



Human Activity Recognition using Smartphone

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(<https://github.com/gornes>)



Problem Statement

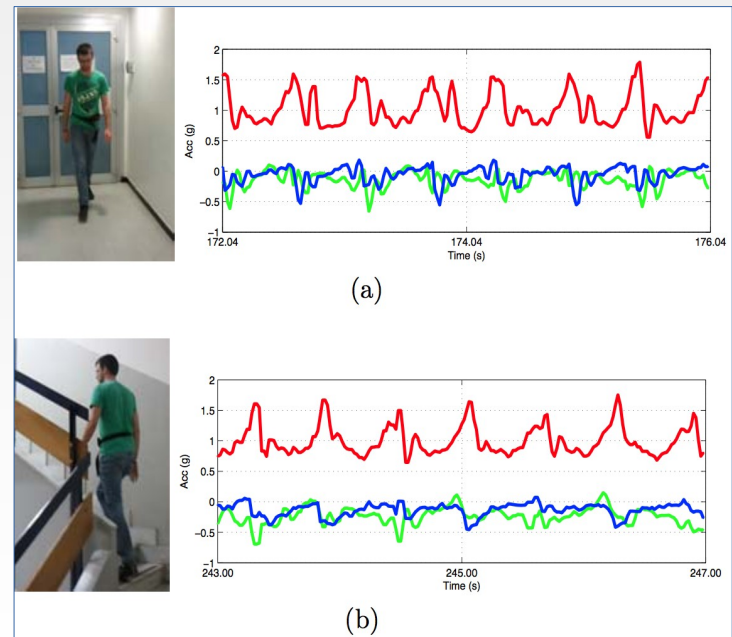


- Classify Human Activity from Smartphone Data



Data

- Data Set: 10299 Samples, 651 Features
- 30 people, 6 activities
- Sensor Data: Accelerometer & Gyro
- Signal Domain: Time & Frequency





Previous Approaches

➤ SVM Accuracy: **89.3%**

Method	MC-SVM						
Activity	Walking	Upstairs	Downstairs	Standing	Sitting	Laying	Recall %
Walking	109	0	5	0	0	0	95.6
Upstairs	1	95	40	0	0	0	69.8
Downstairs	15	9	119	0	0	0	83.2
Standing	0	5	0	132	5	0	93.0
Sitting	0	0	0	4	108	0	96.4
Laying	0	0	0	0	0	142	100
Precision %	87.2	87.2	72.6	97.1	95.6	100	89.3

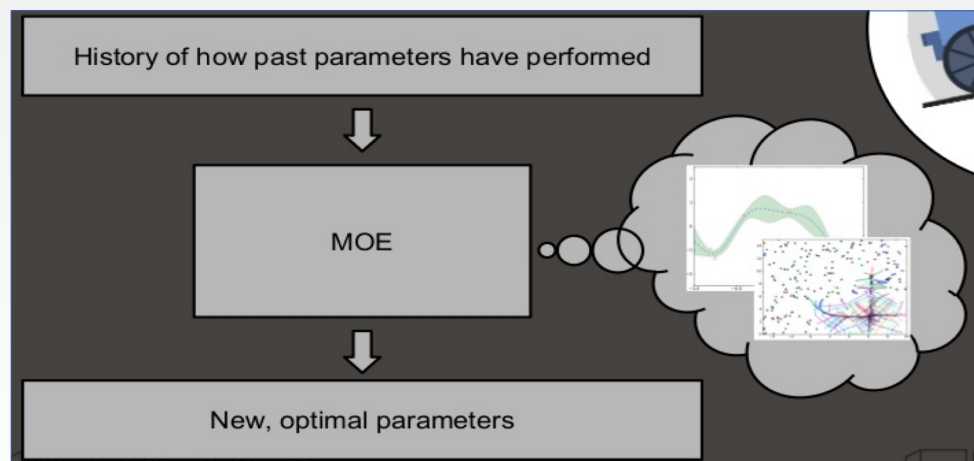
➤ Linear SVM Accuracy: **96.40%**

Approach Implemented	Accuracy
OVO Multiclass linear SVM with majority voting.	96.40%
Kernel variant of learning vector quantization with metric adaptation	96.23%
Confidence-based boosting algorithm Conf-AdaBoost.M1.	94.33%



Applied Approach

- Parameter Optimization:
 - Grid Search
 - **Yelp MOE**
- Models / Classifiers:
 - Support Vector Machine
 - Random Forrest
 - AdaBoost
 - **XGBoost**
 - Ensemble





Results

Approach	Accuracy [%]
SVM	96.50
XGBoost	95.76
Ensemble	94.77
RF	92.84
AdaBoost	91.55



Next Steps

Confusion Matrix

Activity	Walk	Walk Up	Walk Dawn	Stand	Sit	Lay	Recall %
Walk	487	6	3	0	0	0	98.2
Walk Up	12	457	2	0	0	0	97.0
Walk Dawn	5	26	399	0	0	0	92.6
Stand	0	0	0	449	40	0	91.4
Sit	0	0	0	7	525	0	98.7
Lay	0	0	0	0	0	537	100
Precision %	96.6	93.1	98.7	98.5	92.9	100	96.5

- Improving Dynamic & Static Classification



Thanks!

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