HUMAN ACTIVITY RECOGNITION

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1. Introduction

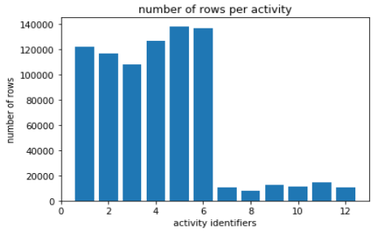
Human activity recognition is a problem of analyzing and identifying human activity patterns from data acquired by wearable sensors located on various parts of the body, which has a very wide range of applications such as healthcare and behavior monitoring. The focus of this work is to classify the corrected data into well-defined human activities by means of a suitable neural network after training.

2. Objectives

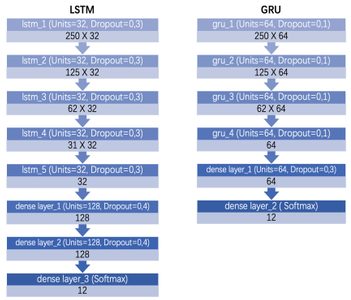
- Build a generic model framework to classify the HAPT dataset
- Classify the behavior patterns of action performers using multi-label classification
- Compare the classification performance of different RNN networks based on HAPT
- Compare the effect of different networks base on the speed of convergence and the number of parameters
- Investigate and summarize the accuracy of the trained neural networks for each class of activities

3. Methods

- Statistics of data from HATP dataset



- Preprocessing procedure
  - Sliding windows with length 250 samples and shift 125 samples
  - Assign a label with 0 to an unwanted window during the sequence to label and delete it afterwards
  - Z-Score normalisation
  - Resampling of training dataset
  - Shuffle the dataset
- Model Architecture
  Two types of RNN networks: LSTM, GRU



- Other Training Details
  - 1500 steps with validation every 20 steps. Batch size 32
  - Adam optimizer
  - Schedule learning-rate with initial-learning-rate 0,001
  - the model with highest validation accuracy is used to test

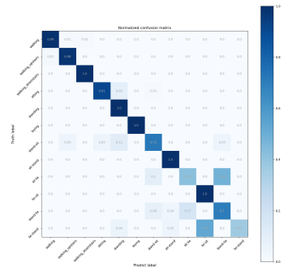
4. Training process

Change process of train accuracy

5. Training Results

- Visualisation on exp.02 user 01 with GRU. 95,82% accuracy is achieved

- Confusion matrix of the trained model (LSTM) for the HAPT test results. 94,40% accuracy is achieved



6. Conclusions

- Both models have achieved high accuracy, which proves that the RNN networks can be applied for human activity recognition and have good performance.
- Due to the shorter duration of dynamic activities(some are even shorter than window length), there are less training data for them, which leads to a imbalanced data set. so the accuracy of dynamic activities is much lower than static one.

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