Anomaly Assessment of Social Behavior among Multiple Animals

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Abstract (should be within 1st page)

Studying open-field animal social behaviors is essential for understanding various mental conditions. Existing research is often limited by the reliance on predefined behavioral patterns and the constraints imposed by short observation periods. Infrequent or hierarchical behaviors, which may offer deeper insights, typically require extended observation times. To address these challenges, unsupervised learning algorithms have become critical, enabling the discovery of patterns in unlabelled data without the need for exhaustive manual annotation. In this study, we propose a reconstruction-based multi-scale autoencoder model to detect anomalous social behaviors in mice from long-term video recordings. The model is trained on groups of normally reared mice and then used to estimate the reconstruction error for other groups during the testing phase. The validity of our model is demonstrated by higher anomaly scores in mice raised under non-traditional conditions compared to conventionally reared groups. Our model overcomes the limitations associated with predefined behavioral analysis and shows adaptability across different scenarios.