

10. A tracking-by-detection method to study social networks based on proximity in pigs

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A better comprehension of social interactions may help to understand and improve the group functioning of commercial pigs. Social network analysis is a powerful tool to quantify interactions and identify the social roles of each individual. Previous social network studies mostly relied on manual annotations of small samples. Recent advances in sensing technologies and artificial intelligence provide new opportunities to monitor social behaviours continuously, at an individual level, and over a long period. The aim of this preliminary study was to investigate the potential of a computer vision algorithm to monitor interactions based on spatial proximity and to explore how sampling methods and network definitions affect social networks. For this purpose, video data has been collected in 12 pens, each containing 6 pigs. A tracking-by-detection method (YOLOv3 combined with SORT) was applied to detect the location and track each individual. Networks were constructed with different definitions of proximity based on minimum time and inter-individual distances, and we analysed whether individuals exhibit similar positions across these networks. To assess the effect of sampling methods, estimated networks from different subsamples of the dataset were compared to the complete network. Our preliminary results indicate that network definitions and sampling methods affect network parameters at the group and individual level. We conclude that the proposed tracking algorithm is a promising method to generate large quantities of data and quantify the pigs' social structure. The results highlight the need to develop standardized methods regarding network definitions and sampling for further investment in the group structure.