

# CROWD BEHAVIOR ANALYSIS

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## Problem and Motivation

Our aim in this project is to analyze crowd scenes to detect the behavior of pedestrians. This involves human action recognition and automated analysis of crowd behavior. Both of these are rapidly growing fields of research in computer vision, having applications in surveillance, crowd safety and abnormal event detection.

## Approach

We will use Improved/Dense trajectories [1] [2] to extract the actions of the humans involved in the crowd scene. Improved trajectories handle camera motion and angles by subtracting the camera motion from overall optical flow [2]. Based on the extracted actions we will model the crowd scenes as clusters of different social situations (unsupervised learning) and then detect the behavior of pedestrians as being normal/abnormal or otherwise. We wish to use socially-aware large-scale crowd forecasting [3] to predict normal behavior of people and then compare it with the observed behavior to detect anomalies at finer semantic scale.

## Related Works

Density-aware person detection and tracking in crowds by *M. Rodriguez* [4]

Tracking in Unstructured Crowded Scenes by *M. Rodriguez* [5]

Crowd Behavior Analysis using Histograms of Motion Direction by *Hannah M. Dee and Alice Caplier*

## Datasets

There are several datasets available for crowd behavior analysis:

- 1) The dataset used in [3] available at request from [www.ivpe.com/crowddata.htm](http://www.ivpe.com/crowddata.htm)
- 2) PETS2009 crowd behavior public dataset.

## References

- [1] Action Recognition with Improved Trajectories, *Heng Wang and Cordelia Schmid*
- [2] Action Recognition by Dense Trajectories, *Heng Wang and Cordelia Schmid*
- [3] Socially-aware Large-scale Crowd Forecasting, *Alexandre Alahi, Vignesh Ramanathan, Li Fei-Fei*
- [4] Density-aware person detection and tracking in crowds, *M. Rodriguez*
- [5] Tracking in Unstructured Crowded Scenes, *M. Rodriguez*
- [6] Crowd Behavior Analysis using Histograms of Motion Direction, *Hannah M. Dee & Alice Caplier*