Human Activity Recognition

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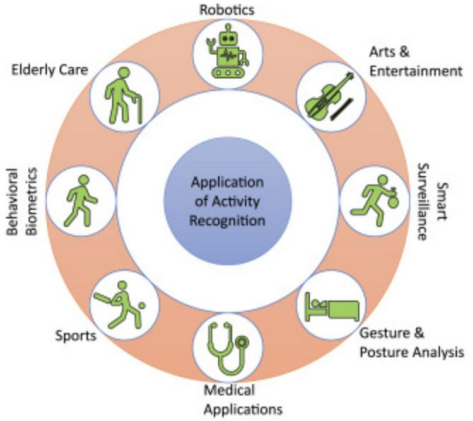
Introduction

Using sensors to identify human activities such as walking, jogging, sitting.

Activity Recognition (AR) is monitoring the liveliness of a person by using intelligent devices such as smartphones and wearable devices.



Dataset

Group of 30 Volunteers(19-48 years). Each person performed 12 activities like:

· Sitting
· Walking
· Standing
· Laying
· Walking Upstairs
· Walking downstairs
· Running
· Jogging

wearing a smartwatch(samsung) on their wrist

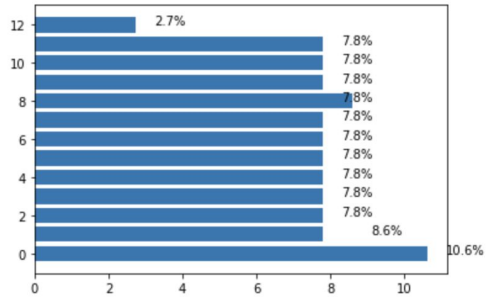
Sensors types

1. Inertial sensors
    a. Accelerometer
    b. Gyroscope

Feature Extraction and Preprocessing

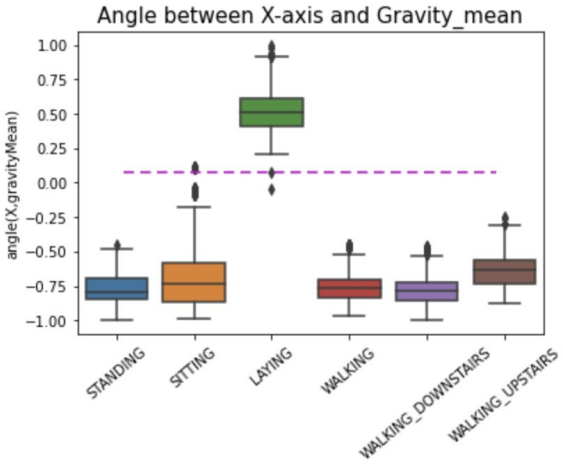
Data Preprocessing

- Feature Scaling - Standard Scaler
- Null values imputations
- Outlier detection
- High variance
- Class Imbalance rectification



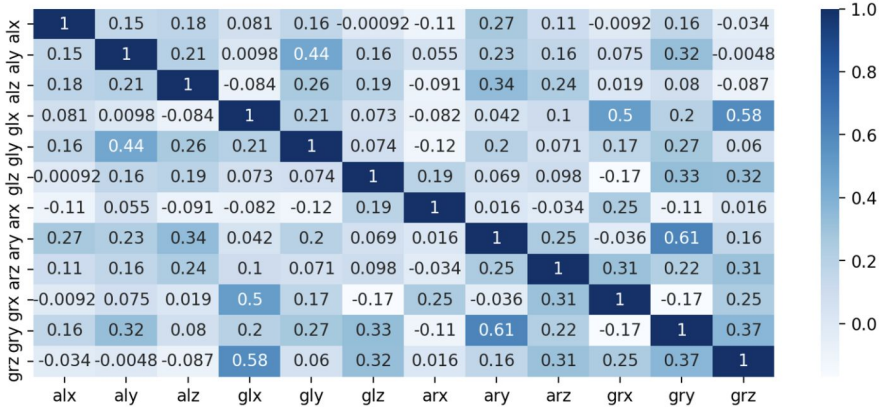
Univariate Analysis

- Understanding features and its importance
- Descriptive Statistics



Multivariate Analysis

- Correlation Matrix
- PCA
- TSNE



Models

Logistic regression

Decision tree

Random Forest

XGBoost

Neural network

Experiments and Evaluation

Hyperparameter tuning

- K-fold- decision tree
- Grid search - Random forest
- Feature importance- logistic regression

Evaluation

Metric	Logistic Regression	Decision Tree	Random Forest	XGBoost	Neural Network
Accuracy	0.534	0.802	0.957	0.938	0.823
Precision	0.511	0.792	0.957	0.945	0.78
Recall	0.534	0.787	0.944	0.948	0.79
F1 score	0.514	0.823	0.955	0.955	0.83

Results

Random forest has the best accuracy- 95% on test data when implemented with Gridsearch.

For UI and data visualization

- Streamlit is an open-source app to create apps.

For Tracking and logging model parameters

- MLFlow : simplifies end-to-end machine learning lifecycle.

Github link- https://github.com/shruti-visala1/Human-activity-recognition-1