Activity Recognition using Motion History Images

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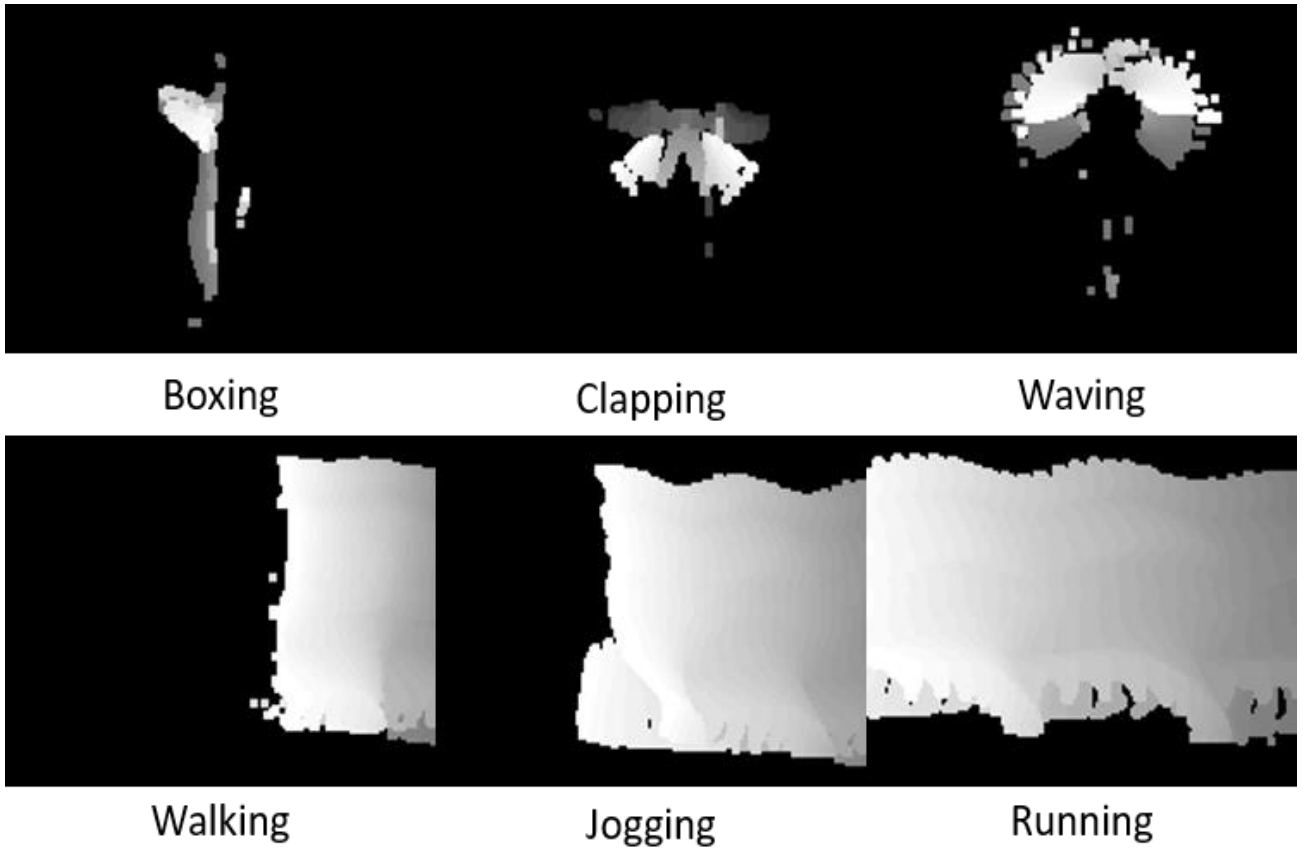
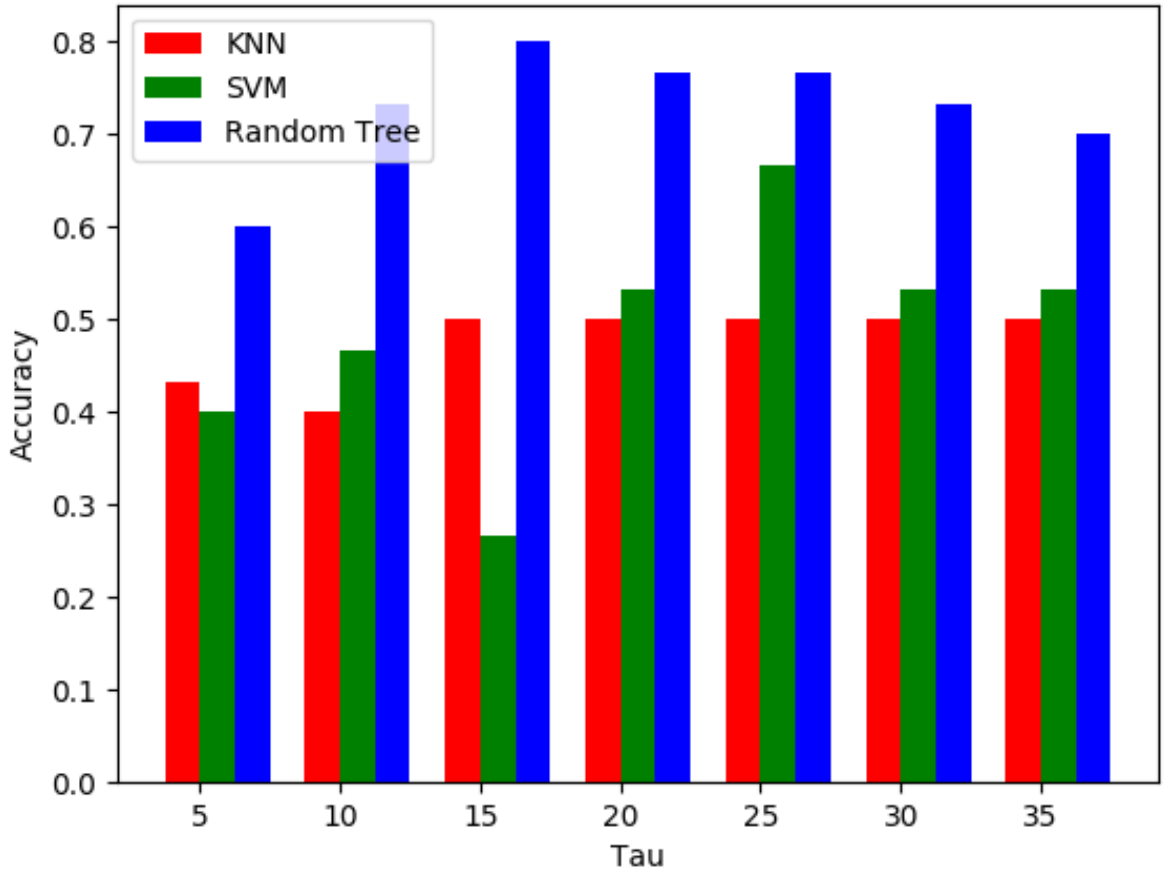
GEORGIA TECH - CS 6476

