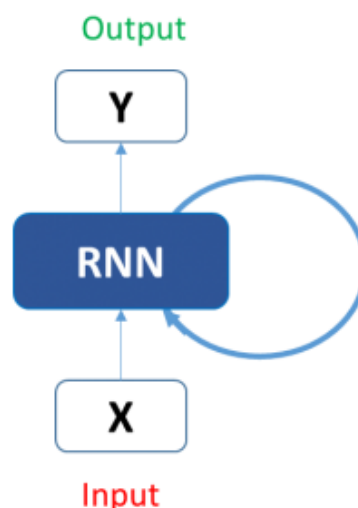# Human Activity Recognition

## Problem Statement

Human activity recognition is the problem of classifying sequences of data collected from sensors like accelerometer and gyroscope from mobile phones or some other specialized sensors for a few specific movements to be identified. This project is about identifying/predicting the activity someone is performing based on the sensor data recorded. Human activity recognition is applicable in scenarios where we require knowledge of an individual's activity in real time. One of its applications is in palliative care centers, where continuous surveillance of patients is required; under such conditions this technology can be used to monitor the activities of individual's and thus provide them with assistance if needed. The project needs usage of RNN for human activity recognition data contained in csv format. The dataset has 6 kinds of activities as follows:

1. Walking
2. Walking Upstairs
3. Walking Downstairs
4. Sitting
5. Standing
6. Laying

## Background

The research area of ambient assisted living has led to the development of activity recognition systems (ARS) based on human activity recognition (HAR). These systems improve the quality of life and the health care of the elderly and dependent people. The main objective of project is to recognize the human activities such as walking, walking upstairs, walking downstairs, sitting, standing and laying by analyzing the data values. Neural Network (NNs) consists of an interconnected component, it is designed based on human brain neuron structure. RNN differ slightly from Feed Forward NN. A recurrent neuron stores the state of a previous input and combines with the current input thereby preserving some relationship of the current input with the previous input.

**Methodology**

**Step 1: Data collection and dataset preparation**

Download train.csv and test.csv

Dataset can be downloaded from:

.

**Step 2: Developing a Recurrent backprop neural network for Human Activity Recognition**
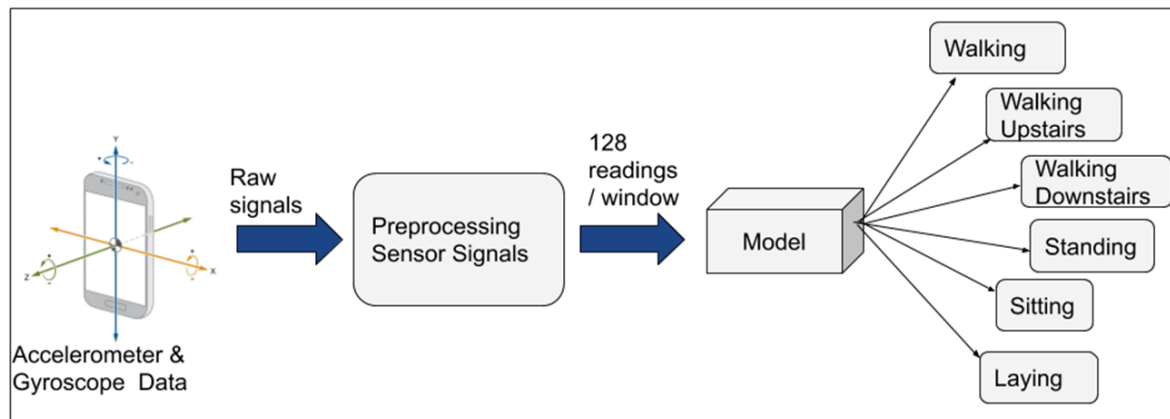
In this step a Recurrent backprop neural network model for Human Activity Recognition is developed.

**Step 3: Training and experimentation on datasets**

Training and testing are performed on Recurrent backprop neural network model on the csv datasets to do the prediction accurately.

**Step 4: Deployment and analysis**

The model needs to be tested and its storage and inference time needs to be analyzed for real case test scenarios.



**Experimental Design**

**Dataset**

Feature Selection technique will be used to find the features that could contribute most towards the output label. This must be done in order to reduce the confusion that the models undergo when trained with large feature sets also, it helps in decreasing the complexity of models and even increases its accuracy and thereby decreases the error rate.

**Evaluation Measures**

Evaluation is measured in terms of Cross Validation and Evaluation Metrics such as Confusion Matrix, Classification Accuracy, Precision, Recall, F1 score.

**Software and Hardware Requirements**

Python based Computer Vision and Deep Learning libraries will be exploited for the development and experimentation of the project. Tools such as Anaconda Python, and libraries such as OpenCV, Tensorflow, and Keras will be utilized for this process. Training will be conducted on google colab for training the Recurrent backprop neural network for Human Activity Recognition.