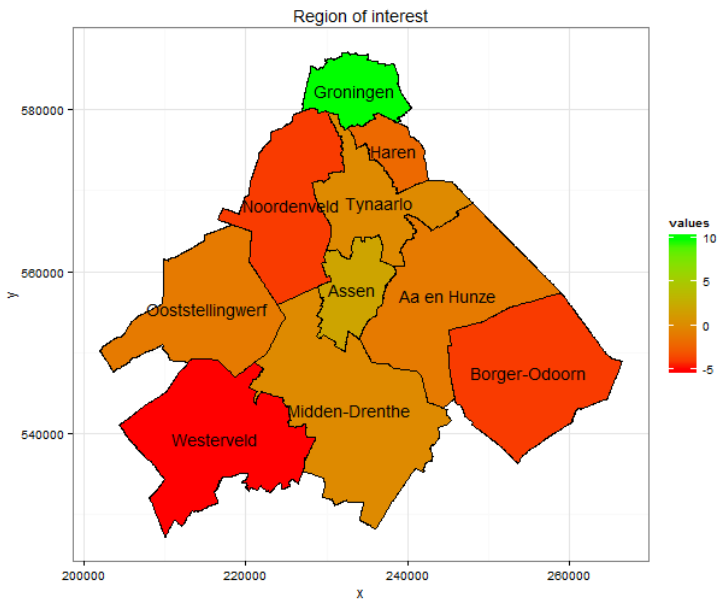

Figure 11: Region of interest

4.5.2 Demographics of region of interest

In the chosen demographic region of interest looking at the relative household difference between 2005 and 2012, there are three municipalities that stand out. One of them is Ooststellingswerf, which is the yellow colored municipality in Figure 13 with a score of -1.22%. This is the only municipality in the region of interest that has experienced a decrease of households in the time period 2005 to 2012. The other two municipalities that stand out are Groningen, with a score of 4.41% and Aa en Hunze with a score of 3.48%. These two municipalities have a high increase of households compared to the other municipalities. The municipalities that do not stand out have similar scores between an increase of households of 0.5% to 1.4%.

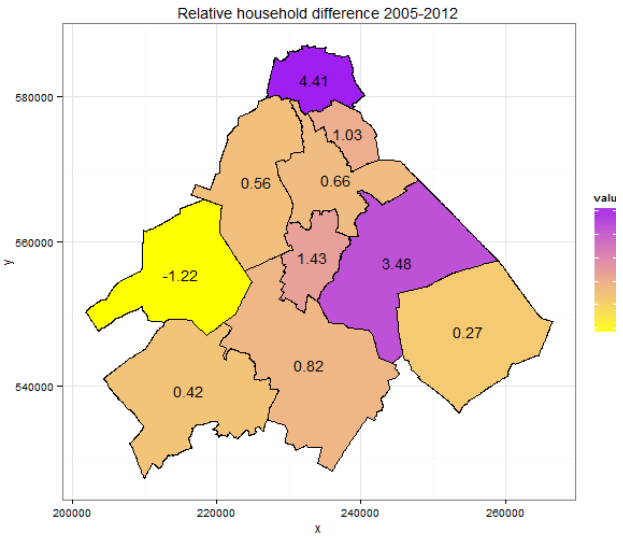

Figure 13: Household difference 2005-2012

Looking at the difference in population between 1995-2005 and 2005-2012 it stands out that the top municipality Groningen has had a large increase of citizens in both time periods. Besides Groningen also the municipality Assen, located most central within the region of interest, has an high increase of citizens in both images. In the period of 1995-2005 the population has increased with 9910 citizens and in 2005-2012 there was an increase of 4450. This shows there has been a smaller growth in this time period. This trend is visible in most other municipalities as well.

Even though the time period 1995-2005 is a larger time period then 2005-2012, it can be concluded that in most municipalities the growth of population has been reduced or has changed to shrinkage. In the time period 2005-2012 four municipalities have had a shrinking amount of population while in the period 1995-2005 there is no municipality with a shrinking population. Only Groningen has had an higher increase of citizens in the period 2005-2012 compared to the increase of citizens the municipality had in the time period 1995-2005. The nine other municipalities had a smaller increasing or shrinking population.

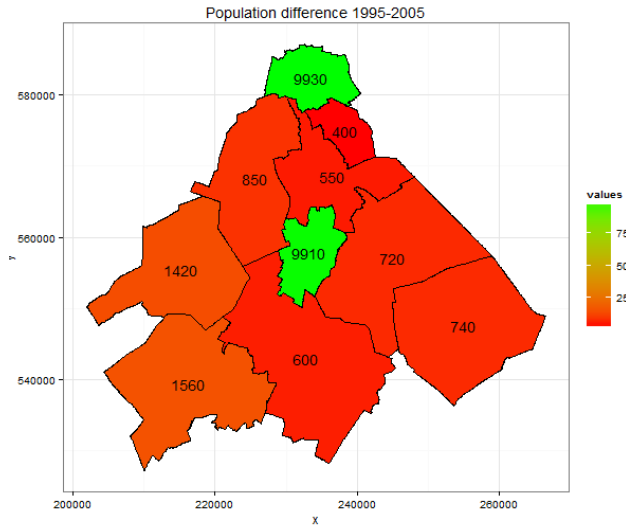

Figure 14a: Population difference 1995-2005

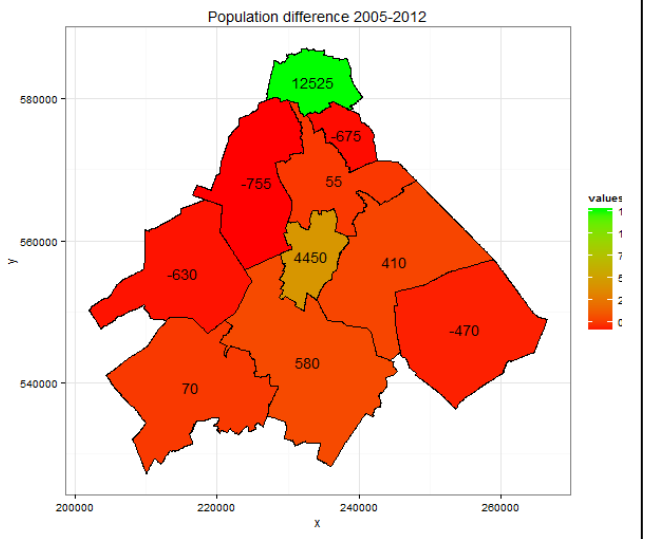

Figure 14b: Population difference 2005-2012

In the region of interest, looking at the relative amount of citizens that is in the age category 20 to 65 years, it stands out that the municipality of Groningen has the highest percentage. Almost 70% of the population is in the age between 20 and 65 in the municipality of Groningen. The other municipalities all score lower than 60%. The lowest scores are in the two red coloured municipalities Noordenveld (54,51%) and Westerveld (54,71%). All other municipalities have a similar score between 55 and 60%.

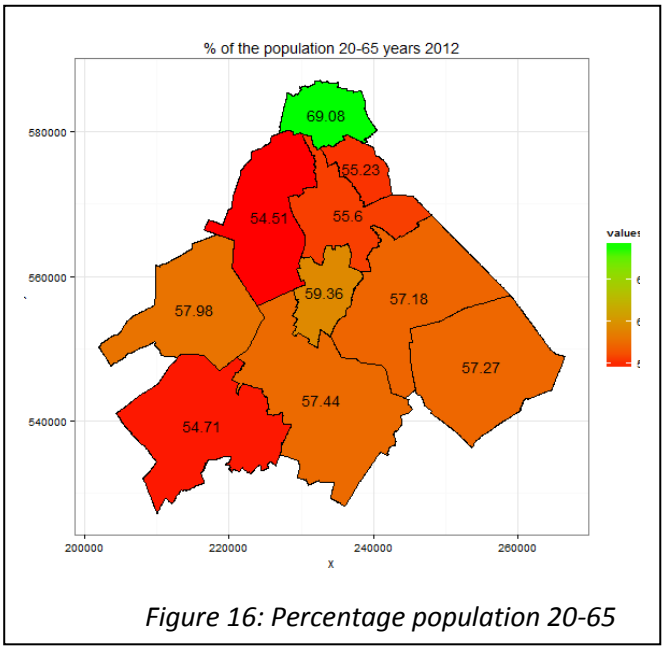

Figure 16: Percentage population 20-65

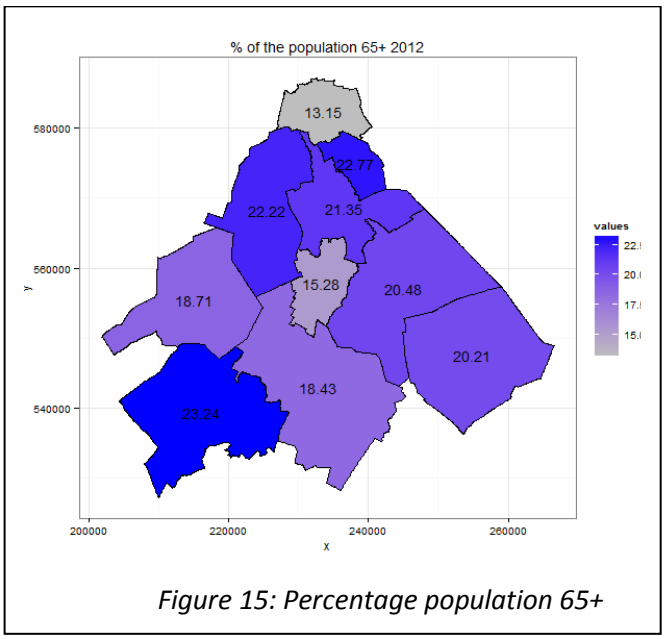

Figure 15: Percentage population 65+

In the municipalities of the region of interest, for the percentage of the population above 65 years, it stands out that the top and center municipality turn grey and show the lowest percentages of the population in the age 65 years and older. These are Groningen and Assen. The most south west municipality turns totally blue which indicates a, in comparison to the other municipalities, high percentage of the population that is in the age 65 and older. The three municipalities that share a border with Groningen have a relative high score 21%-23%. The other municipalities have a percentage of 18.43% to 20.48%.

4.5.3 Shrinkage score region of interest

In order to show which municipalities share characteristic demographics to shrinkage regions and which municipalities do not, the municipalities are scored relative to the other municipalities. The ten municipalities in the region of interest are scored for each demographic value. The three most characteristic values get a point reduction. The most characteristic municipality gets a reduction of -3, the second most -2 and the third most -1. It is the same the other way around for the least characteristic values. The points are added and in the last column of the table it is shown which municipalities have the most characteristic demographic developments in relation to shrinkage regions. In this column it is shown that the municipality of Groningen obviously is least related to shrinkage regions. The municipality of Haren the most.

1
2
3
-1
-2
-3

Municipality	Hh. Diff. 2005-2012	Diff. Pop. 1995-2005	Diff. Pop. 2005-2012	% 65+ 2012	% 20-65 years 2012	Shr. Score
Aa en Hunze	3,48%	720	410	20,48%	57,18%	2
Assen	1,43%	9910	4450	15,28%	59,36%	9
Borger-Odoorn	0,27%	740	-470	20,21%	57,27%	-2
Groningen	4,41%	9930	12525	13,15%	69,08%	15
Haren	1,03%	400	-675	22,77%	55,23%	-8
Midden-Drenthe	0,82%	600	580	18,43%	57,44%	1
Noordenveld	0,56%	850	-755	22,22%	54,51%	-7
Ooststellingwerf	-1,22%	1420	-630	18,71%	57,98%	-3
Tynaarlo	0,66%	550	55	21,35%	55,60%	-2
Westerveld	0,42%	1560	70	23,24%	54,71%	-5

Table 3: Establishing shrinkage score region of interest

5. Analyzing online communication

Introduction chapter

In this chapter online communication is analyzed. Online communication in this research means communication through social media. The first part of this chapter aims on comparing types of social media platforms are compared. Three types are set up, National social media, local social media and global social media. The comparison is made by describing the types of platforms on common characteristics of any platform. These common characteristics of social media platforms are found by a literature research and by exploring existing social media platforms. This comparison might indicate what type of communication is established in what type of social media platform. The second part of this chapter emphasizes the messages in the platforms. The data that is used in this research is described and explored. Because of the availability of a large amount of tweets in the chair group GRS, these are used as online communicated messages.

5.1 Social media platforms

In this research online communication between citizens is a key subject. Since the Dutch politics are aiming on a participating society in order to manage changing situations (Dale 2013), existing citizen initiatives are interesting. On the other hand there is a lot of information publicly shared on the internet. Presumably it is possible to indicate hot topics and/or the perceptions of citizens on subjects by scanning these online communicated messages. In the Netherlands citizen communication through social media is seen as a method that can improve citizen participation and communication (Donders 2011). There have been initiatives to emphasize and create online platforms that enable citizen communication. Companies are offering the service to create an online accessible platform that can be used for online participation projects: Mett, Malengo, UnitedKnowledge (Knowledge 2014, Mett 2014). There has been a congress in the Netherlands aimed on (online) citizen participation called 'I Love Burgers 2012' (Burgers 2011). And there has been an eParticipation award for the best online platform for citizen participation in 2009 and 2010 (www.rijksoverheid.nl 2009, Berg 2010).

Together there are many different online platforms that manage online communication. Some are national and some are local. Also the global social media platforms like Facebook and Twitter provide a platform for citizen initiatives and communication. In appendix 2 an inventory is given of platforms for citizen participation and communication. The social media platforms in this appendix are used to score types of platforms. The choice for these social media is based on the exploring of google searches. Besides the google searches it is generally known that Twitter and Facebook are intensively used social media platforms. Additionally the choices for social media are influenced by the eParticipation award in the Netherlands.

The characteristics and the messages of and within social media platforms are further looked into. After inspecting the setup, description and communication in social media platforms, certain differences and similarities stand out. Based on these found differences and similarities in characteristics of social media platforms, categories are set up which are used to compare the social media platforms to each other. There has not been much research to social media platforms. The categories are mostly chosen based on noticeable aspects of social media platforms when inspecting them. These categories are described in a few short words in tables with the same lay out as Table 4 to give an overview.

Common characteristics		National social media	Local social media	Global social media
Characteristics of the data	Date	5.1.1	5.1.2	5.1.3
	Location	5.1.1	5.1.2	5.1.3
	Privacy	5.1.1	5.1.2	5.1.3
Interpretation of the communication	Subjects	5.1.1	5.1.2	5.1.3
	Proactive/reactive	5.1.1	5.1.2	5.1.3
	Community form	5.1.1	5.1.2	5.1.3

Table 4: Table to describe social media platforms

Characteristics of the data

Date of messages: One of the characteristics that stands out is the date of publication of the system, linked to the date of communication. If a system is meant for continuous communication over a longer period of time it can be an interesting factor when communication is established and for how long it has continued.

Location of messages: Another characteristic is the location of the participants and/or the location where the messages are aimed on. A social media platform meant for the whole of the Netherlands might only have reactions in certain type of areas.

Privacy of messages: Different social media platforms have different approaches in privacy of posted messages (Sirkunnen 2008).

Interpretation of the communication

Subjects of messages: For interpreting the communication in a social media platform it is important to know (if any) what type of subjects the platform aims on.

Proactive or reactive: Social media can have a proactive and a reactive approach. In a full reactive approach a facilitating party is generating topics where members of the platform react on. In a proactive approach the members raise topics on their own behalf.