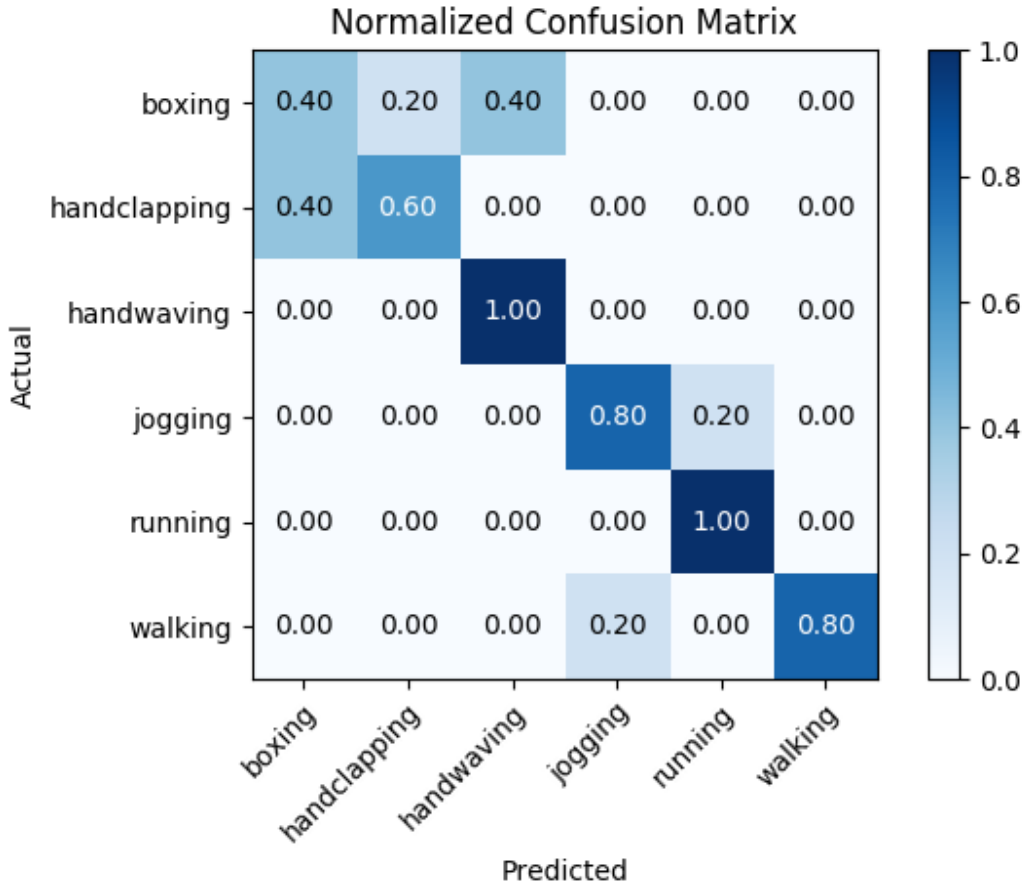
Methods

- Calculate MHI and MEI
- Calculate Hu Moment Descriptor
  - Central Moment
  - Scale-Invariant Moment
  - Test on multiple features
- Train classifier
  - KNN
  - SVM
  - Random Forest
- Test classifier



Results


KNN
SVM
Random Tree
Accuracy
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
5
10
15
20
25
30
35
Tau


Normalized Confusion Matrix
boxing
handclapping
handwaving
jogging
running
walking
Actual
0.40 0.20 0.40 0.00 0.00 0.00
0.40 0.60 0.00 0.00 0.00 0.00
0.00 0.00 1.00 0.00 0.00 0.00
0.00 0.00 0.00 0.80 0.20 0.00
0.00 0.00 0.00 0.00 1.00 0.00
0.00 0.00 0.00 0.20 0.00 0.80
boxing
handclapping
handwaving
jogging
running
walking
Predicted
1.0
0.8
0.6
0.4
0.2
0.0

Video Methods

- Generate continuous MHI from most recent 20 frames
- Use this MHI in prediction
- Output prediction and probability of each label

https://youtu.be/Ux76p2-zn6o

Challenges

- **Challenge:** MHI is highly dependent on the subject standing still
  - **Fix:** More training images to capture both potentials.
    - Tend to lose distinction between classes.
  - **Fix:** Track body parts/features
    - Difficult implementation, lose computational benefits of MHI
- **Challenge:** Subject must perform activity exactly as trained
  - **Fix:** Use a better recognition method
    - This one is a killer flaw – can't achieve robust results in real-world settings.