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Quantifying Social Behaviour: Animal Tracking with DeepLabCut

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Abstract

This thesis aims to provide a comprehensive investigation into the use of DeepLabCut (DLC) as a robust tool for quantifying social behaviour in neuroscience research. Traditional methods for analysing social behaviour often rely on subjective and ambiguous techniques, such as manual or semi-automatic tracking. These approaches are time-consuming, prone to bias, and lack precision. DLC, a machine-learning tool, offers a solution by accurately quantifying behavioural data and generating ethograms based on annotated points on animals' bodies. In this thesis project, I focus on establishing and optimising the DeepLabCut within the limitations of our research group's available resources. To achieve this, I installed a graphics card, implemented DLC, and contributed to the collection of data from social memory tests conducted in our laboratory. By conducting these tests, I aimed to investigate the behavioural responses of mice to various stimuli and interactions. To analyse the acquired data, I developed Python code that uses DLC parameters to classify different behaviours exhibited by the mice. This involved refining my coding skills in data categorization, visualisation, and statistical analysis. The tracking model implemented in this study was evaluated using real-world data provided by the Radulovic Laboratory at Aarhus University, Department of Biomedicine. This dataset involved tracking and monitoring the movements and interactions of mice within an enclosure. By applying the DLC tracking model to these datasets, I assessed the effectiveness and performance of DLC in the context of analysing social behavior.The findings of this study demonstrate the successful implementation of DLC as a powerful tool for quantifying social behaviour in mice. The optimised DLC system proved to be accurate and efficient in tracking and analysing the intricate behavioural responses of the mice during social memory tests. Furthermore, the developed Python code facilitated the classification and interpretation of the behavioural data. In conclusion, this thesis project highlights the potential of DLC as a valuable tool in the field of neuroscience research, specifically in the quantification and analysis of social behaviour. The findings presented here contribute to a deeper understanding of social memory tests in mice and pave the way for future advancements in the field of behavioural analysis.

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