Community forming: A possible characteristic of social media platforms is the possibility of forming communities within the platform (Sirkunnen 2008).

5.1.1 National social media

In order to describe Dutch national social media four different social media platforms have been explored. These are described in appendix 2: Buurbook, verbeterjebuurt, voordebuurt and de eparticipatiemonitor. These are chosen based on the results of searching to social media platforms with search terms in google. After a exploration it stands out that all selected national social media are most active in the west of the Netherlands. Especially in the large and dens populated cities like Amsterdam and Rotterdam. All four national platforms seem to have no private communication possibilities. Three of the four media inspected seem active, and contain recent posts that originate in 2014. This indicates that they are currently continuously used.

Two of the four media are in direct connection with municipalities. This creates a direct link between citizen and municipality. When there are governmental organisations active in the social media the online communication often has as a subject an activity that is executed by the municipality. The content of these social media aims at changes that are wanted to be made by the municipality. The municipality could suggest an event or project where the citizens react to, creating reactive communication. Besides this reactive form of communication the proactive messages often aim on local initiatives or local degradation. Local initiatives in the form of for example a neighbourhood drink or collective ecological undertaking. The messages about local degrading are for instance littering, call for maintenance or broken street lights. When the municipality is not involved it seems that with citizen initiatives the call for funding or participating organisations is higher. In forming communities only small communities are formed around a certain topic. A citizen initiative possibly has more people enthusiastic and communicating about it, however there are no broader communities.

Common characteristics		National social media
Characteristics of the data	Date	Partially active
	Location	Dense populated areas
	Privacy	All public
Interpretation of the communication	Subjects	Municipal activities and citizen initiatives
	Proactive/reactive	Proactive and reactive
	Community form	Small communities

Table 5: National social media platforms described on categories

5.1.2 Local social media

When exploring local social media it stands out that it is hard to find active local media. Often these are used only for a certain period of time with one goal and about one location. This location can be a building but also a part of a municipality, like a neighbourhood. The messages in local social media seem to be publicly accessible. The subject often aim on the (re)use of a building or spatial location, or it aims on generating communication in the spatial defined area like a neighbourhood. Either way the communication is proactively set up where the participants reactively participate. There is no community forming within the platform.

Common characteristics		Local social media
Characteristics of the data	Date	Unactive
	Location	One certain location
	Privacy	All public
Interpretation of the communication	Subjects	Use/re-use of a small scaled location
	Proactive/reactive	Proactive
	Community form	No community forming

Table 6: Local social media platforms described on categories

5.1.3 Facebook/twitter

The global social media platforms Twitter and Facebook are popular in the Netherlands. Many people in the Netherlands have an account and participate in the platforms. It is safe to say that practically everybody has heard of these platforms. Because Facebook and Twitter are so well known and so heavily used it will take a whole study to describe the differences in date and location of messages. The location can be seen as the whole of the Netherlands since in every municipality there is someone who is using Facebook and Twitter. Facebook and twitter are continuously used. An interesting characteristic of Facebook and Twitter are the privacy rules. There are a lot of possibilities regarding the privacy settings of your account that is necessary to make to make use of these platforms. It is possible to share your posts and pictures with a selective group of people or to make them publicly accessible. Also the approaching of others towards you can be managed. For instance in Facebook you can set that other people can only post a picture with a 'tag' of you, after you give the permission to do this.

The messages in Facebook and in Twitter can be about any imaginable topic. The subjects posted about are focussed in groups or pages. For members of Facebook and Twitter it is possible to link your account to such groups where you can share messages with other people interested in the same group or page. This can be private groups but also public groups. Generally in Twitter and Facebook the communication will mostly be proactive and coming from individuals themselves. It is however possible for organizations to make groups and ask questions about certain topics. These groups or pages are also the way of forming communities within these large social media platforms.

Common characteristics		Global social media
Characteristics of the data	Date	Very active
	Location	Everywhere
	Privacy	A lot of possibilities with privacy
Interpretation of the communication	Subjects	Any imaginable topic
	Proactive/reactive	Mostly proactive
	Community form	Forming communities in groups

Table 7: Global social media platforms described on categories

5.2 Social media data used in this research

A database of tweets that is gathered within the GRS chair group is used as social media data. Tweets are publicly available and can be accessed by creating a twitter account and accessing the twitter API (twitter 2012).

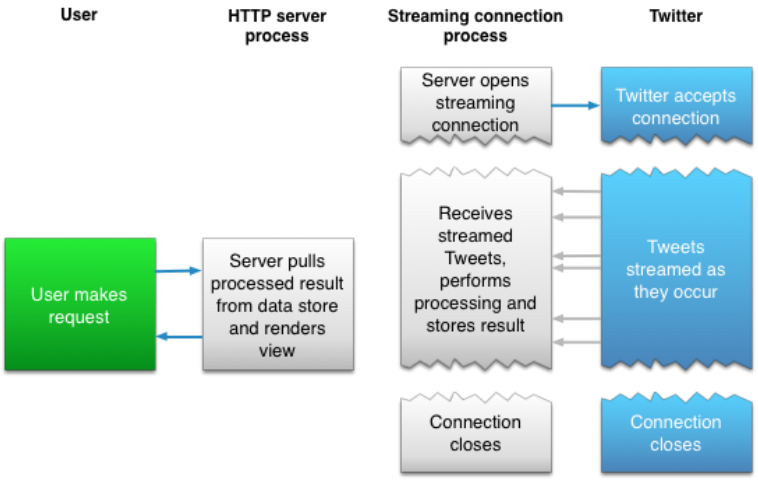

Figure 17: Streaming process tweets (twitter 2012)

A script is used to gather these tweets. In this script the tweets that are within the geographical borders of the Netherlands are constantly generated and checked for new tweets. All new tweets are tested for a coordinate of origin of the tweet. When a tweet contains a coordinate of origin it is kept and added to a database. This forms the database underlying this research and contains only tweets that are georeferenced within the Netherlands.

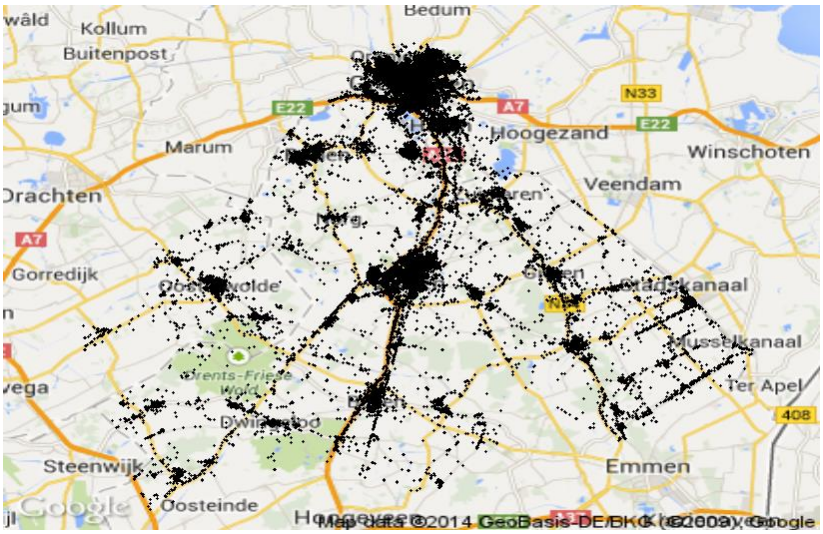

Figure 18: Georeferenced tweets of region of interest

The database used in this research contains 8.039.695 tweets. The tweets have been gathered in the time period 05-11-2013 until 12-03-2014. Events or news that have taken place during this time period will probably be over represented.

5.3 Tweets gathered in region of interest

The geographical borders of the municipalities of the region of interest are used to separate the tweets. For all municipalities all tweets within the borders have been gathered by spatially intersecting the location of the tweet and the municipal borders using the function 'gIntersects' of the package rgeos (Rundel 2012). The same is done for the tweets in the neighbourhoods. In Table 8 the amount of tweets for all municipalities of the region of interest are shown. Also the amount of citizens is added and the tweet per citizen. This is calculated by dividing the amount of tweets by amount of citizens. In a scatter diagram the tweets per citizen score have been plotted linked to the population of the municipalities and linked to the population of the neighbourhoods (CBS 2014). A trend line shows that there slightly are more tweets per citizen when the population is higher. For this research the ten databases of tweets in the ten municipalities are used to come to the results.

Municipalities	Amount of tweets	Amount of citizens	Tweets per citizen	Shrinkagescore
Aa en Hunze	7906	25740	0,31	2
Assen	22085	67210	0,33	9
Borger-Odoorn	10576	25860	0,41	-2
Groningen	73580	193125	0,38	15
Haren	6073	18455	0,33	-8
Midden-Drenthe	8153	33560	0,24	1
Noordenveld	7221	30955	0,23	-7
Ooststellingwerf	13570	25860	0,52	-3
Tynaarlo	9153	32355	0,28	-2
Westerveld	6726	19200	0,35	-5
Total	**165043**	**472320**	**0,35**	**0**

Table 8: Tweets in municipalities region of interest

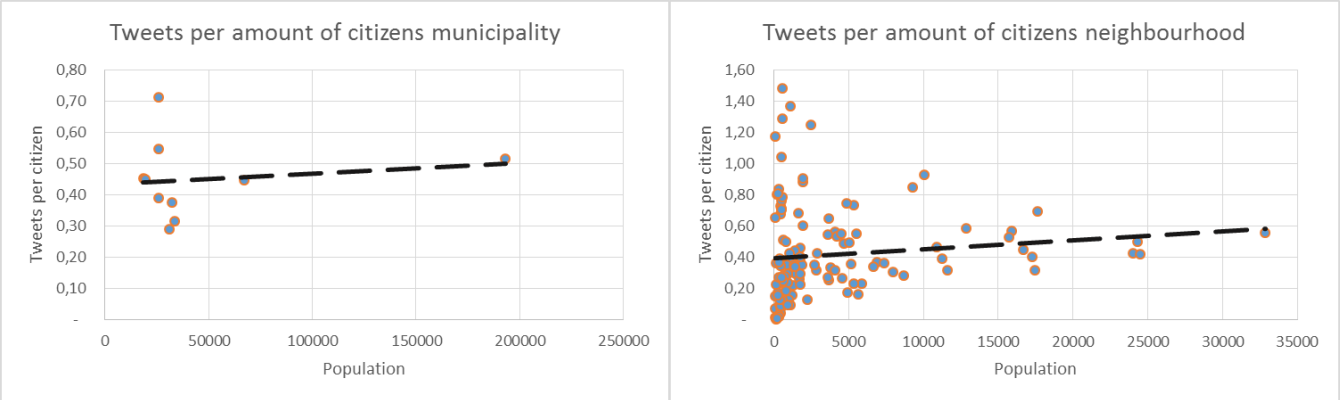

Figure 19: Tweets related to neighbourhoods and municipalities

6. Linking online communicated messages to shrinkage

Introduction chapter

In order to link tweets to the sentiment of a population, and the sentiment to shrinkage, three possible relations are set up. Databases of tweets are converted and shaped in such a way that the tweets can be explored and related to the shrinkage scores of the municipalities.

The first relation aims on the locations people seem to care about in different municipalities. Locations that people care about might indicate what type of locations the citizens prefer to visit or are important to the population. In order to indicate what locations are most important the 10 locations tweeted about most are taken out for each municipality. This is done by manual scanning of the most used words of a tweet database of a municipality.

For the second relation, tweets are selected that contain words that are related to spatial effects of shrinkage. These words are chosen by logically thinking which words indicate the spatial effects of shrinkage that are found in the review of this research. After selecting these tweets the context of the words are inspected. The context of the tweets containing these search words might indicate what is said about the spatial effects of shrinkage.

As a final relation the overall sentiment of the population of different municipalities is compared based on the categorizing of tweets in a questionnaire. The questionnaire is filled with fifty tweets. Ten times five tweets are randomly selected out of the tweet databases of each municipality. All questionnaires are unique. The participants of the questionnaire categorize the tweets into categories indicating an overall sentiment of the population of a municipality.

6.1 Selecting and preparing of the tweets

6.1.1 Top 10 locations tweeted about

For each municipality the ten locations that are tweeted about most are taken out. This is done by manual scanning of the most used words. First, all tweets of one municipality are converted to have no capital letters and no punctuation. This leaves only the words used in the tweets. Then these words are put in a TermDocumentMatrix (Feinerer 2012). This contains a document for each tweet that exists of all the words used in the tweet. The function findFreqTerms of the tm (text mining) package (inside-R 2012) is used to find which words are encountered most. By manually setting a lowfreq (low frequency) in the function, only the words are returned that occur more often than the set limit. This lowfreq limit is set by trial and error. The manual scanning starts with at a high number of lowfreq. This number is lowered until ten locations are found. All words above the lowfreq limit that cannot be linked to a location are taken out and set in a list. This list is used to delete words from the complete TermDocumentMatrix. By expanding this list when manually checking the most used words, finding the top ten locations tweeted about becomes easier after each municipality. The resulting top ten locations tweeted about are shown in the tables of this paragraph, including the number of encounters, the percentage of tweets containing this word and the meaning of the location.

Aa en Hunze		Total amount of tweets: 10026	
% of tweets	Encounters	Top 10 locations	Meaning
0.81%	81	**groningen**	*Province/Municipality/city*
0.76%	76	**assen**	*Municipality*
0.68%	68	**drenthe**	*Province*
0.41%	41	**hunze**	*Village*
0.39%	39	**schoonloo**	*Village*
0.38%	38	**saksen**	Resort: *Social facilities*
0.36%	36	**henryderoo**	*Village*
0.35%	35	**kalsbeek**	Care farm: *Social facilities*
0.33%	33	**warmenbossenweg**	*Street*
0.32%	32	**mijnmakelaarmeertens**	Broker: *Economic facility*
Shrinkagescore: 2			

Table 9: Top 10 locations Aa en Hunze

Assen		Total amount of tweets: 30103	
% of tweets	Encounters	Top 10 locations	Meaning
5.46%	1643	**assen**	*Municipality/city*
1.39%	418	**drenthe**	*Province*
0.80%	242	**groningen**	*Province/Municipality/city*
0.31%	92	**nederland**	Country: *Netherlands*
0.24%	73	**peelo**	*Neighbourhood*
0.24%	72	**acv**	Local football club: *Social facilities*
0.21%	63	**amsterdam**	Capital city of Neth.: *Amsterdam*
0.16%	48	**gemeenteassen**	*Municipality*
0.15%	46	**netherlands**	Country: *Netherlands*
0.14%	43	**theaterdnk**	Theater: *Social facilities*
Shrinkagescore: 9			

Table 10: Top 10 locations Assen

Borger Odoorn		Total amount of tweets: 14144	
% of tweets	Encounters	Top 10 locations	Meaning
1.18%	167	**borger**	*Village*
0.81%	114	**exloo**	*Village*
0.72%	102	**drenthe**	*Province*
0.57%	80	**emmen**	*Municipality/city*
0.49%	69	**groningen**	*Province/Municipality/city*
0.43%	61	**odoorn**	*Village*
0.34%	48	**nederland**	Country: *Netherlands*
0.28%	39	**stadskanaal**	*Municipality*
0.27%	38	**borgerodoorn**	*Municipality*
0.24%	34	**klijndijk**	*Village*
Shrinkagescore: -2			

