

Model Description

-Description of model:

For this course, we have used a CNN(convolutional neural network) with 3 1D convolutional layers. After each convolutional layer, we apply batch normalization and activation function(RELU). We have used a window size of 30 and step size of 15 to account for the falling data.

Our model is capable of classifying the subset of activities:Sitting/Standing, Walking,Running, Lying down, and Falling. We have trained models for both Respeck, Thingy, and combined, but our best model is the one for Respeck so we have only provided that.

-Testing the model:

To test the model, we used Leave one out Cross Validation where we left one subject out for testing and the other subjects for training. We performed Leave one out Cross Validation for all of the subjects .Then we analyzed the performance through accuracy, precision, recall, and F-1 score metrics. The results of running the Leave one Out Cross Validation are as below:

For the specific activities:

Sitting/Standing: Accuracy: 0.965, Precision: 0.973, Recall: 0.965, F1-Score: 0.967

Walking: Accuracy: 0.906, Precision:0.891, Recall: 0.906, F1-Score: 0.897

Running: Accuracy: 0.963, Precision: 0.964, Recall: 0.963, F1-Score: 0.961

Lying down: Accuracy: 0.986, Precision: 0.973, Recall: 0.986, F1-Score: 0.979

Falling: Accuracy: 0.964, Precision: 0.964, Recall: 0.964, F1-Score: 0.962

Overall Metrics:

Average Testing Accuracy is 0.966, average precision is 0.964, average recall is 0.966,average F1-Score is 0.963