論 文 の 内 容 の 要 旨

論文題目 Social Group Analysis from Surveillance Video using Attention-Based Cues
（人物の注意を手掛かりとしたサーベイランスカメラ映像における集団の解析）

氏　　名　　ジャムウェイハー　イサラン

Understanding of social groups has recently attracted a lot of interest due to its application to various research fields. Social group information has been used to improve the accuracy of pedestrian tracking in low frame rate videos, to analyze human behaviors, or to provide more realistic results for tasks such as crowd simulation.

It can be observed that humans in the same social group tend to act in unison rather than individually and activities performed in social groups also differ from those performed by individuals. For example, humans from the same social group tend to talk and pay attention to one another, while ignoring those from different social groups. They also tend to stay in close proximity and move in similar direction. These observations suggested that social group discovery can be performed with two types of visual cues, attention-based cues, such as how pedestrians pay attention to one another, and position-based cues, such as relative distances or movement direction between pedestrians.

This paper describes our approach to social group discovery by using the cues described above. In surveillance videos, it is generally accepted that human attention can be accurately estimated from their head pose. The first part of this thesis describes an approach to estimate human head pose, which is the most important information for calculating attention-based cues. The approach can obtain a robust head pose estimator without requiring any prior training data, and is also robust to appearance differences within the scene.

An approach to discover human social group is described in the second part of this thesis. We first describe an approach to estimate the group probability for each pair of pedestrians in the video. The group probability measures how likely each pair of pedestrians are in the same social groups using pairwise measurements based on their attention and position. A hierarchical clustering–based approach is then applied to discover social groups based on the calculated group probability scores.

Throughout these approaches, social group information can be robustly acquired. This would surely enrich current social group analysis processes and makes it possible for more detailed and real–time analyses, which would open up new possibilities for vast array of applications.