Table 11: Top 10 locations Borger-Odoorn

Groningen		Total amount of tweets: 99399	
% of tweets	Encounters	Top 10 locations	Meaning
5.45%	5416	**groningen**	*Province/Municipality/city*
0.50%	497	**esns14**	Music *event*
0.28%	280	**nederland**	Country: *Netherlands*
0.21%	209	**oosterpoort**	Theater: *Social facilities*
0.20%	198	**euroborg**	Football stadium: *Economic facilities*
0.19%	188	**umcg**	Hospital: *Social facilities*
0.18%	182	**amsterdam**	*Municipality/city*
0.18%	179	**martiniplaza**	Theater/sportscomplex: *Social facilities*
0.17%	171	**eurosonic**	Music *event*
0.16%	159	**netherlands**	Country: *Netherlands*
Shrinkagescore: 15			

Table 12: Top 10 locations Groningen

Haren		Total amount of tweets: 8349	
% of tweets	Encounters	Top 10 locations	Meaning
2.92%	244	**haren**	*Municipality/Village*
1.92%	160	**groningen**	*Province/Municipality/city*
0.67%	56	**pinksterbloemweg**	*Street*
0.54%	45	**dilgt**	Nursing home: *Social facilities*
0.47%	39	**nederland**	Country: *Netherlands*
0.30%	25	**oekraïne**	Country: *Ukraine*
0.25%	21	**kaaphoorn**	Pavilion: *Social facilities*
0.23%	19	**opencoffeeharen**	Reoccuring networking *event*
0.22%	18	**krim**	Region in *Ukraine*
0.20%	17	**ekoplaza**	Biologic supermarket: *Social facilities*
Shrinkagescore: -8			

Table 13: Top 10 locations Haren

Midden-Drenthe		Total amount of tweets: 10623	
% of tweets	Encounters	Top 10 locations	Meaning
1.95%	207	**beilen**	*Village*
1.41%	150	**drenthe**	*Province*
0.67%	71	**middendrenthe**	*Municipality*
0.64%	68	**groningen**	*Province/Municipality/city*
0.59%	63	**assen**	*Municipality*
0.56%	59	**westerbork**	*Village*
0.40%	42	**vvbeilenjeugd**	Football club: *Social facilities*
0.35%	37	**nederland**	Country: *Netherlands*
0.35%	37	**smilde**	*Village*
0.32%	34	**orvelte**	*Village*
Shrinkagescore: 1			

Table 14: Top 10 locations Midden-Drenthe

Noordenveld		Total amount of tweets: 8994	
% of tweets	Encounters	Top 10 locations	Meaning
1.73%	156	**roden**	*Village*
1.33%	120	**peize**	*Village*
0.69%	62	**noordenveld**	*Municipality*
0.61%	55	**groningen**	*Province/Municipality/city*
0.46%	41	**drenthe**	*Province*
0.37%	33	**norg**	*Village*
0.33%	30	**netherlands**	Country: *Netherlands*
0.33%	30	**velddijk**	*Street*
0.30%	27	**veenhuizen**	*Village*
0.27%	24	**assen**	*Municipality/city*
Shrinkagescore: -7			

Table 15: Top 10 locations Noordenveld

Ooststellingwerf		Total amount of tweets: 18405	
% of tweets	Encounters	Top 10 locations	Meaning
0.58%	107	**lweggens**	*Farmer*/agriculture shop
0.39%	72	**vofvhouwelingen**	Junior dairy *farmer*
0.30%	55	**bessenboerderij**	*Farmer*/agriculture shop
0.30%	55	**boerbrunia**	*Farmer*
0.27%	49	**oosterwolde**	*Village*
0.25%	46	**gullewaard**	Restaurant: *Economic facilities*
0.24%	45	**destoerderij**	Biological water buffalo *farm*
0.23%	43	**appelscha**	*Village*
0.18%	34	**leeuwarden**	*Municipality/city*
0.17%	32	**nederland**	Country: *Netherlands*
Shrinkagescore: -3			

Table 16: Top 10 locations Ooststellingwerf

Tynaarlo		Total amount of tweets: 12146	
% of tweets	Encounters	Top 10 locations	Meaning
1.67%	203	**groningen**	*Province/Municipality/city*
1.08%	131	**tynaarlo**	*Municipality/Village*
0.72%	87	**drenthe**	*Province*
0.71%	86	**zuidlaren**	*Village*
0.63%	76	**eelde**	*Village/airport*
0.38%	46	**assen**	*Municipality/city*
0.34%	41	**nederland**	Country: *Netherlands*
0.33%	40	**paterswolde**	*Village*
0.30%	36	**s2m050**	Open office: *Economic facilities*
0.27%	33	**gemeentehuis**	Town hall: *Social facilities*
Shrinkagescore: -2			

Table 17: Top 10 locations Tynaarlo

Westerveld		Total amount of tweets: 8635	
% of tweets	Encounters	Top 10 locations	Meaning
0.86%	74	**dieverbrug**	*Village*
0.79%	68	**dwingeloo**	*Village*
0.78%	67	**drenthe**	*Province*
0.56%	48	**havelte**	*Village*
0.38%	33	**vvhavelte**	Football club: *Social facilities*
0.31%	27	**diever**	*Village*
0.29%	25	**vledder**	*Village*
0.23%	20	**dwingelderveld**	National Park: *Social facilities*
0.23%	20	**nederland**	Country: *Netherlands*
0.23%	20	**vvdwingeloo**	Football club: *Social facilities*
Shrinkagescore: -5			

Table 18: Top 10 locations Westerveld

With the top ten locations it can be indicated what locations seem to be most important to the citizens in different types of municipalities according to the content of tweets. The type of locations can possibly be linked with the shrinkage score of the municipalities. In order to do this the locations are placed into categories. The categories are chosen after inspecting the resulting top 10 locations. The categories are: Village, Neighbourhood, Municipality, Groningen, Drenthe, Amsterdam, Netherlands, Farm, Social Facilities, Economic facilities, Street, Event, Ukraine.

6.1.2 Words in tweets indicating spatial effects of shrinkage

The second relation aims on the encounters of words that are related to spatial effects in shrinkage areas. These spatial effects are described in the second chapter: Review of this report. Based on these spatial effects of shrinkage search words are set up. The words are chosen by logically thinking which words are related most to these spatial effects of shrinkage. The tweet datasets of each municipality are separately scanned for these set up words. The tweets gathered in this paragraph are further inspected by looking at the context of the tweets the words are found in. Because the tweet datasets are in Dutch it is scanned for the Dutch translation of the following words.

	Spatial effect	English	Dutch
1	Forced moving	move, moved	verhuizen, verhuisd
2	Vacanct buildings	vacancy, tenantless	leegstand, leegstaand
3	Degradation	degradation, decay	verloedering, verval
4	Social facilities	school, supermarket, health care, club, university, park, cafe	school, supermarkt, zorg, club, universiteit, park, cafe
5	Economic facilities	market, shop, centre	markt, winkel, centrum
6	Public transport	bus, train	bus, trein

Table 19: Keywords spatial effects shrinkage regions

The spatial effect 'social facilities' could mean a lot of different words. Therefore there are more words used in this category. After scanning the datasets for words, tables are formed with the number of encounters of the words mentioned in Table 19. The total amount of encounters of the word indicating a spatial effect is counted, which is used to calculate the relative amount of tweets that contain words of the spatial effect. In the top left of the table the spatial effect related to the table is given. Because of practical reasons the words are used with a capital starting letter as well as without.

Forced moving	verhuizen	Verhuizen	verhuisd	Verhuisd	Total	Rel. Total
Aa en Hunze	2	1	3	0	6	0,060%
Assen	3	1	5	0	9	0,030%
Borger-Odoorn	2	0	1	0	3	0,021%
Groningen	32	0	8	0	40	0,040%
Haren	2	0	2	0	4	0,048%
Midden-Drenthe	5	0	0	0	5	0,047%
Noordenveld	3	0	0	1	4	0,044%
Ooststellingwerf	3	0	1	0	4	0,022%
Tynaarlo	5	0	1	0	6	0,049%
Westerveld	1	0	2	0	3	0,035%

Table 20: Score keywords indicating forced movings

Vacant buildings	leegstand	Leegstand	leegstaand	Leegstaand	Total	Rel. Total
Aa en Hunze	0	0	0	0	0	0,000%
Assen	1	0	0	0	1	0,003%
Borger-Odoorn	1	0	0	0	1	0,007%
Groningen	3	0	1	0	4	0,004%
Haren	1	1	0	0	2	0,024%
Midden-Drenthe	0	0	1	0	1	0,009%
Noordenveld	0	0	0	0	0	0,000%
Ooststellingwerf	0	0	0	0	0	0,000%
Tynaarlo	0	0	0	0	0	0,000%
Westerveld	0	1	0	0	1	0,012%

Table 21: Score keywords indicating vacant buildings

Degradation	verloedering	Verloedering	verval	Verval	Total	Rel. Total
Aa en Hunze	0	0	4	0	4	0,040%
Assen	0	0	8	1	9	0,030%
Borger-Odoorn	0	0	2	0	2	0,014%
Groningen	1	0	17	0	18	0,018%
Haren	1	0	1	0	2	0,024%
Midden-Drenthe	0	0	2	0	2	0,019%
Noordenveld	0	0	3	0	3	0,033%
Ooststellingwerf	0	0	3	0	3	0,016%
Tynaarlo	0	1	4	0	5	0,041%
Westerveld	0	0	1	0	1	0,012%

Table 22: Score keywords indicating degradation

Social facilities	school	School	supermarkt	zorg	club	universiteit	park	cafe	Total	Rel. Total
Aa en Hunze	170	6	3	15	30	0	11	10	245	2,444%
Assen	591	36	3	102	62	0	55	15	864	2,870%
Borger-Odoorn	231	11	2	30	13	0	24	9	320	2,262%
Groningen	1546	117	25	370	229	52	183	113	2635	2,651%
Haren	134	14	0	42	23	2	10	5	230	2,755%
Midden-Drenthe	238	1	5	35	25	0	36	4	344	3,238%
Noordenveld	112	25	2	27	18	0	15	5	204	2,268%
Ooststellingwerf	226	23	3	29	8	1	9	3	302	1,641%
Tynaarlo	213	7	1	43	14	0	6	11	295	2,429%
Westerveld	163	3	0	35	12	0	21	1	235	2,721%

Table 23: Score keywords indicating social facilities

Economic-facilities	markt	Markt	winkel	Winkel	centrum	Centrum	Total	Rel. Total
Aa en Hunze	15	0	8	0	2	2	27	0,269%
Assen	57	11	57	14	45	18	202	0,671%
Borger-Odoorn	17	3	18	0	23	1	62	0,438%
Groningen	219	102	192	32	137	54	736	0,740%
Haren	18	3	18	1	5	2	47	0,563%
Midden-Drenthe	29	0	30	2	32	1	94	0,885%
Noordenveld	19	2	6	1	15	0	43	0,478%
Ooststellingwerf	18	0	23	0	11	2	54	0,293%
Tynaarlo	23	8	23	0	5	6	65	0,535%
Westerveld	12	1	9	0	5	0	27	0,313%

Table 24: Score keywords indicating economic facilities

Public transport	bus	Bus	trein	Trein	Total	Rel. Total
Aa en Hunze	86	12	10	1	109	1,087%
Assen	140	36	72	12	260	0,864%
Borger-Odoorn	105	32	7	1	145	1,025%
Groningen	716	172	393	72	1353	1,361%
Haren	49	5	9	5	68	0,814%
Midden-Drenthe	48	12	62	7	129	1,214%
Noordenveld	55	3	0	1	59	0,656%
Ooststellingwerf	54	6	4	0	64	0,348%
Tynaarlo	76	8	21	6	111	0,914%
Westerveld	38	9	6	0	53	0,614%

Table 25: Score keywords indicating public transport

To indicate the context of a tweet the function findAssocs of the package Text mining is used (inside-R 2012). This function scans a TermDocumentMatrix (Feinerer 2012) for the correlation between words. It takes into account how many times a word is used and how many times that word is used in the same sentence with other words. Also, the words that are connected with the searched word are counted and it is taken into account how many times the word is used not in the context of the searched for word. So if a word and the searched for word are only used in the same sentence the word will have a correlation score of 1. If this word is in every sentence of the searched for word but is also in other sentences without the searched for word, the score will be between 0 and 1.

The four most encountered search words are chosen to continue on. These are the Dutch words school (school), zorg (health care), club (club) and park (park). The context of the tweets containing these words are inspected with the function findAssocs. This results in a list of words that have a correlation score with the search words. The three words with the highest associated score are taken out. In appendix 5 the results of this function are given in a schedule.

6.1.3 Setting up questionnaire 'The difference in perceptions'

To be able to grasp the sentiment out of a group of tweets questionnaires are used. In these questionnaires the participants categorize tweets into three different categories. These categories are chosen based on the overall sentiment that is attempted to grasp in the hypotheses (Table 26). The categories are 'the tone of the tweet', 'aimed on what time' and 'the subject of the tweet'. For each category there are different options to answer. In the tone of the tweet the participant can choose for positive (1), neutral (2) and negative (3). The category aimed on what time has the options past (1), now (2), future (3) or no time/unknown (4). The subject of the tweet can be him/herself(1), different subject (2) or no idea (3).

Because categorizing the sentiment of online communicated messages can have discussable outcomes the questionnaires are used to let multiple people indicate this sentiment. Every questionnaire is unique and exists out of fifty tweets. In the scripting language R five tweets are selected for each municipality using the function sample. These are joined together by putting them in the same column. To the participants it is not explained that the tweets are from different municipalities to prevent biasedness.

With the outcome for the first category it can be indicated which municipality relatively has the most positive tweets, most negative tweets and most neutral tweets. This outcome is in a later phase linked to the shrinkage score. This is done for all categories and outcomes. In appendix 4 and Figure 20 an example of the questionnaire is added. Because the tweets are in Dutch the questionnaire is only executed by Dutch people. The layout of the questionnaire is in Dutch. The people approached for this questionnaire are from the personal environment of the author of this research, which mostly means people in the age category 20-30.

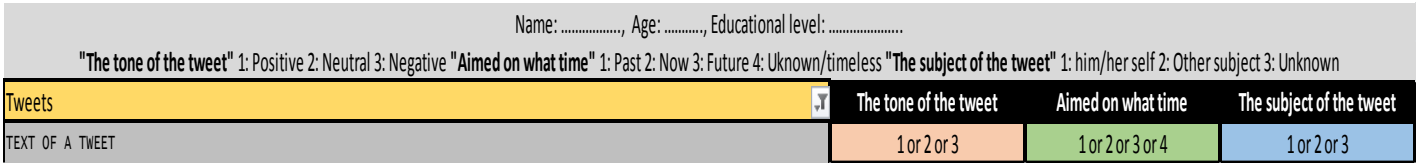

Figure 20: Top of questionnaire

6.2 Linking tweets to shrinkage regions

In the previous subchapter data is gathered and shaped in a form necessary for relating it to the shrinkage score of the municipalities in the region of interest. Three relations have been executed. For all relations links with the shrinkage score are attempted to be found. By establishing the relations, indications can be made about the set up hypotheses.

