

Objective:

1. Train accurate classifiers to correctly predict human activity with smartphone embedded sensors data.
2. Attempt to determine the “right” algorithm for the challenge.

Field:

Human Activity recognition(HAR):
sensor-based, single-user activity recognition.

Citation

Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and Jorge L. Reyes-Ortiz. A Public Domain Dataset for Human Activity Recognition Using Smartphones. 21th European Symposium on Artificial Neural Networks Computational Intelligence and Machine Learning, ESANN 2013.

Bruges, Belgium 24-26 April 2013.

Tools:

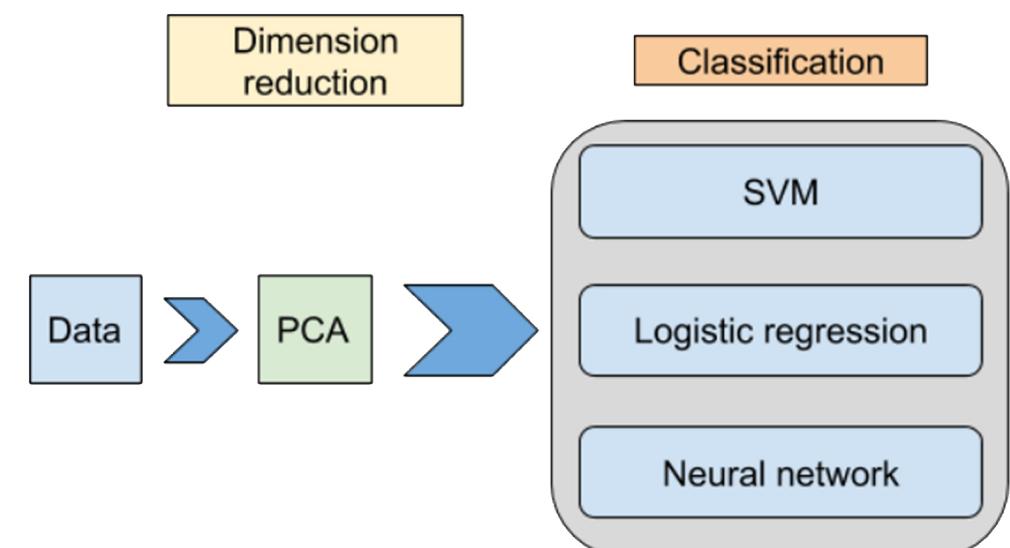
- Python 3.6
- Matplotlib for data visualizations
- Pandas for data extraction
- Sklearn for “out of the box” algorithms
- TensorFlow and Keras for neural network implementation

Methods:

Train 3 different classifiers based on ML supervised learning algorithms:

- SVM
- Multinomial logistic regression
- Simple neural network

Dimension reduction via PCA algorithm to improve runtime.

**Results:**

The classifiers showed a high level of accuracy:

- SVM: 95.728%
- Logistic regression: 94.563%
- Neural network: 96.601%

- We can see that the neural network was slightly more accurate, due to the negligible difference it's hard to determine which classifier matched the problem most.
- The dropout layers were an excellent choice to avoid over-fitting in the neural network.

Future:

- Use different test and train split, the 90/10 division may caused a over-training issue in all the classifiers.
- Try a smaller dimension reduction, e.g 50 dimensions instead of 36.
- Use less nodes in the neural network while maintaining same accuracy to improve performance.
- Use other algorithms to create a wider view of the existing alternatives.

