HMM Based One Shot Gesture Recognition

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Challenges
Challenges
Challenges

Small
Challenges

Small

vs.
Challenges

Small

vs.

Large
Challenges

Small vs. Large

What matching criteria to use?
Challenges
Challenges
Challenges
Challenges

Confuse body movement with gesture
Challenges
Challenges

Train (11.22s)  Test (4.63s)
Challenges

Train (11.22s)  Test (4.63s)

Confuse turning off video with gesture
Frame Matching
Frame Matching

Histogram of Gradients (HoG)
Frame Matching

Histogram of Gradients (HoG)
Frame Matching

Histogram of Gradients (HoG)

32x32
Frame Matching

Histogram of Gradients (HoG)

32x32
Frame Matching

16x16

Histogram of Gradients (HoG)
Frame Matching

Histogram of Gradients (HoG)
Frame Matching

= feature vector

Histogram of Gradients (HoG)
Frame Matching

Train One vs. All LR Classifier

Output: $p(\text{frame})$
Gesture Matching with HMM
• Next frame
• Skip $n$ frames
• Self transitions
- Next frame
- Skip $n$ frames
- Self transitions
- Transition to beginning of another clip
• Inference with Viterbi Algorithm
• Unary scores = LR model output
• No pairwise scores
• First/last $m$ frames optional
Results
Results

• **Scale variations:** HoG of different scales

• **Extra gesture noise:** First/last 5 frames of HMM considered optional

• **Body movement:** Maximize unary potential over translations