Hypotheses
Locations people seem to care about
1. In non-shrinkage municipalities people tend to talk about locations of a larger scale. 2. Because social facilities are changing as a spatial effect in shrinkage regions, relatively more tweets are about social facilities in shrinkage regions. 3. In shrinkage regions there is less diversity in the type of locations they talk about.
Context of messages about spatial effects in shrinkage regions
1. Typical spatial effects of shrinkage are more tweeted about in shrinkage municipalities. 2. Tweets about social facilities in shrinkage municipalities have a more negative context. 3. More tweets in shrinkage regions are about vacant buildings and forced moving's, and the context indicates that the word forced fits in these spatial effects of shrinkage.
Overall perceptions of citizens
1. People in shrinkage municipalities are more negative than people in non-shrinkage municipalities. 2. People in shrinkage municipalities tweet more about the past than in non-shrinkage municipalities. 3. People in shrinkage municipalities tend to talk about other people or subjects and not that much about themselves compared to non-shrinkage municipalities.

Table 26: Hypotheses

Top 10 locations

For the top ten locations found in each municipality it is attempted to categorize type of locations into categories. These categories are linked to the shrinkage score of the municipality. When there appears to be a relation, it shows that according to the tweets, the citizens of a shrinkage municipality have more interest in certain type of locations than non-shrinkage municipalities, or the other way around.

Searched words

The second relation counts the number of encounters of words related to these spatial effects in the tweets. The relative amount of tweets that contain the words searched for are found. Words with a high amount of encounters are taken out and compared to the shrinkage score of the municipality. By doing this, a link is created between the relative amount of usage of a certain word and the shrinkage score of the municipality. It is possibly indicated what type of spatial effects seem to play in shrinkage regions and which do not. Also the function findAssocs (inside-R 2012) is used to find the words that are correlated most with the search words. This possibly indicates the context of the tweets the words are used in. Then the words used in the context of the tweet can also be related to the shrinkage score.

Questionnaire 'The difference in perception'

With the resulting scores of the questionnaire the sentiment is related to the shrinkage scores of the municipalities. The participants have categorized fifty messages into categories indicating the overall sentiment in a municipality. Because 10 people have filled in the questionnaire that contains 5 tweets for each municipality, all categories have 50 scorings. By adding all scores for all categorized messages the resulting scores of the categories can be related to the shrinkage score.

6.3 Results of relations

6.3.1 The top 10 locations

The top 10 locations found in each municipality are categorized and shown in Table 27. In the next pages the scores are related to the shrinkage score and visualized in graphs and maps, in order to inspect if the set up hypotheses are more likely to be correct or not. The hypotheses are: 1. In non-shrinkage municipalities people tend to talk about locations of a larger scale. 2. Because social facilities are changing in shrinkage regions, because it is a spatial effect in shrinkage regions, relatively more tweets are about social facilities in shrinkage regions, 3. In shrinkage regions there is less diversity in the type of locations they talk about.

Locations categorized	Village	Neighborhood	Municipality	Groningen	Drenthe	Amsterdam	Netherlands	Farm	Social facilities	Economic facilities	Street	Event	Ukraine	Total	Shr. Score
Aa en Hunze	3		1	1	1				2	1	1			10	2
Assen		1	2	1	1	1	2		2					10	9
Borger-Odoorn	4		3	1	1		1							10	-2
Groningen				1		1	2		3	1		2		10	15
Haren			1	1			1		2	2	1		2	10	-8
Midden-Drenthe	4		2	1	1		1		1					10	1
Noordenveld	4		2	1	1		1				1			10	-7
Ooststellingwerf	2		1				1	5		1				10	-3
Tynaarlo	3		2	1	1		1		1	1				10	-2
Westerveld	5				1		1		3					10	-5

Table 27: Top 10 locations categorized for all municipalities in region of interest

1. *In non-shrinkage municipalities people tend to talk about locations of a larger scale*

This hypothesis is described by categorizing the top ten locations that the people in the different municipalities are tweeting about and then linking it with the shrinkage score of the municipality. The larger scale spatial units (Country, Province) are categorized out of the top ten locations of the municipalities in the region of interest. These larger scaled locations appear to have the trend that a high shrinkage score, thus municipalities with less indication of shrinkage (non-shrinkage municipalities), tend to talk about larger scaled locations. The words 'Netherlands' and the capital of the Netherlands, 'Amsterdam', show clear trend lines in Figure 21. Also the province/municipality and city Groningen shares this line. For the province of Drenthe this is not the case and it even has a slight decrease the matter the shrinkage score increases.

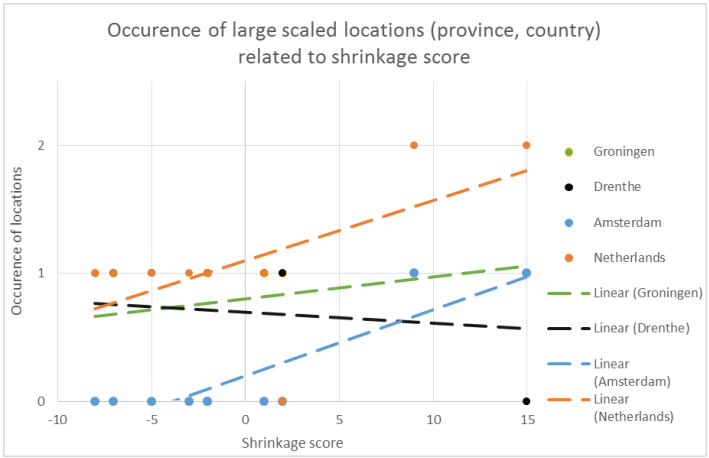

Figure 21: Larger scaled locations related to shrinkage score

In the maps listed below the trend lines are supported. The municipality of Groningen and Assen, with the highest shrinkage score, appear green in all four maps. This means that they are encountered most often. Especially in the maps of the encounters of Amsterdam and Netherlands the difference is clear.

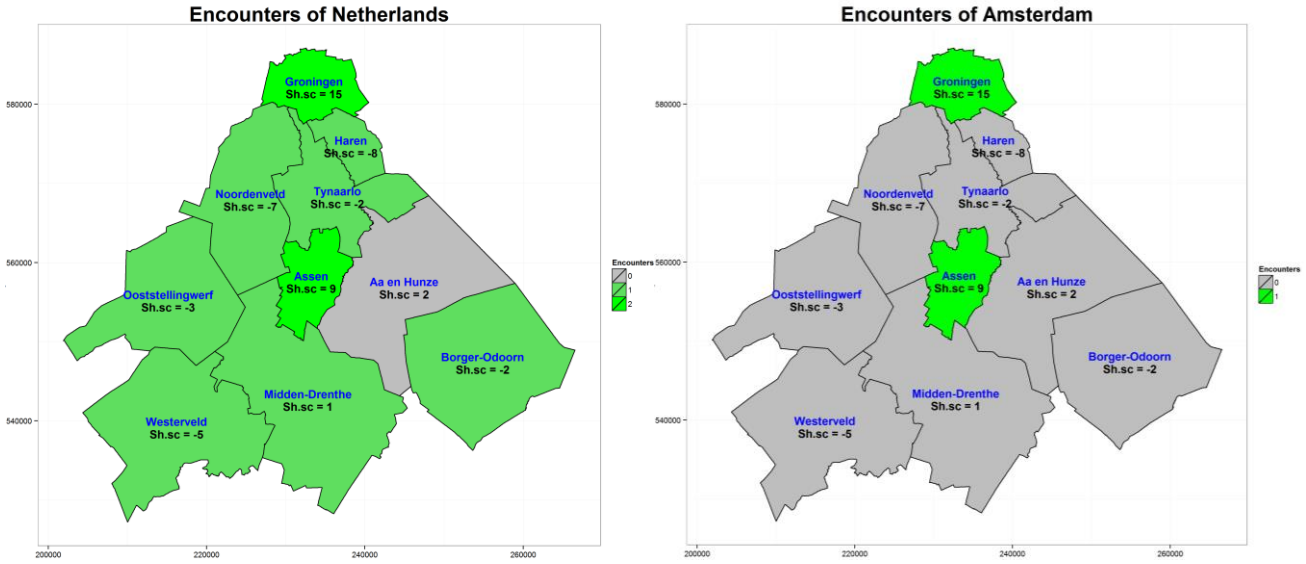

Figure 22: Encounters of 'Netherlands' and 'Amsterdam'

In the linkage graph, Figure 23, the trend line indicates that municipalities with a low shrinkage score (shrinkage municipalities), indicating shrinkage, do talk more about villages and municipalities. Especially the trend line for villages indicates a clear trend.

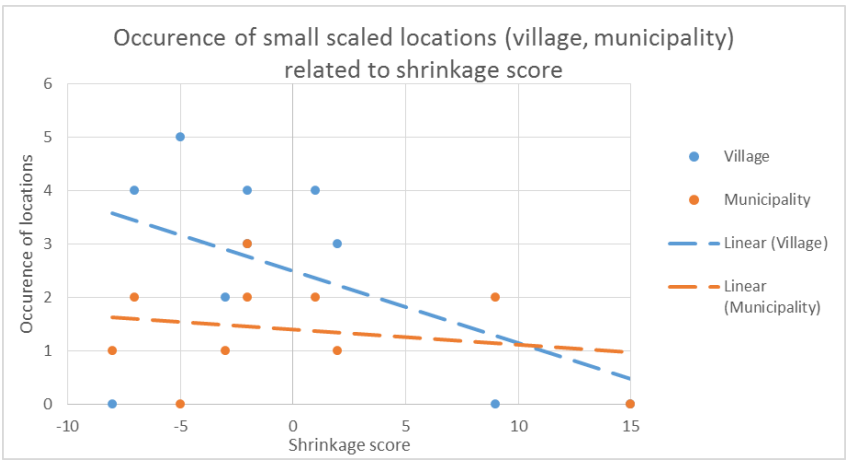

Figure 23: Smaller scaled locations related to shrinkage score

When visualizing the encounters of villages and municipalities in maps it shows that the most north municipality has the lowest score. For both location types the municipality has no encounters. This municipality is Groningen and is also the municipality with the highest shrinkage score, indicating it is the least characteristic to shrinkage regions. In the map showing the encounters of villages also Assen has a score of zero encounters. It forms a clear indication that in shrinkage municipalities villages and municipalities are a type of location that is relatively tweeted about more often.

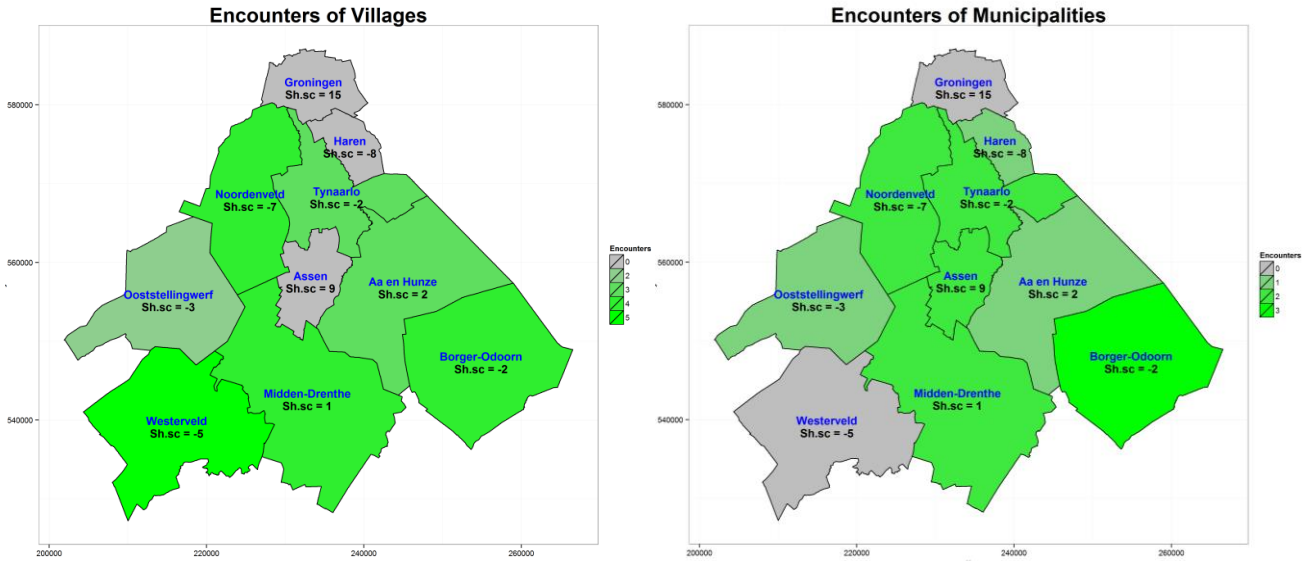

Figure 24: Encounters of villages and municipalities

Overall, considering the larger scaled locations (country, province and capital) and considering the smaller scaled locations (villages and municipalities) it appears that relatively the more characteristic the municipality is to shrinkage the more important villages and municipalities are. For non-shrinkage municipalities, it relatively appears to be more important to tweet about the larger scaled locations. The hypothesis is strengthened by the results of this relation.

2. *Because social facilities are changing as a spatial effect in shrinkage regions, relatively more tweets are about social facilities in shrinkage regions*

The exact opposite of the hypothesis appears to be true when visualizing a trend line of the sample of municipalities in the region of interest. Non-shrinkage municipalities have more social facilities in the top ten locations tweeted about.

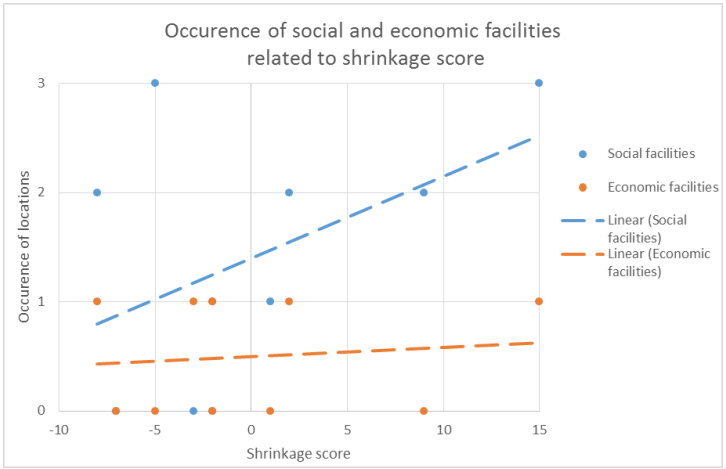

Figure 25: Encounters of social and economic facilities related to shrinkage score

In the map of social facilities it is indicated that all municipalities with a shrinkage score higher than 0 do not have a grey colour. This means that all non-shrinkage municipalities do have encounters of social facilities in the top ten locations.

