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Guardian Monitor: AI Team

The model I developed was the BiDirectional Long Short-Term Memory (BiLSTM) based on the LSTM model developed by Veena Suresh. The BiLSTM model used was from TensorFlow.Keras.

The data used was the room 2 data used by the other team members.

* + Kneel: 10 individual recordings
  + Lie Down: 10 individual recordings
  + Pickup: 9 individual recordings
  + Sit: 20 individual recordings
  + Sit Rotate: 19 individual recordings
  + Stand: 18 individual recordings
  + Stand Rotate: 18 individual recordings
  + Walk: 10 individual recordings

The activities of kneel, lie down and pickup were doubled.

The recordings were broken up into lengths of 750 rows.

This resulted in 1814 records with each record having 750 rows and 90 columns.

The data was split into training and testing with an 80:20 split.

The training therefore used 1451 records, and the testing used 363 records.

The model parameters were:

* + Early stopping: “val\_loss”
  + Patience: 20
  + Batch Size: 32
  + Learning rate: 0.001
  + Dropout rate: 30%

In the clinical setting the precision (positive predictive value) and recall (sensitivity) are more important than overall accuracy. This is particularly important when the condition being tested for has a low incidence. The occurrence of significant false positives rates can lead to multiple false alerts and “alert fatigue”.

Many of the machine Learning algorithms perform poorly with imbalanced data.

It can be seen from the screen shot below that the BiLSTM model, after fine tuning of the various parameters, performed quite well.

The test accuracy was 0.9063 and test loss was 0.2988 with the above parameters.

More importantly the precision (0.90) and recall (0.91) and f1-score (0.94) were very good for the human activity of “lie down” which is the closest of the assessed activities that is closest to a fall.

The only problem is that it took 63 minutes to train the model.

I note the Convolutional Neural Network had a high accuracy and low loss. It may be that the data used more represents an image of the human activity and less of a time sequence.

A screenshot of a computer

Description automatically generated