

Human Activity Recognition using Smart Phones Dataset

Abstract:

Human activity recognition has wide applications in medical research and human survey systems. In this project, we design a robust activity recognition system based on a smartphone. The system uses a 3-dimensional smartphone accelerometer as the only sensor to collect time series signals, from which 31 features are generated in both time and frequency domain. Activities are classified using 4 different passive learning methods, i.e., quadratic classifier, k-nearest neighbour algorithm, support vector machine, and artificial neural networks. Dimensionality reduction is performed through both feature extraction and subset selection. Besides passive learning, we also apply active learning algorithms to reduce data labelling expenses.

Existing System:

In the existing system, humans need wearable devices like fit watches to recognise the human activity and this needs lot of infrastructure. Rather than these wearable devices, humans mostly carry a smart phone and the smart phone market is more than the wearable market.

Proposed System:

The demands for understanding human activities have grown in health-care domain, especially in elder care support, rehabilitation assistance, diabetes, and cognitive disorders. A huge number of resources can be saved if sensors can help caretakers record and monitor the patients all the time and report automatically when any abnormal behaviour is detected. Other applications such as human survey system and location indicator are all benefited from the study.

Many studies have successfully identified activities using wearable sensors with very low error rate, but the majority of the previous works are done in the laboratories with very constrained settings. Readings from multiple body-attached sensors achieve low error-rate, but the complicated setting is not feasible in practice. This project uses low-cost and commercially available smartphones as sensors to identify human activities.

Given a classifier, active learning intelligently queries the unlabelled samples and learns the parameters from the correct labels answered by the oracle, usually human. In this fashion, users label only the samples that the algorithm asks for and the total amount of required training

samples is reduced. To the best of our knowledge, there is no previous study on applying active learning to human activity recognition problem.

Software Tools:

1. VS Code
2. Jupyter Notebook
3. Pandas
4. Matplotlib
5. NumPy
6. Anaconda
7. Python3

Hardware Tools:

1. Laptop
2. Operating System: Windows 11
3. RAM: 16GB
4. ROM: 4GB
5. Fast Internet Connectivity

Applications:

1. Mobile Apps to collect and diagnose the data
2. Sports application needs these kind of ML models.