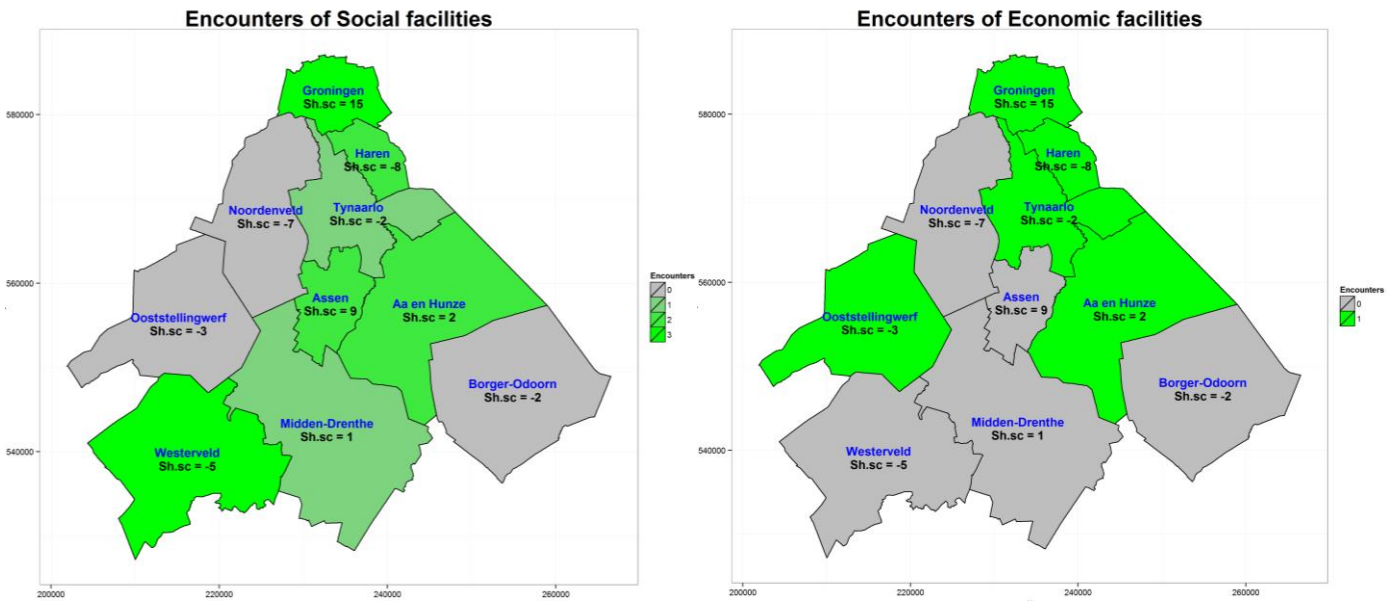

Figure 26: Encounters of social facilities and economic facilities

The hypothesis does not find any support in the tweets and appears to be not true. The indication however is clear that this hypothesis appears to be false.

3. *In shrinkage regions there is less diversity in the type of locations they talk about.*

The top ten locations have been categorized. For each municipality the different categories of locations have been counted. Adding these categories together forms the diversity score. The diversity score for each municipality is listed in Figure 27.

Locations categorized	Shr. Score	*Diversity*
Aa en Hunze	2	**7**
Assen	9	**7**
Borger-Odoorn	-2	**5**
Groningen	15	**6**
Haren	-8	**7**
Midden-Drenthe	1	**6**
Noordenveld	-7	**6**
Ooststellingwerf	-3	**5**
Tynaarlo	-2	**7**
Westerveld	-5	**4**

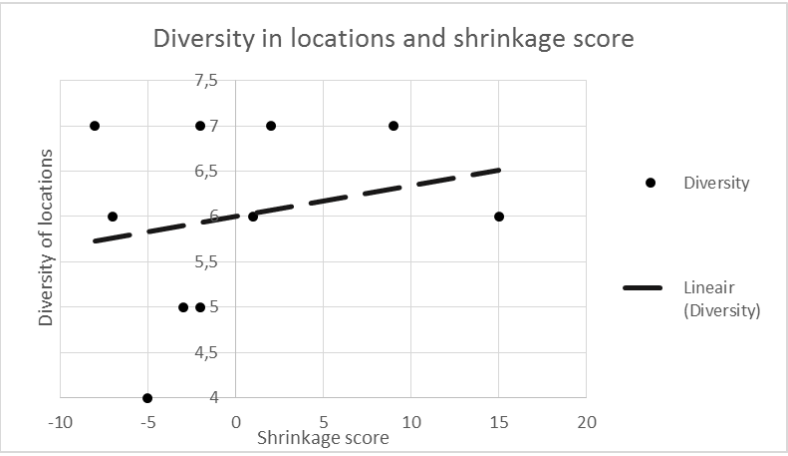

Figure 27: Diversity in categories of locations related to the shrinkage score

In Figure 27 the diversity score is related to the shrinkage score in a graph. It indicates that the higher the shrinkage score the higher the diversity score. This indicates that in non-shrinkage municipalities of the region of interest have more diversity in their top ten locations. The hypothesis is strengthened by the result of this relation.

6.3.2 Search words spatial effect shrinkage

With the searching of words and associated words it is indicated what spatial effects of shrinkage regions relatively more are tweeted about and what is said in these tweets. It can show or not show if the spatial effects in shrinkage municipalities are noticeable in tweets by word scanning. The hypotheses set in this research are inspected. One of them is that the words scanned for indicate that the typical spatial effects are more tweeted about in shrinkage municipalities. Another hypothesis is that tweets about social facilities in municipalities with shrinkage have a more negative context. The last hypothesis that is tested is that more tweets in shrinkage regions are about vacant buildings and forced moving's, and that the context indicates that the word forced fits in shrinkage regions. On average 1% of tweets in a municipality are 165 tweets. This is calculated by: (Total amount of tweets / amount of municipalities)/100. Which is =(165043/10)/100.

word-scores	Forced moving	Vacant buildings	Degradation	Social facilities	Economic-facilities	Public transport
Aa en Hunze	0,06%	0,000%	0,040%	2,4%	0,3%	1,09%
Assen	0,03%	0,003%	0,030%	2,9%	0,7%	0,86%
Borger-Odoorn	0,02%	0,007%	0,014%	2,3%	0,4%	1,03%
Groningen	0,04%	0,004%	0,018%	2,7%	0,7%	1,36%
Haren	0,05%	0,024%	0,024%	2,8%	0,6%	0,81%
Midden-Drenthe	0,05%	0,009%	0,019%	3,2%	0,9%	1,21%
Noordenveld	0,04%	0,000%	0,033%	2,3%	0,5%	0,66%
Ooststellingwerf	0,02%	0,000%	0,016%	1,6%	0,3%	0,35%
Tynaarlo	0,05%	0,000%	0,041%	2,4%	0,5%	0,91%
Westerveld	0,03%	0,012%	0,012%	2,7%	0,3%	0,61%

Table 28: Percentage of tweets indicating spatial effects of shrinkage after searching typical words

1. *Typical spatial effects of shrinkage are more tweeted about in shrinkage municipalities*

The hypothesis states that typical spatial effects are relatively more tweeted about in shrinkage municipalities. The opposite appears to be true. In table 23 the six spatial effects of shrinkage regions are scored from 1 to 10. A score of 1 indicates that it relatively has the least tweets about the spatial effect and 10 the most. Afterwards the total score is set in a graph together with the shrinkage score testing the relation. It shows that non-shrinkage municipalities have a higher total score. The hypothesis seems very improbable.

Municipalities	Most relative encounters scored 10, least 1						total score	shrinkage score
Aa en Hunze	10	1	9	5	1	8	34	2
Assen	3	5	7	9	8	5	37	9
Borger-Odoorn	1	7	2	2	4	7	23	-2
Groningen	5	6	4	6	9	10	40	15
Haren	8	10	6	8	7	4	43	-8
Midden-Drenthe	7	8	5	10	10	9	49	1
Noordenveld	6	1	8	1	5	3	24	-7
Ooststellingwerf	2	1	3	3	2	1	12	-3
Tynaarlo	9	1	10	4	6	6	36	-2
Westerveld	4	9	1	7	3	2	26	-5

Table 29: Scores relative encounters spatial effects

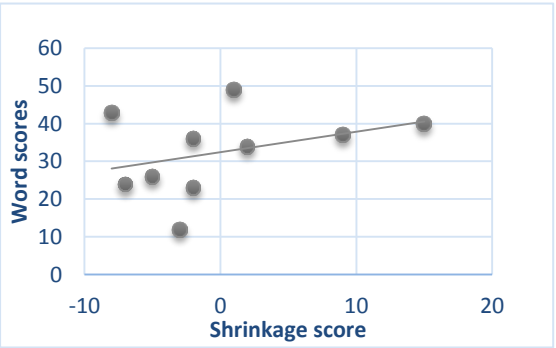

Figure 28: Shrinkage score related to word scores

2. *Tweets about social facilities in shrinkage municipalities have a more negative context.*

In appendix 5 the result is shown for searching for the three most associated words for the four most used words indicating social facilities. These words are: school, zorg (health care), club, park. It was expected that words could manually be categorized in negative or positive. The results show that the most correlated words are often the name of the person who tweeted or words that do not indicate the context. The word 'naar', which in this context probably means to, is used most often in the context. This probably indicates sentences like: I am going to 'searched word'. Since the results are not interpretable for the meaning of this hypothesis it cannot not tested. Presumably this is caused by a lack of sentences with the searched for words. Also, when a word, like a name, is used in the context of the searched word it gets a high correlation.

3. *More tweets in shrinkage regions are about vacant buildings and forced moving's, and the context indicates that the word forced fits in these spatial effects of shrinkage.*

The first part of the hypothesis appears to be true. For both the spatial effects 'Forced movings' and 'vacant buildings' shrinkage municipalities have a higher relative encounter of the searched for words. In Figure 29 and Figure 30 the relative encounter and the shrinkage score are related. The relation between the words indicating forced moving and the shrinkage score of the municipalities is not very strong. The line only has a slight skewness and is almost straight. For the vacant buildings graph the skewness is more extreme and clear. However, the data indicates that it is more likely to be true than false.

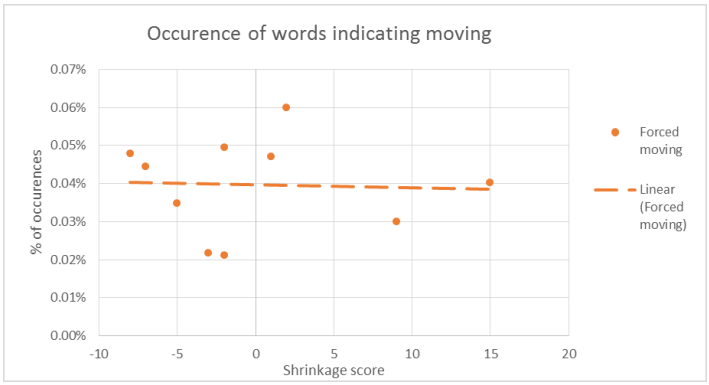

Figure 29: Shrinkage score related to occurrence of words indicating moving

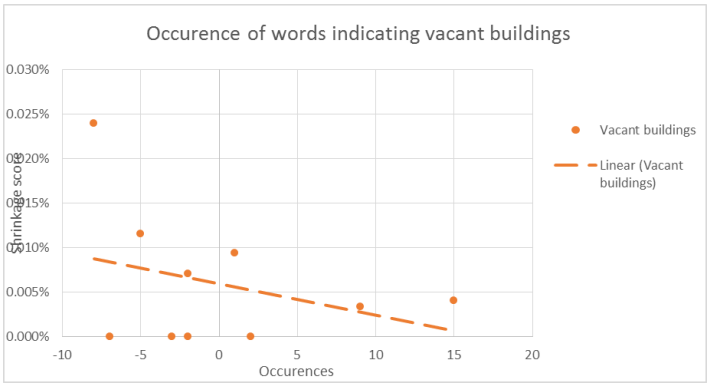

Figure 30: Shrinkage score related to occurrence of words indicating vacant buildings

The second part of the hypothesis tests the context of the two spatial effects in shrinkage regions. Since in the second hypothesis testing the searched for words has proven that the amount of tweets containing the words is not large enough this test is not executed. The amount of words encountered for the spatial effects 'forced moving' and 'vacant buildings' are smaller than for the 'social facilities'.

6.3.3 Questionnaire 'The difference in perceptions'

By executing a questionnaire and letting the participant categorize the tweets three hypotheses are inspected. The first hypotheses claims that people in shrinkage municipalities are more negative than people in non-shrinkage municipalities. For the second hypothesis it is inspected if people in shrinkage municipalities tweet more about the past than in non-shrinkage municipalities. The third and final hypothesis that is inspected with the execution of this questionnaire, is that people in municipalities characteristic to shrinkage regions tend to talk about other people or subjects and not that much about themselves compared to non-shrinkage municipalities.

Result	Tone			Time				Subject		
Questionnaire	1	2	3	1	2	3	4	1	2	3
Aa en Hunze	20	17	8	6	21	7	6	15	22	3
Assen	15	22	8	4	22	7	7	19	11	10
Borger-Odoorn	14	27	4	6	10	5	19	12	13	15
Groningen	17	22	6	3	16	4	17	15	14	11
Haren	15	19	11	8	20	5	7	14	22	4
Midden-Drenthe	8	26	11	3	13	8	16	14	21	5
Noordenveld	8	27	10	5	10	7	18	11	17	12
Ooststellingwerf	15	26	4	3	5	10	22	9	14	17
Tynaarlo	18	20	7	8	11	9	12	14	23	3
Westerveld	17	20	8	3	18	5	14	16	20	4
Total	148	228	80	50	148	70	142	140	179	87

Table 30: Resulting scores of categories in the questionnaire

	Tone	Time	Subject
1	Positive	Past	His/her self
2	Neutral	Now	Other subject
3	Negative	Future	Unknown
4		Unknown/timeless	

1. *People in shrinkage municipalities are more negative than people in non-shrinkage municipalities.*

The resulting scores of the questionnaire indicate a slight relation between the shrinkage score and positive/negative tone of the tweet. The relation supports the hypothesis but is not very strong. Most tweets in the questionnaire have been categorized as neutral.

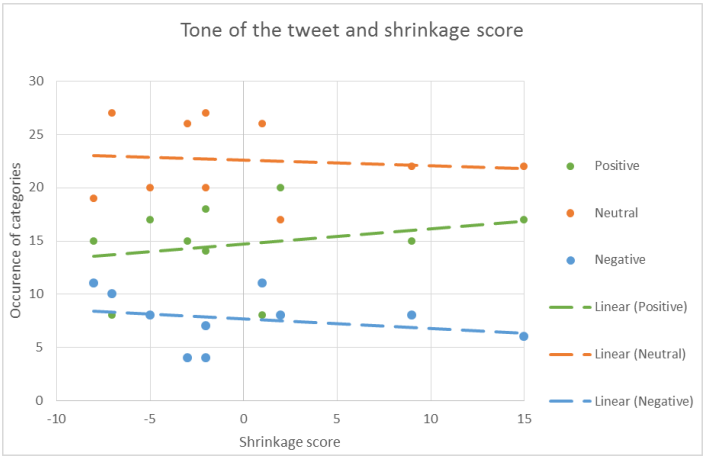

Figure 31: Tone of the tweet linked to the shrinkage score

When visualizing the scores in the region of interest it shows that the municipalities of Noordenveld and Midden Drenthe make a clear change from a low value representing the colour grey in the map of the positive and a high representing colour green in the map of the negative. This indicates that in these municipalities people tweet more negative. For the municipalities Ooststellingwerf and Borger-Odoorn the opposite is true.

