
Kolekar, Dash

HMM-Based Human Activity Recognition

1 Abstract

The goal is to automatically detect human activities, a task simplified to multinomial classification for the purposes of the paper (given video footage of a human, is the human (a) walking, (b) running, etc.?). The authors extract and fuse *shape* and *optical flow* features and use these as the observations for per-activity HMMs. They achieve perfect or near-perfect classification accuracy for all activities mentioned, outperforming LS-SVM's average accuracy of 80%.

2 Method

Starting with raw video, the authors subtract the background, determine regions of interest, and then extract shape and optical flow features. These are passed into a k -means clustering algorithm, which provides an alignment for each time-indexed feature with one of k states. Such aligned sequences are used to train HMM models for each activity (i.e. all sequences corresponding to one activity should be used for one HMM).

During test time, we won't know the activity, so we can perform MLE with our pre-built HMM models.

The authors use the Baum-Welch algorithm to train each HMM.

References

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