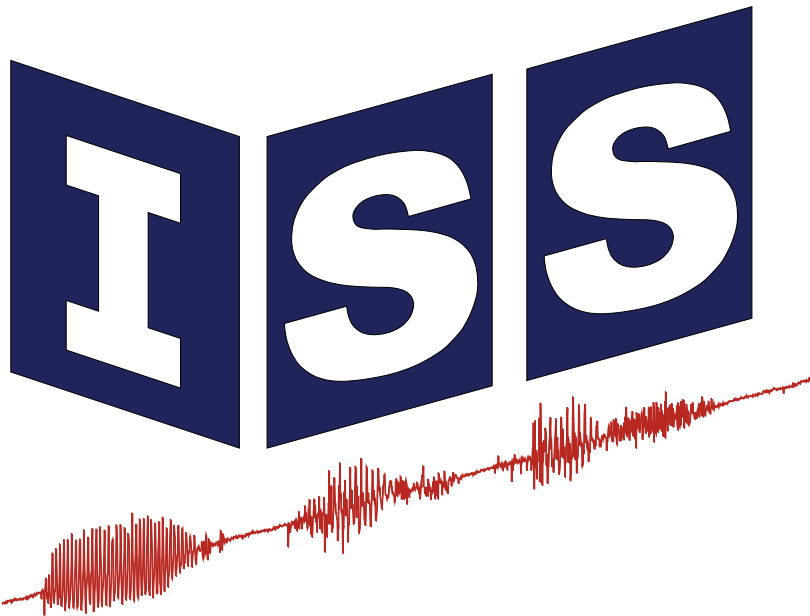


HUMAN ACTIVITY RECOGNITION

Deep Learning Lab



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System Theory

University of Stuttgart

07.02.2023

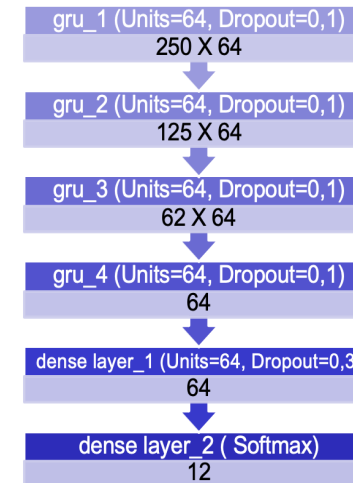
Deep Learning Lab: HUMAN ACTIVITY RECOGNITION

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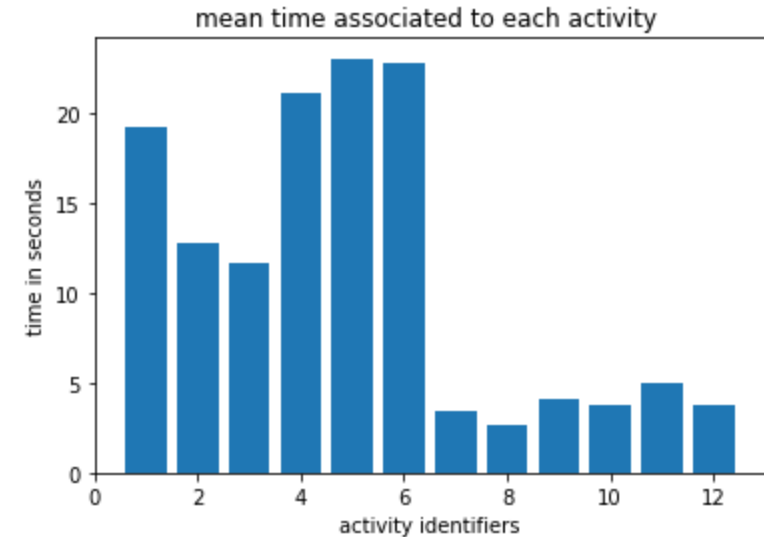
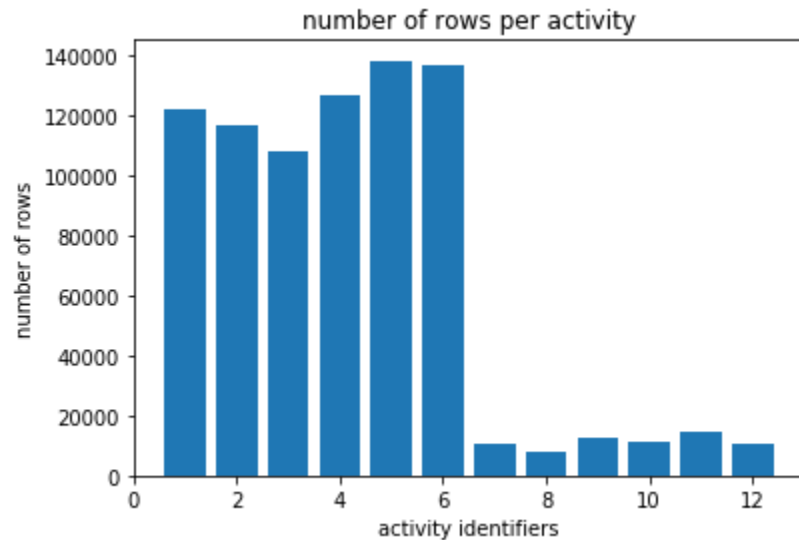
1. Methods
 - 1.1 Statistics of data from HAPT dataset
 - 1.2 Model Architecture
2. Training process
3. Training result
 - 3.1 Visualisation on exp.02 user 01 with GRU
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Deep Learning Lab: HUMAN ACTIVITY RECOGNITION