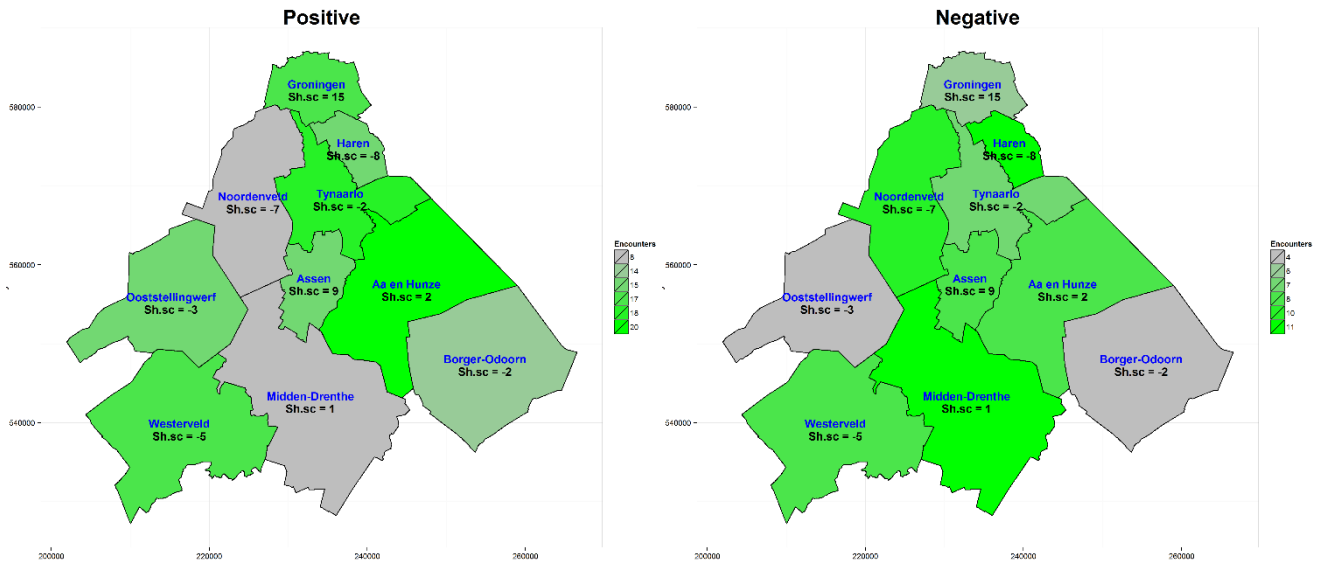

Figure 32: Maps showing the scores for options positive and negative

Since the relation is clearly not strong, no conclusions can be taken out the resulting scores of the questionnaire for the tone of the tweet. The maps indicate that there are clear changes in values considering the positive and negative score, this however does not seem to be linked with the set up shrinkage score.

2. *People in shrinkage municipalities tweet more about the past than in non-shrinkage municipalities.*

When relating the resulting scores of the questionnaire for the time context with the shrinkage score of the municipalities in the region of interest, there appears to be a clear relation in the 'now' category. In non-shrinkage there are more tweets categorized in now than in the municipalities with a low shrinkage score. For the three other options: 'future', 'now' and 'unknown', a similar trend is visible. These three trend lines show that in shrinkage municipalities there is a slightly higher score than in not shrinkage municipalities.

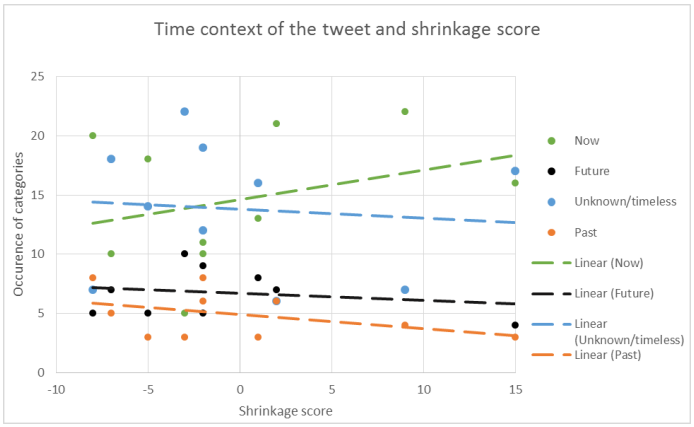

Figure 33: Time context of the tweet linked to the shrinkage score

In the three maps visualizing the resulting scores for the options ‘past’, ‘now’ and ‘future’ in the category of time context there is no clear change visible that is related to shrinkage. It is remarkable that the municipality of Groningen, as the largest city and highest shrinkage score in the region of interest, has the lowest score in the past as in the future.

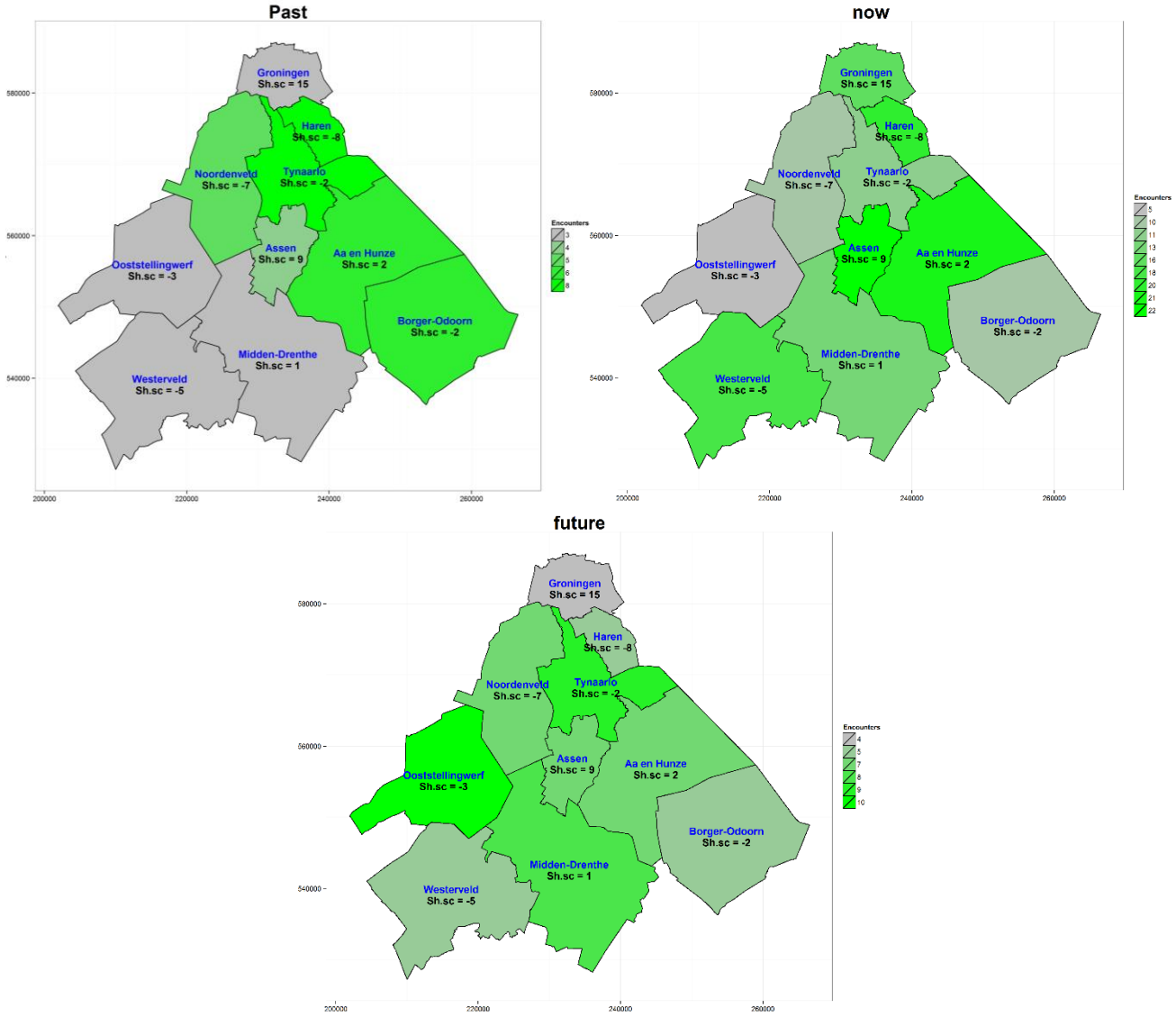

Figure 34: Maps showing the scores for options: past, now and future

Overall the hypothesis does not have a clear indication. The trend in the relation of shrinkage and past does have a slight relation. Nevertheless, this relation appears to be neglectable.

3. *People in shrinkage municipalities tend to talk about other people or subjects and not that much about themselves compared to non-shrinkage municipalities*

In the category subject of the tweet there are clear indications of trends visible. Figure 35 shows that shrinkage municipalities have more tweets about his/her self than in non-shrinkage municipalities. In these municipalities the result of the questionnaire shows that more is tweeted about other subjects in shrinkage municipalities.

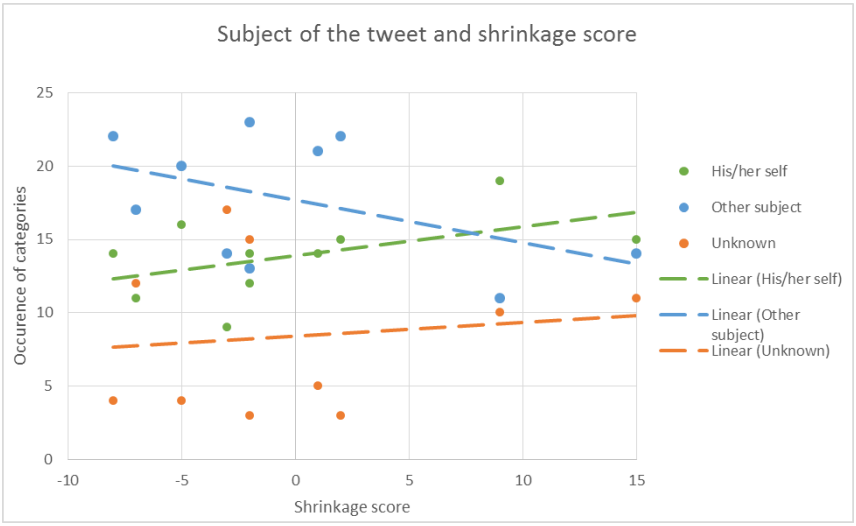

Figure 35: Subject of the tweet linked to the shrinkage score

In the visualization of the maps the biggest changing municipality that supports the hypothesis is the municipality of Assen in the centre of the region of interest. It has a high shrinkage score, indicating no shrinkage, and has a bright green colour in the map indicating the scores about him or herself and a grey colour, indicating the lowest score in other subjects.

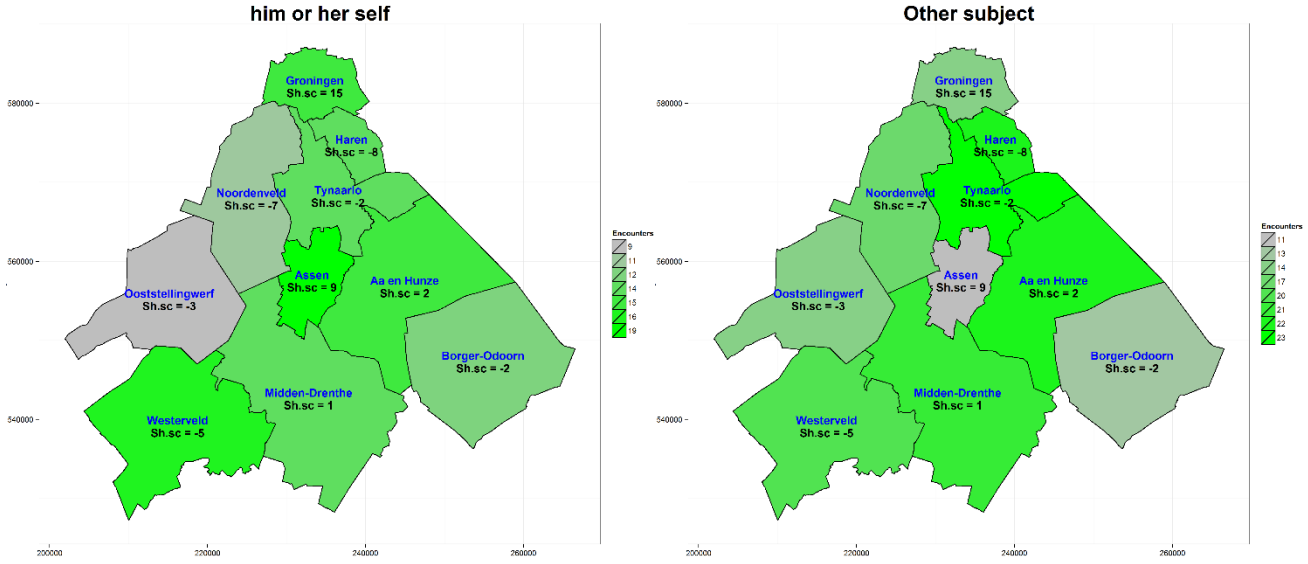

Figure 36: Maps showing scores for the options him or her self and other subject

The results indicate that the hypothesis is true. In shrinkage municipalities there are more tweets about other subjects compared to non-shrinkage municipalities. Also, more tweets are about the tweeter him or herself in non-shrinkage municipalities in the region of interest.

7. Discussion

Introduction chapter

This thesis is a standalone product linked to a mix of research fields. It contains links to social science, geographical information science, and information technology science. It is a research that fits best into a new research field called SMA: Social Media Analytics (Neuberger 2014). The usage of social media is rising. On the other hand the technology to gather information from social media is rising (Bruijn 2011). There is much data available online. The challenge is to grasp the right data and link them to other data to be able to research the content of online communicated messages (Kolari 2007). In this thesis the sentiment of a population is attempted to be grasped, and afterwards linked to shrinkage.

Because of the availability of tweets, only these online communicated messages are used. Twitter publicly allows open access to tweets. The people that are tweeting might not be a good representative group for the citizens in a municipality. Nevertheless, everything in this research has been relative to the other municipalities. Using twitter data in the way that is done in this research has some further **limitations**. These limitations influence the **usability of the results** of this research. It has as an effect that the results of this research can only be seen as indications instead of clear and strong conclusions.

There is a lot possible to continue on from the results out of this research. The possibilities to analyse the tweets are enormous (Thelwall 2011), but also the quality and usability of the results could most probable significantly be improved. **Recommendations** are given in this chapter. Furthermore a **reflection** on this research of the author is given in this chapter.

7.1 Limitations

Process of categorizing

The methods in this research include processes where subjects are categorized. In the first part, the demographics of municipalities are analysed. Municipalities have been given a shrinkage score. This shrinkage score is a way of combining multiple demographic developments into one number indicating how characteristic a municipality is to shrinkage regions. In the second part of this thesis tweets have been categorized in certain topics. The two categorized parts are linked. Those relations are the basics of the results and conclusions of this research. Since the process of categorizing is not exact the results are questionable in multiple ways. However, all processes of categorizing have been questioned and discussed and do give a good interpretation of the meaning it is supposed to have. Together the final results can only be seen as indications and views and not as exact facts.

Social media limited to tweets

Another limitation of this research is the usage of only twitter data (tweets) to scan the sentiment. If the people who are tweeting are representable for the population of an area is an important topic that has not been tested in this research. Probably only a certain part of the population is represented by twitter. Nevertheless, the tweets are categorized and compared to tweets of other municipalities. It is possible that the tweets represent a different type of group in the one municipality compared to the other.

Characteristics tweets

The tweets used in this research are location based of the location at the moment of the tweet. Someone passing by a location in a different municipality than where he or she lives will be taken into account for that municipality. Twitter also has only a certain type of (short) messages that can influence the content or word use. Another influential characteristic of the twitter data is that some people are overrepresented. Especially in the word counting it showed that the nickname of the person tweeting has a strong relation with used words.

7.2 Usability of results

The value of the results of this research is not very clear. There are many discussable factors underlying the resulting conclusions. First of all a small sample size is used. For only ten municipalities a shrinkage score is calculated. With a sample of ten, a statistical correlation is difficult to be calculated. Also the way of categorizing is discussable. The set up methods to grasp the sentiment of a population are coming from logic. The resulting conclusions do show indications of what a new method of research could bring.

