CSL7460

CSL7460 Mobile and Pervasive Computing

Mobile Sensing and HAR - Final Report

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Project Details

Project Title **:** Research-Oriented Study of Mobile Sensing and Human Activity Recognition

Due to the widespread availability of low-cost wearable devices and portable computing devices, massive amounts of data, such as motion, location, physiological signals, and environmental data, are being captured. Human activity recognition (HAR) is a research topic that aims to understand how human behavior develops through the interpretation of attributes derived from data.

Relevant Documentation Links

- Human Activity Recognition Part 1.ipynb
- Human Activity Recognition Part 2.ipynb
- Project Presentation
- Project Report
- Project Files Repository

Implementation

For: Human Activity Recognition Part 1.ipynb

This colab file includes the implementation of three models namely: **Decision Tree, Random Forest** and **Logistic Regression classifiers**. In addition, it contains the analysis of the results in terms of **Accuracy** and **Run Time** along with comparing the Feature Selection Technique on this dataset - Dataset Link

1. Data Visualization
2. Pre-processing
3. Feature Extraction
4. Classifier Training & Validation Strategy

For: Human Activity Recognition Part 2.ipynb

This collab file includes the implementation of the **2D CNN model** with the focus on distinguishing between Sitting and Standing activities on this dataset - Dataset Link

1. Standardize data
2. Frame Preparation
3. 2D CNN Model

Major learnings/takeaways from Project

- Studied multiple papers related to Human Activity Recognition to find out the most suitable methodology
- Compared multiple models to find out the best method, tested multiple models on two different datasets
- Analyzed the best method for classification of Human Activity with different feature selection techniques - Logistic Regression Classifier
- Successfully distinguished between hard-to-distinguish activities like Sitting and Standing with 100% accuracy using 2D CNN Model

References

- Activity recognition using smartphone sensors
- HAR using smartphone sensors with two-stage continuous hidden Markov models
- Dataset: Human Activity Recognition with Smartphones
- WISDM: WIreless Sensor Data Mining