

Average shortest squared distance metric for trajectory comparison in event detection applications

**D.A. Padmasiri*, R.A.A. Rupasinghe, S.G.M.P. Senanayake
M.P.B. Ekanayake, G.M.R.I. Godaliyadda and J.V. Wijayakulasooriya**

*Department of Electrical and Electronic Engineering, Faculty of
Engineering, University of Peradeniya, Sri Lanka*

**da.padmasiri@gmail.com*

In the context of machine learning, pattern recognition and event detection plays a major role because of the increased threat of terrorism and crime. It is widely used in applications such as traffic flow analysis and video surveillance in security applications.

According to literature, the most frequently used way of recognizing patterns in a given video is extracting sets of feature trajectories of different features from the video and classifying them based on their pair wise disparity. In event detection, it is essential to identify the location trajectory of an object correctly. In this study, it was attempted to classify location trajectories based on the shape alone. Although the most suitable metric in the literature is Hausdorff distance metric, the spectral clustering which is the classification algorithm to be applied for the metric requires a symmetric disparity metric. Therefore, this was not used due to the asymmetry. Dynamic Time Warping (DTW) was the most suitable distance metric on which spectral clustering could be applied. All the same, it captures both shape and directional information of trajectories.

ASSD is basically a metric which measures the disparity between two location trajectories. In this study, for given two location trajectories, first the longer one was identified. Then, for a given point on the longer location trajectory, the Euclidean Distances with respect to each point on the shorter location trajectory was computed and the shortest value was identified. This computation was repeated for all the points on the longer location trajectory, and the average value of all such computed shortest Euclidean distances was obtained. This average value was considered as the disparity measure between the two considered trajectories.

For a set of location trajectories extracted from a video stream, both DTW and ASSD metrics were applied in parallel, and the obtained results were compared; hence the fact that the desired results can be obtained using the proposed method was justified. Further, the significance of the proposed method in pattern recognition and event detection applications was illustrated through this work.