The exact resulting effects of shrinkage will only be known after it has happened. In general everyone agrees that demographic developments in shrinkage regions will have many effects on the living environment. Possibly the results of this research can be used by governments or organizations to set up policies by knowing the people targeted for and guiding the changing society into a new optimal living environment. Understanding the changes could also prove to be useful for an organisation for choosing a location to start a establishment or to close one. Also citizens of the Netherlands could be interested in the characteristics of shrinkage regions to know what might happen to their living environment.

Overall I think the most valuable and useful results of this research are the methods that indicate the sentiment from tweets. To understand and grasp the sentiment of a population or targeted group is a difficult task. With the increasing communication online this sort of research can in my opinion be expected to be executed in an increasing frequency. The approach or methods of this research can be of value for further researches in this domain. Especially in combination with demographic developments.

7.3 Recommendations

Shrinkage regions

This research has two different topics coming together. These are shrinkage regions and the analysing of tweets. Shrinkage regions are a subject where a lot of data and researches are available for. It can be expected that the choosing of a region of interest and indicating a shrinkage score is done in a way that is supported by existing researches. For getting a better view on the shrinkage regions more municipalities could have been taken into account. Also a more local scale, like neighbourhoods or villages, is a spatially interesting scale to compare. Emphasizing smaller spatial areas could be a good add-on for this research.

Analysing tweets

During the end of the process of coming to this thesis, time restriction caused to simplify the executed tests that grasp the sentiment of the tweets. The tests are made up and there is no support indicating that these tests are the best way of grasping the sentiment. Expected is that in this moment of time there are no standards to analyse tweets on sentiment. However, possibly this is not true. The tests set up could have been executed in a better but more time intensive way.

The first test, choosing the top 10 locations, has been done manually. If a list of locations within the region would have been available, a link could have been made with these locations. A more direct and specific connection could have been established between type of location and tweets.

The second test, looking at the context of a tweet, was an experiment that found its basics in a found function called findAssocs (inside-R 2012). The function finds the most correlated words with a certain word and thus seemed ideal for showing the context of words. These words have been filled by looking back at the spatial effects in shrinkage regions. The function did not give good results and expected is that it only works with a larger amount of tweets containing the searched for words.

The last and final test has been the execution of a questionnaire which purely aims on the overall sentiment of a group of tweets. Only ten questionnaires have been filled and have been taken into account for the final result. This may have been caused by the lay out of the questionnaire or the short period of time of execution. Nevertheless, an option would be to online publish the tweets and let people categorize generated tweets. Then a person puts in categories which could automatically update maps that are available in that online source.

Overall

Overall this research has relations with different research fields. Since my knowledge is coming from a geographical/spatial view it would be wise to let scientists specialized in other sciences reflect on this research. Someone in social sciences could improve the way of looking at the people tweeting and the sentiment of the tweets. Also someone specialized in computer science could possibly reflect and improve the technical gathering and analysing of the tweets.

7.4 Reflection on research

This research focusses on a new rising research field and method for doing research. An article underlying this research shows this research field called SMA: Social Media Analytics (Neuberger 2014). There is a lot of data available online. Learning how to gather and analyse this data in the right way is important (Valenzuela 2012). I expect that social media will prove to be valuable for science and research. It can have many values. The view of the citizens can be indicated by scanning the messages that they chose to contribute publicly. Also, communication with citizens could be set up about any subject. Nowadays and in our past we are used to gather people together to discuss about any topic. To me this seems to be a lot less effective than online communication. I think It is a lot more difficult to gather many people at one moment in time, instead of giving a period of time in which people online can share thoughts and discuss. When people get used to this way of communicating it could become more viable.

Governments, companies, politicians and all sorts of organizations can freely use this publicly available data to commercialize, gather information and to see what citizens think is important and are communicating about. This is done more frequently. The content of messages about organizations or a certain subject can possibly be very valuable.

In this research basic programming techniques are used to geographically compare different communicated messages. It is attempted to indicate the resulting effects of shrinkage within tweets, and to see if these effects are a hot topic in shrinkage regions. The results are indications and do not give new surprising insights in shrinkage regions. Nevertheless it shows a perspective and future insight in what this sort of research can bring and create.

Our constant adapting society is in my experience influenced more and more by the inhabitants of an area. Citizen initiatives and participation seems to be a method that is used more often. Which in my opinion is a democratic and interesting trend. More perceptions are taken into account to come to a desired future situation. Social media is in my opinion the tool to improve these processes. Our living environment can be optimised by using these views that are available in social media or can be generated by just asking a question in a social media platform. This research has been static and looks back at the content of existing tweets. The content of these tweets can show what people have been thinking during this time period.

8. Conclusions

Introduction chapter

The conclusions of this research can only be seen as indications. First, conclusions of getting to a region of interest and shrinkage score for municipalities, and conclusions for analyzing online communication are listed. Also, relations are made between the content of tweets and the level of shrinkage of municipalities. Conclusions are derived from these results. In this chapter a short overview is given of the conclusions resulting out of the three set-up relations.

8.1 Conclusions demographics

Characteristic demographic developments for a shrinkage region are besides population shrinkage also household change, aging and a decreasing working population (Jong 2013).

Demographic developments in the Netherlands

Households	In the large cities of the Netherlands the amount of households is relatively increasing the most.
Population shrinkage	In the time period 2005-2012 a lot more municipalities in the Netherlands are experiencing a shrinking population compared to the time period 1995-2005.
	The north east, south east and south west of the Netherlands stand out in the population differences in the time periods 1995-2005, 2005-2012, 2012-2025 and 2012-2040 because there appear to be the most shrinking municipalities.
Working population	Cities in general have a higher percentage of their population within the age category 20-65 years, compared to other municipalities.
	In the north east, south east and south west of the Netherlands most municipalities are located with a lower percentage of the population in the age category 20-65 years.
Aging	In the north east, south east and south west of the Netherlands most municipalities are located with a higher percentage of the population that is older than 65 years.
	The centre-west and centre-south of the Netherlands show on overall municipalities with a lower percentages of the population that is older than 65 years compared to the other municipalities of the Netherlands.

Region of interest and shrinkage score

After scoring all municipalities on characteristic demographics for shrinkage it stands out that two regions in the Netherlands have municipalities where shrinkage is indicated close to one municipality that is experiencing opposite demographic developments. This is in the south east and north east. As a region of interest the north east region is chosen existing out of ten municipalities: Groningen, Noordenveld, Tynaarlo, Haren, Ooststellingwerf, Assen, Aa en Hunze, Westerveld, Midden-Drenthe and Borger-Odoorn. A shrinkage score is calculated for the municipalities relative to the demographics of the other municipalities in the region of interest. Groningen and Assen are least characteristic for shrinkage regions, Haren, Noordenveld and Westerveld the most.

8.2 Conclusions analyzing online communication

National, local and global social media platforms are explored based on common characteristics of social media communication. In exploring social media platforms the characteristics of data and the interpretation of the communication are further inspected.

Characteristics of data

Date: Global social media are continuously very active, national social media are partially active and local social media platforms are only active for a short period of time.

Location: Local social media are active in one location, like a neighbourhood or a building, national social media are mostly active in dense populated areas and global social media are active everywhere.

Privacy: National and local social media communication is public while global social media platforms have many possibilities in privacy settings of online communication.

Interpretation of communication

Subjects: Local social media aim at the use/re-use of a small scaled location, national social media at municipal activities and/or citizen initiatives and global social media platforms aim at any imaginable topic.

Proactive/reactive: Communication in local social media is proactive, communication in national social media platforms can be both proactive and reactive and global social media platforms appear to be mostly proactive.

Community form: In local social media platforms there is no community forming, in national social media platforms there are small communities and in global social media platforms a lot of communities are formed.

8.3 Conclusions relating shrinkage municipalities to locations

1. In municipalities where there is less indication of shrinkage (non-shrinkage municipalities) people tend to talk about locations of a larger scale.

Overall, considering the type of larger scaled locations found: country, province and capital, and considering the smaller scaled locations found: villages and municipalities, it appears that relatively the more characteristic the municipality is to shrinkage the more important villages and municipalities are. In non-shrinkage municipalities it appears to be more important to tweet about the larger scaled locations. The hypothesis appears to be true.

Appears to be true

2. Because social facilities are changing as a spatial effect in shrinkage regions, relatively more tweets are about social facilities in shrinkage regions.

The hypothesis does not find any support in the tweets and appears to be not true. The indication is clear that this hypothesis appears to be false. In shrinkage municipalities there is no indication of more tweets about social facilities than in non-shrinkage municipalities.

Appears to be false

3. In shrinkage regions there is less diversity in the type of locations they talk about

The higher the shrinkage score the higher the diversity score. This indicates that non-shrinkage municipalities have more diversity in their top ten locations. The hypothesis is strengthened by the result of this test.

Appears to be true

8.4 Conclusions relating shrinkage municipalities to spatial effects shrinkage regions

1. Typical spatial effects of shrinkage are more tweeted about in shrinkage municipalities.

The hypothesis states that typical spatial effects are more tweeted about in shrinkage municipalities. The opposite appears to be true. It is shown that non-shrinkage municipalities have more encounters of words indicating spatial effects of shrinkage. The hypothesis seems very improbable.

Appears to be false

2. Tweets about social facilities in shrinkage municipalities have a more negative context.

To indicate the context of a word all tweets containing this searches for word are picked out and the words most correlated words are found using the function findAssocs (inside-R 2012). This function finds the words that are most associated with the searched for word. The results show that the most correlated words often are the name of the person who tweeted, or words that do not indicate the context. The word 'naar', which in this context probably means to, is used most often in the context. This probably indicates sentences like: I am going to 'searched word'. Since the results are not interpretable for the meaning of this hypothesis it cannot be related. Presumably this is caused by a lack of sentences with the searched for words.

Unknown

3. More tweets in shrinkage regions are about vacant buildings and forced moving's , and the context indicates that the word forced fits in these spatial effects of shrinkage.

The hypothesis states that typical spatial effects are relatively more tweeted about in shrinkage municipalities. This part of the hypothesis appears to be true. Relatively, there are more tweets about movings and vacant buildings in shrinkage municipalities. The hypothesis is strengthened.

Appears to be true

The second part of the hypothesis tests the context of the two spatial effects in shrinkage regions. Since in the second hypothesis testing the searched for words has proven that the amount of tweets containing the words is not large enough this test is not executed. The amount of words encountered for the spatial effects 'forced moving' and 'vacant buildings' are smaller than for the 'social facilities'.

Unknown

8.5 Conclusions relating shrinkage municipalities to overall sentiment

1. People in shrinkage municipalities are more negative than people in non-shrinkage municipalities.

There is a very slight relation between the shrinkage score and the negative sentiment of the population. However, this relation is so small that it does not prove anything. The hypothesis is somewhat supported and appears to be true, but stating this because of the outcomes of this test is very unreliable.

Appears to be true

2. People in shrinkage municipalities tweet more about the past than in non-shrinkage municipalities.

Overall the hypothesis does not have a clear indication to prove or refute. The trend line showing the relation between shrinkage and past does have a slight relation. Nevertheless, this relation is so small that it is neglectable.

Appears to be true

3. People in shrinkage municipalities tend to talk about other people or subjects and not that much about themselves compared to non-shrinkage municipalities.

The results indicate that the hypothesis is true. In shrinkage municipalities there are more tweets about other subjects compared to non-shrinkage municipalities. Also, more tweets are about the tweeter him or herself in non-shrinkage municipalities in the region of interest.

Appears to be true

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Appendices

Figure reference list

Table reference list

Appendix 1: Table of content of the DVD that accompanies the thesis report

- 1.Report (Word, PDF)
- 2.Midterm & Final presentation (PPT)
- 3.Input data
- 4.Process (incl.scripts)
- 5.Result images
- 6.Questionnaires
- 7.References (Endnote file)

Appendix 2: Social media platforms

In this appendix social media found by google searches are listed. Because this thesis is aimed on the Netherlands a big part of the social media found are Dutch. At the final page of this appendix a small English description is given for each platform.

Companies that create online platforms for citizen participation

- Mett:
  https://www.mett.nl/systeem+online+burgerparticipatie+en+cocreatie/default.aspx
- United Knowledge
  http://www.unitedknowledge.nl/diensten/e-participatie

Congress about (online) citizen participation

- I Love burgers 2012
  http://www.iloveburgers.nl/burger-participatie.html

First impression national social media

http://eparticipatiemonitor.bendeburgers.nl/

This national communication platform is especially active in the west, more dense area of the Netherlands, the Randstad. There are no dates with the messages but the website seems to be outdated because of a link made to the offline social media platform Hyves. The most popular conversations do have dates and these are in 2010/2011. This platform aims on citizen initiatives and is partially proactive because of the involvement of governments.

http://www.verbeterdebuurt.nl/

There are a lot of messages in multiple municipalities. It depends if the municipality is participating in the system. It seems that the more dense populated areas have the most messages. Not so populated municipalities seem message-less. There is a variety in positive and negative messages. Most messages posted report general problems. Problems like traffic signs, garbage problems, streetlights, maintenance playgrounds, dangerous traffic situations, parking, etc… .

http://www.voorjebuurt.nl/

A lot of messages are located in the Randstad, the centre western and more populated part of the Netherlands. There is only one message in the province of Groningen and also only one in the province of Limburg. All messages are about citizen initiatives and in this platform the economic importance is emphasized. The platform is still used and appears to be a relatively new platform.

http://www.buurbook.nl/zoek/

This platform especially has communication in the Randstad. In the north eastern part and south eastern part of the Netherlands there are not many messages. When exploring the messages outside of the Randstad it appears that most messages are commercialising for local companies. The platform appears to be currently actively used.

First impression local social media

http://www.deamstelverandert.nl/

eParticipatieaward winner of 2009. The communication platform has been offline for a long period of time. The communication in this platform has had a clear set up. In a first round participants can post idea's. Then a second round follows where there is discussed about the implementation of the ideas that are placed in the first round. After this discussion ideas are chosen to be submitted and executed.

http://timorpleincommunity.nl/

The timorpleincommunity platform originates from 2009 and is aimed on entrepeneurs or citizens that want to organise something in the indian neighbourhood in East Amsterdam. It is a network that is of importance for the potential of citizen undertaking and improve the local economy. This could have consequences for the social cohesion in the neighbourhood. It is not used.

Facebook & twitter groups citizen initiatives

Small initiatives about the reuse of spatial locations or collective farming. Often because of degradation of facilities that are not owned by a government. The collective farming seems a popular initiative.

Appendix 3: LinkedIn responses on categories

LinkedIn process

As a new general method to test assumptions made in this research, LinkedIn is used. LinkedIn is used by sharing information of this research in groups that have a subject related to this research. There, it is asked, if interested people have an opinion or idea about these tests. In this way the assumptions and set up of this research can be verified and ideas can be gathered in order to improve the continuing process. LinkedIn has been chosen because it is generally known as a more serious social media platform. It is used for profiling yourself or your organization to hire, be hired or to discuss topics related to the work of the organizations or persons. There are groups about many different subjects. For this research the Dutch groups 'Krimp: Het nieuwe denken' (Shrinkage: the new way of thinking), 'Ruimtelijke Ontwikkeling' (Spatial Development) and 'Actief burgerschap in de openbare ruimte' (Active citizenship in public spaces) are used to discuss the set up tests with people that take interest in my research. Since this method for research is relatively new, the result is unpredictable.

