



A data infrastructure that automatically collects animal identification real-time

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Goal

A technology and infrastructure that automatically retrieves animal ID real-time.

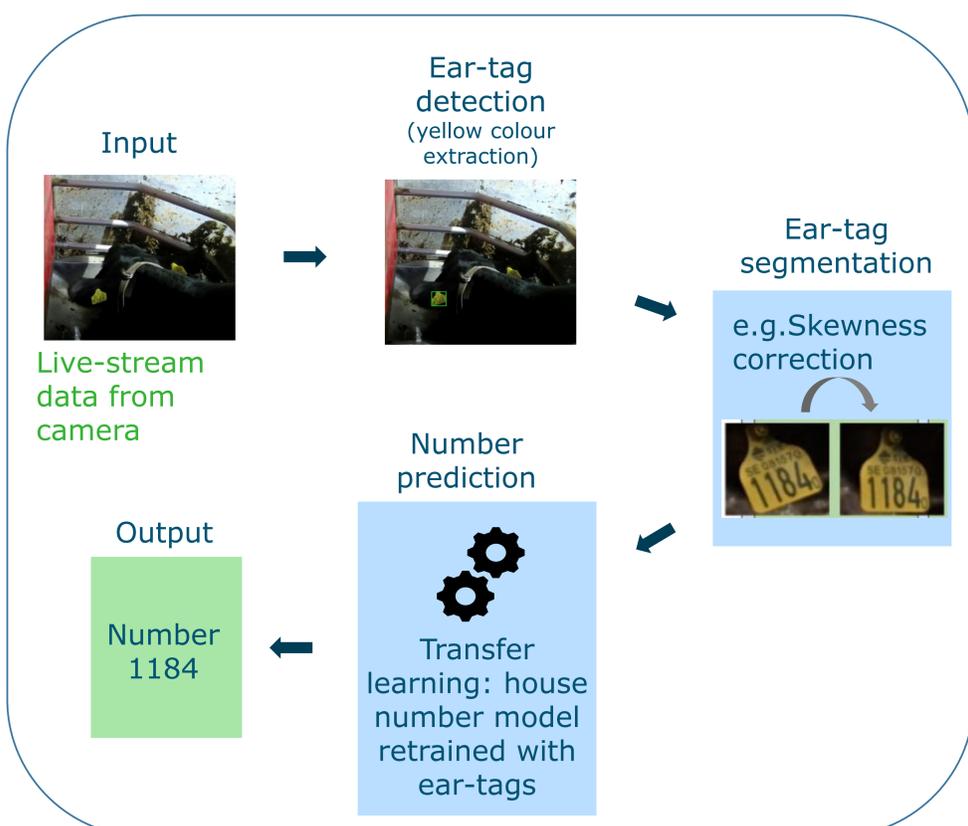
Background

With the technological developments in precision dairy farming, streams of collected data are increasing rapidly. To fully utilize these data, different data streams need to be combined using animal ID as key identifier. However, not every technology records animal ID and if they do, it is not straightforward to retrieve animal ID automatically and real-time.

The use of video is an attractive approach to achieve this because it offers 24/7 monitoring, and is a relatively cheap investment. We considered the use of video to 'read' the 4-digit number of the ear-tag, and to only store this number together with a timestamp as real-time animal ID tool.

Ear-tag detection and number recognition

1. Detection of the ear-tag area; yellow colour extraction using openCV in python
2. Digit segmentation using image processing technique
3. Number recognition using a convolutional neural network model



Model

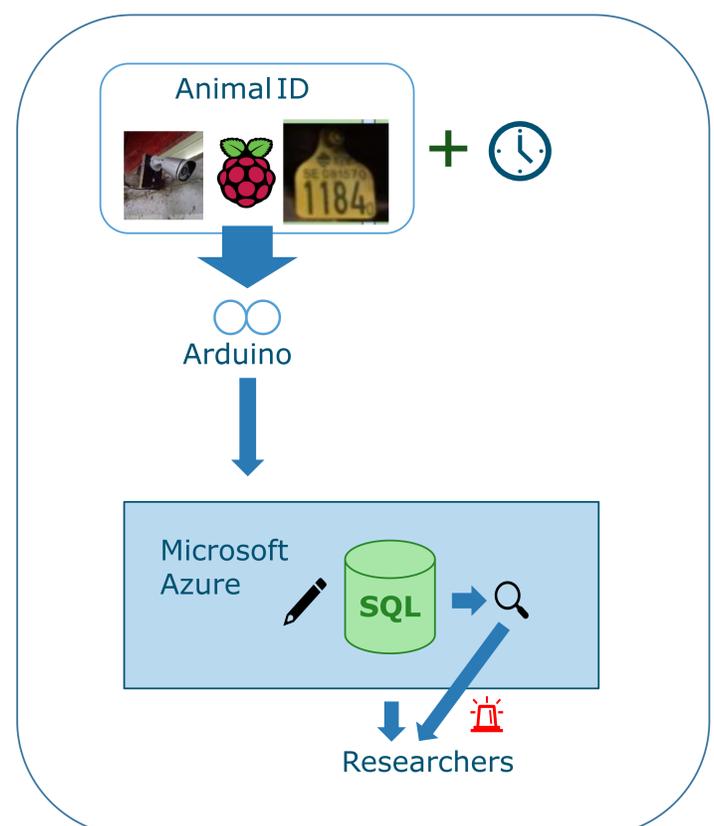
As labelled images of ear-tags were scarce, transfer learning using a pre-trained convolutional neural network model (trained on Street View House Number dataset) was used. This model solve a similar issue: reading house numbers from street view. The model is retrained with 600 ear-tag images and validated with 75 images (accuracy: 98%). This fine-tuning increased the accuracy of a test set of 75 images from 80% to 87%

Number of correctly predicted digits with pretrained and retrained models.

# correct digits	Pretrained House number model	Retrained model
4	36	48
3	21	19
2	14	3
1	4	5

On-farm infrastructure

An infrastructure on-farm composing of a video station involving a Raspberry Pi, fitted with a high quality camera. The camera (FOSCAM FI9901) is installed in a milking robot, which records in top view the head of the animal from behind. The Raspberry Pi is programmed to detect the ear-tag from the live-stream, to read the number (4-digits), and to push just this number, together with a timestamp, to a database via an Arduino (SAM21).



Acknowledgements

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