Human Activity Analysis & Recognition using Machine Learning & Deep Learning Models

Technical Report

Environment Setup

- IDE used: VSCode with Jupyter notebook support & Google Colab
- Python version used: 3.11.6
- Memory requirement: 8 GB RAM (Minimum); GPU required for LSTM

Install Libraries

1. **NumPy**: A library for numerical computations in Python.

   Command: pip install numpy

2. **Pandas**: A library for data manipulation and analysis.

   Command: pip install pandas

3. **Matplotlib**: A plotting library for creating visualizations in Python.

   Command: pip install matplotlib

4. **Scikit-learn**: A machine learning library for various tasks such as classification, regression, and clustering.

   Command: pip install scikit-learn

5. **Seaborn**: A statistical data visualization library based on Matplotlib, providing a higher-level interface for drawing attractive statistical graphics.

   Command: pip install seaborn

6. **XGBoost**: An optimized gradient boosting library for machine learning tasks.

   Command: pip install xgboost

7. **Keras**: A high-level neural networks API, often used with TensorFlow as a backend.
   Command: pip install tensorflow keras

Dataset

The dataset is freely available at UC Irvine Machine Learning Repository.

Characteristics: Multivariate, Time-Series
Subject Area: Computer Science
Year: 2012
Associated Tasks: Classification, Clustering
Instances: 10299

Link:
https://archive.ics.uci.edu/dataset/240/human+activity+recognition+using+smartphones

A video of the experiment including an example of the 6 recorded activities with one of the participants can be seen in the following link:
http://www.youtube.com/watch?v=XOEN9W05_4A