In an early stage of this research a post was made where the following question was asked:

Do you think there is a difference in citizen participation in shrinkage regions compared to other regions? And if so do you think I can show this by looking at the following categories?

During this stage of the research the categories were different then the set up tests described in this research. Also citizen participation was in this stage more important than citizen communication, which changed in a later stage. In appendix 2, where the LinkedIn process is described more detailed. In the posted message categories had been set that aim on the perceptions of citizens.

There were sixteen reactions where the size and content of the messages varied a lot. Some reactions had the length of one sentence while other where a whole lot longer. After interpreting the reactions the most interesting responses where:

1. Try to look also what type of citizens post the online messages.
2. Categories like history, economy, educational level and culture could play an important role in your research and are important to take into account.
3. The connection that people have to the municipality can be an important factor. Nationality and migration could indicate this.
4. Differences within the municipalities are also interesting. Is it not the case that weak neighbourhoods become more dirty while middle class neighbourhoods do succeed in starting initiatives and rich neighbourhoods have enough money to hire people or pay people to manage the neighbourhood?
5. In villages the focus will generally be on the liveability of a whole area while in the bigger villages and cities the focus will only be on part of the area.

These points have been taken into account in the process of the research. Especially in chapter 4 and 6 some of these points are added.

In a later stage of this research the tests set up have been shared in the same groups.

What if you would have a lot of tweets with a lot of hidden information in there, devided over a certain amount of municipalities that are categorized by a shrinkage score. What would you think to be interesting to compare or find and why? Also I would like to hear your opinion about the tests I set up.

Unfortunately there have not been many responses towards this post.

Based on the responses within LinkedIn 5 relations are set up in the next page as an add on for this thesis.

Demographics related to shrinkage score

When linking the shrinkage score with the difference in population in different time periods it stands out that the movement of the trend line is similar in all periods. The only thing that differs is the steepness of the line. The bigger the time period the steeper the trend line. It shows that the municipalities with a low shrinkage score, where shrinkage is indicated, have a low difference in population. The municipalities with a high shrinkage score, and thus no shrinkage, have a high increase of population.

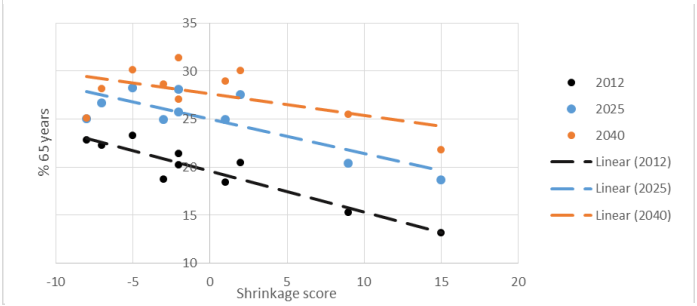

Figure 2: Shrinkage related to % 65 years

In order to indicate the working population the percentage in the age category 20-65 years is taken out. This is done for the years 2012, 2025 and 2040. It is related to the shrinkage score and it shows a clear increasing trend line. It shows that shrinkage municipalities have a lower percentage than the not shrinkage municipalities. It also shows that the line decreases over time. In 2012 the line is highest going from 50 percent to 65 percent and in 2040 the lowest going from 47 percent to 60 percent.

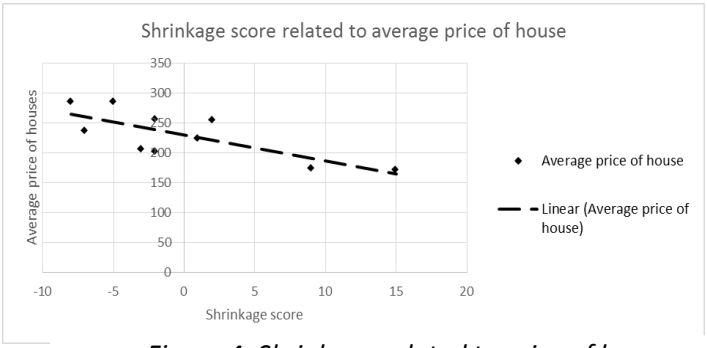

Figure 4: Shrinkage related to price of house

By relating the percentage of western immigrants and not western immigrants to the shrinkage score it is found out what type of municipalities have a higher percentage of immigrants. It shows that the high shrinkage scores, and thus not shrinking municipalities, have a higher percentage than the shrinking municipalities. It shows the same trend, for the western and not western immigrants. The data is of 2012.

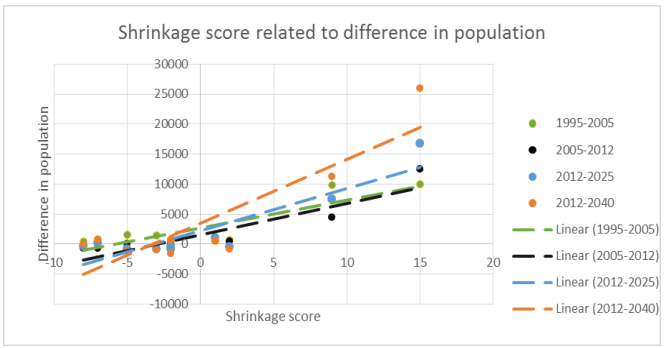

Figure 1: Shrinkage related to difference in population

The percentage of the population that is above 65 years is compared to the shrinkage score for the percentages of the years 2012, 2025 and 2040. All three lines show the same trend. It indicates that in the municipalities with a high shrinkage scores, and thus the not shrinking municipalities, the percentage of people in the age 65 and older is lower. It does seem that the trend line gets less steep in the future. The line of 2012 is steepest and the line from 2040 is most straight.

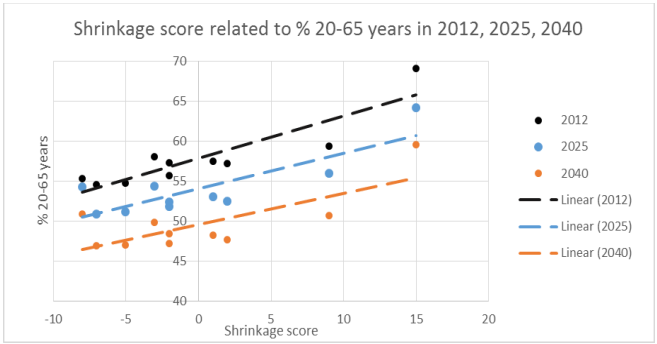

Figure 3: Shrinkage related to % 20-65 years

The average price of houses is linked with the shrinkage score in Figure 4. It shows a clear trend that how higher the shrinkage score is the lower the average price of the houses. This indicates that in not shrinking municipalities the average price of houses is lower than the average price of houses in municipalities that do have a low shrinkage score.

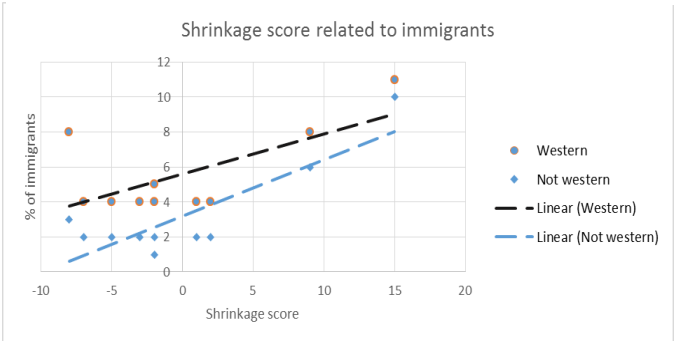

Figure 5: Shrinkage related to immigrants

Appendix 4: Questionnaire

Name: ....., Age: ....., Educational level: .....

"The tone of the tweet" 1: Positive 2: Neutral 3: Negative **"Aimed on what time"** 1: Past 2: Now 3: Future 4: Uknown/timeless **"The subject of the tweet"** 1: him/her self 2: Other subject 3: Unknown

Tweets	The tone of the tweet	Aimed on what time	The subject of the tweet
TEXT OF A TWEET	1 or 2 or 3	1 or 2 or 3 or 4	1 or 2 or 3

Naam: ....., Leeftijd: ....., Opleidingsniveau: .....

"De toon van de tweet" 1: Positief 2: Neutraal 3: Negatief **"Gericht op welke tijd"** 1: Verleden 2: Nu 3: Toekomst 4: Onbekend/Tijdloos **"Het onderwerp van de tweet"** 1: De twitteraar zelf 2: Ander onderwerp 3: Geen idee

Tweets	De toon van de tweet	Gericht op welke tijd	Het onderwerp van de tweet
[1] "Zie hier @MidnightStar__ staat op de kalender. http://t.co/XJncRRHy24"			
[2] "Wat ben jij een vrezelijke kuthoer"			
[3] "Leuk zo''n halte bij Annen maar dan moet er wel gebruik van gemaakt worden"			
[4] "Wie wilt me eventjes naar Hofsteenge brengen zodat ik kaartjes kan halen .... Ben lui ?"			
[5] "Gratis pendel dienst vanavond in #gieten bij de #glammour night. Verzorgd door taxi nijmeijer"			
[6] "Het leven is niet altijd makkelijk maar accepteer het en ga door met je leven want ooit kom alles goed ?"			
[7] "@112groningennl was de tel al kwijt... :-)"			
[8] "Hier ook #storing bij #kpn heeeeel irritant!!"			
[9] "Bij de buurtjes borrel drinken met papÃ¡ , broer en denise"			
[10] "Wandelen met de familie pollema #veelstemoe"			
[11] "@GERBEN___ fijn dankje"			
[12] "@Jolanndaa je treft het wel met hrt weer haha"			
[13] "Slapenn"			
[14] "Een weekendje vrij van beide baantjes, en ik heb oprecht geen idee wat ik de hele dag moet doen.."			
[15] "\"@xElize95: @Londenbitch @_claudiiax zodat ze samen dat misbaksel van een kind kunnen opvoeden.. neh zou te saai zijn voor gtst\" true"			
[16] "@winnower1 It''s well worth viewing! This updated version is top!"			
[17] "De tv alweer afgestemd op @Cultura24 voor het radio/tv evenement van het jaar : De Top 2000! #top2000 @Radio2_nl @Top2000nl"			
[18] "@trienuz dat was echt super idd.."			
[19] "Profiel* #vt"			
[20] "@karinrixt its live.... moderne vrouw"			
[21] "TGT - I Need ? gewoon mooooi"			
[22] "Bezig met ontwerpen betaalbon voor @OpenCoffeeHaren - bijna klaar voor de drukproef bij @DrukkerijvanArk http://t.co/jCQasfMzNO"			
[23] "?@sterre_zrjcg: ?@StephanieLews: ?@85462547685: RT @onblij: ik heb er 30 http://t.co/YyzvvRh7YO - 52 :s - 33? 46 ..? 36"			
[24] "Boodschappen gedaan met mam, vergeet ze haar portomonee ...."			
[25] "La la la la koud in bed"			
[26] "Oke geen Groningen want leo heeft straf.. Pfff"			
[27] "Zo schaatsen! ?"			
[28] "Geen zin in maandag :''("			
[29] "Huiswerk maken x"			
[30] "?@sannnneeeee: \"@Saskiabuntsmax: \"@TheWordsPorn: \"bikini season is coming , are you ready?\" \n\nme: http://t.co/AetzOMo6zY\"\"?"			
[31] "Wakker zo ff douche ff bellen voor stage daarna dokter ...n"			
[32] "Tering bende"			
[33] "Jill ! #tvoh"			
[34] "\"@iiamCaTarina_: A good relationship is worth the wait..? - just this"			
[35] "geen idee wat je wilt... ene keer doe je super lief, andere keer doe je net alsof je me niet kent..."			
[36] "?@RRumahloine: Niemand is te oud voor ballorig!! @xxPrincesjeexx @xxPrincesjexx? zo waar:?"			
[37] "Dobranoc xx"			
[38] "@xgreeneyedchick :(hahahah"			
[39] "@Grasbaal nee. Zowel via Twitter als met safari (op mobiel) zelfde melding. Misschien wel op pc."			
[40] "\"@Linkdeleuke: Met wie heb je veel leuke momenten gehad ? #linkdeleuke\"@xtessaaxo @JBALAYLMx @xgreeneyedchick @DTDB_ @justcilliex"			
[41] "Ik moet invallen in een ander gebied. Inplaats van 15 nu 75 min. rijden. Soms heeft dat ook voordelen. #top2000 #fb"			
[42] "1-0 fra-Ned."			
[43] "I''m at Onder De Linden (Vries, Drenthe) http://t.co/UyfqXz62lJ"			
[44] "Vanavond gourmetten met familie"			
[45] "Op naar the big city of Haren"			
[46] "Ik wil een Logitech headset #smoare"			
[47] "Wauw"			
[48] "Twitter is soms best handig"			
[49] "I''m a panda. ?"			
[50] "@kusjerobinjess &amp @joriswag http://t.co/NNKXN6Tpk4"			

Appendix 5: Associated words

Municipalities	Words	most ass. Word	Correlation	second most ass. Word	Correlation	third most ass. Word	Correlation
Aa en Hunze	school	naar	0.17	morgen	0.16	rij	0.16
	zorg			No clear indication			
	club			No clear indication			
	park	heengaan	0.58	linkin	0.58	stijlvol	0.58
Assen	school	omwt	0.16	tot	0.14	naar	0.12
	zorg	verpleegkundigen	0.32	administratie	0.26	No clear indication	
	club	drentsche	0.44	golf	0.42	country	0.32
	park			No clear indication			
Borger-Odoorn	school	naar	0.2	overslaan	0.15	morgen	0.12
	zorg	gespecialiseerd	0.67	ouderen	0.6	goedemiddag	0.58
	club			No clear indication			
	park	jurrasic	0.5	plaatjes	0.5	south	0.5
Groningen	school	hate	0.18	naar	0.11	morgen	0.09
	zorg			No clear indication			
	club			No clear indication			
	park	aerial	0.35	central	0.35	south	0.23
Haren	school	ingepland	0.18	koooud	0.18	scheve	0.18
	zorg			No clear indication			
	club	dallas	0.53	buyers	0.52	squash	0.36
	park	bungalows	0.89	verblijven	0.89	managers	0.63
Midden-Drenthe	school	naar	0.22	overplaatsen	0.2	gepest	0.19
	zorg	veranderingen	0.43	No clear indication			
	club	goedbedoeld	0.36	No clear indication			
	park	afgestoken	1	parkgrenzen	1	vuurwerkvrij	1
Noordenveld	school	0810	0.2	naar	0.2	08451415	0.17
	zorg	klagen	0.6	oeganda	0.6	ontevreden	0.6
	club	merelilse	0.6	overlopen	0.6	amen	0.43
	park	central	0.71	httptco9tlywtrggn	0.71	seasonpix	0.71
Ooststellingwerf	school	naar	0.17	90s	0.13	realized	0.13
	zorg	ncrv	0.71	informatie	0.5	maat	0.5
	club	chrisbanaan	1	large	1	bouma	0.58
	park	south	0.68	nationaal	0.57	drentsfriese	0.43
Tynaarlo	school	naar	0.16	jamer	0.15	morgen	0.12
	zorg			No clear indication			
	club			No clear indication			
	park	httptcoryp2yrnixv	0.71	toegangspoort	0.71	wedbroeken	0.71
Westerveld	school	naar	0.22	dagje	0.21	gewoonlijk	0.17
	zorg	gemeenten	0.52	goedzorgen	0.52	No clear indication	
	club			No clear indication			
	park	nationaal	1	dwingelerveld	0.74	boswandeling	0.39