CSC 665 – Final Project Proposal

Assignment 4

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What you are going to implement?

Using temporal information in the data for classification.

I will be implementing a blink detector, which combines Hidden Markov Models and Support Vector Machines to model the temporal dynamics of eye blinks [1].

How it relates to your work?

My current research involves Blink Rate Detection from videos. There is conclusive evidence that blink rate is related to decision making in situations involving risk, deception detection etc.

How will you know that you succeeded?

This method comprises of four main steps:

- Extracting features for each frame from an eye image sequence. I will use openFace [2] software to obtain facial landmarks. I will use 3 popular features namely: Histogram of Gradients (HOG), Pixel Intensity and Optical Flow[3], and compare their performance in blink detection.
- Classifying those features for each frame.
- Training Hybrid Temporal models.
- Using Leave One Out or 10-Fold Cross Validation obtain blink detection accuracy.

My aim is to build the blink detector following the above 4 steps and get the blink detection accuracy for the temporal model.

How will you know that the technique is good?

I compare the blink detection accuracy of temporal model with the detection accuracy of a multi-class SVM classifier. I should be able to notice a significant improvement in blink detection accuracy for the temporal model.

What the data set is going to look like?

Training data will involve a sequence of frames extracted from videos. I have gathered 5 minute videos of people taken in the lab, where the camera is focused on their face with constant lighting conditions. I have also manually annotated the dataset for blinks.

REFERENCES:

[1] Sun, Y., Zafeiriou, S., & Pantic, M. (2013). A hybrid system for on-line blink detection. In *Hawaii International Conference on System Sciences*.

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[3] Stavens, D. (2007). The OpenCV library: computing optical flow.

[4] Revesz, P., & Triplet, T. (2011). Temporal data classification using linear classifiers. *Information Systems*, *36*(1), 30-41.