Assignment: Action Recognition from Motion

Due June 9

In this assignment you will perform some basic action recognition using motion features.

Part 0: Dataset

We will use a portion of the Weizmann Human Action Classification Dataset[1]. Please obtain the video frames from the tarball on the course website. 3 instances of 3 different actions (run, walk, jump) are located in this directory.

Part 1: Human Detection Via Background Subtraction

Implement a simple human detector by computing the median of the foreground for each frame of each video. Please use the method of your choice for background subtraction. A simple method that is effective for this dataset is to take the median value of each pixel of a video over time as a background image, then threshold the absolute value of differences to this background image.

Part 2: Histograms of Optical Flow

The code in `lk3.m` provided on the course website computes optical flow on a video. Please see `flow_example.m` for example usage. Run this code over the videos provided. Split the optical flow into 4 channels, as in the Efros et al. ICCV 2003 paper. Collect these flow values into a spatial histogram for each video frame. E.g. if you use an N by M pixel rectangular window centered around the human detection, you should construct a $K_1 \times K_2$ dimensional histogram using rectangular spatial cells of N/K_1 by M/K_2 pixels, for each channel. The final histogram would have $K_1 \times K_2 \times 4$ bins.

Part 3: Classification

Perform per-frame classification of the video frames into the 3 different categories. Use the classifier of your choice, and feel free to download code that implements this classifier. State the classifier you used, and where you obtained the code, in your report. Also state your experimental setup (e.g. cross-validation, which videos were train/test, etc.) in your report.

[1] `http://www.wisdom.weizmann.ac.il/~vision/SpaceTimeActions.html#ClassificationDatabase`

Submitting Your Assignment

You should create a report demonstrating the stages of your assignment solution in PDF format. Make sure it is clear what is shown in each figure. **DO NOT INCLUDE SOURCE CODE.**

Submit your assignment using the online assignment submission server at: `https://submit.cs.sfu.ca/`