

Class: DATS 6202– Machine Learning|.

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Team 7: Amjad Altuwayjiri, Yongxin Luo.



Project Proposal

Human Activity Recognition with Smartphones Using Different NN and ML Algorithms

Introduction:

The problem we have selected is human activity recognition using smartphones. With the increasing usage of smartphones, it is essential to identify the activities performed by the users through their smartphones. By analyzing the sensor data from the smartphone, we can accurately classify the activity being performed by the user.

Database:

We will be using [the Human Activity Recognition with Smartphones dataset](#), which contains sensor data collected from the accelerometer and gyroscope of the smartphones. The dataset contains 10,299 instances of 6 different activities performed by 30 subjects.

Machine Learning Algorithms:

We will be using Neural Network algorithm to classify human activity. We will use the Multi-Layer Perceptron (MLP) algorithm Learning vector quantization (LVQ). Additionally, we will be using other machine learning algorithms such as (SVM) for comparison purposes.

Software:

We will use Python as the programming language and implement the MLP using the scikit-learn library. The library provides an efficient implementation of the algorithms and makes it easy to experiment with different parameters.

Reference Materials:

Khan, Y. A., Imaduddin, S., Singh, Y. P., Wajid, M., Usman, M., & Abbas, M. (2023). Artificial intelligence based approach for classification of human activities using MEMS sensors data. *Sensors*, 23(3), 1275. <https://doi.org/10.3390/s23031275>

Ronao, C. A., & Cho, S.-B. (2016). Human activity recognition with smartphone sensors using Deep Learning Neural Networks. *Expert Systems with Applications*, 59, 235–244. <https://doi.org/10.1016/j.eswa.2016.04.032>

Performance Metrics:

We will judge the performance of the network based on the accuracy of the classification. We will also use other metrics such as confusion matrix, precision, recall, and F1 score to evaluate the performance of the algorithms.

Project Schedule:

Day Apr 11 - Apr 15: Data preprocessing and exploratory data analysis

Day Apr 15 - Apr 20: Implementing MLP algorithm and optimizing hyperparameters.

Day Apr 20 - Apr 25: Implementing other algorithms and optimizing hyperparameters.

Day Apr 25 - Apr 1: Comparing the performance of different algorithms and preparing the project report and presentation.