1. Methods

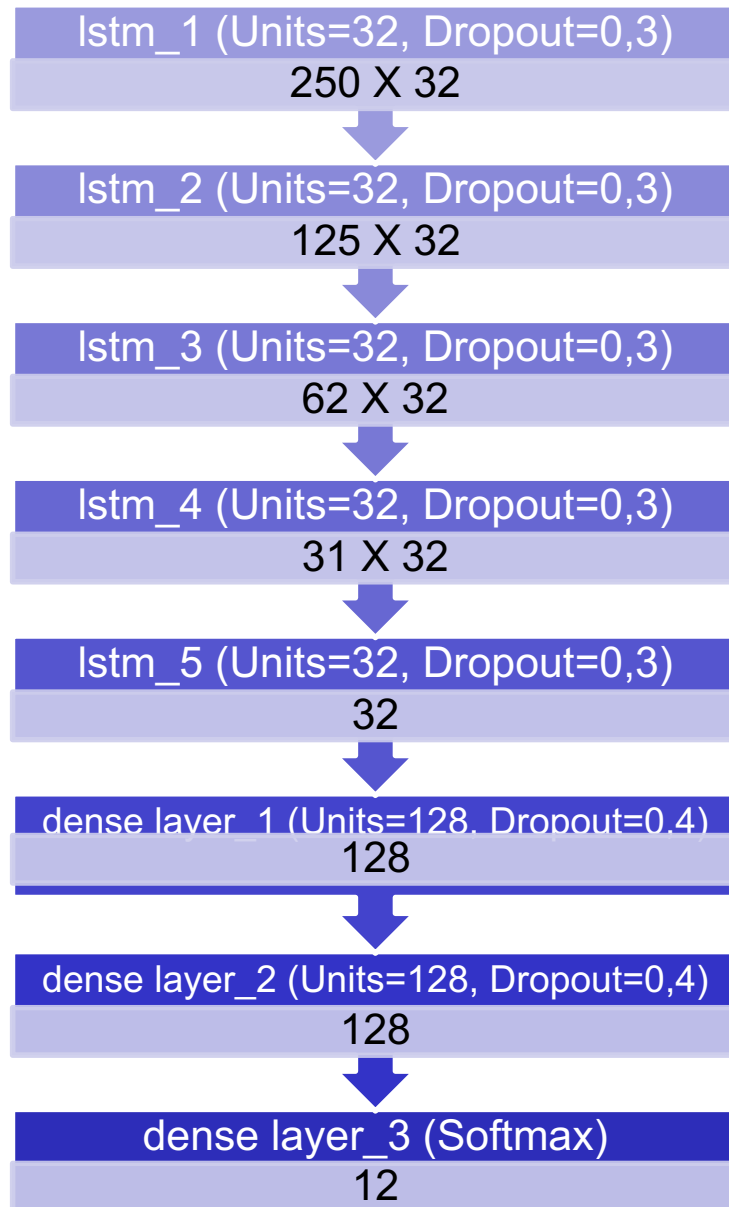


Statistics of data from HAPT dataset

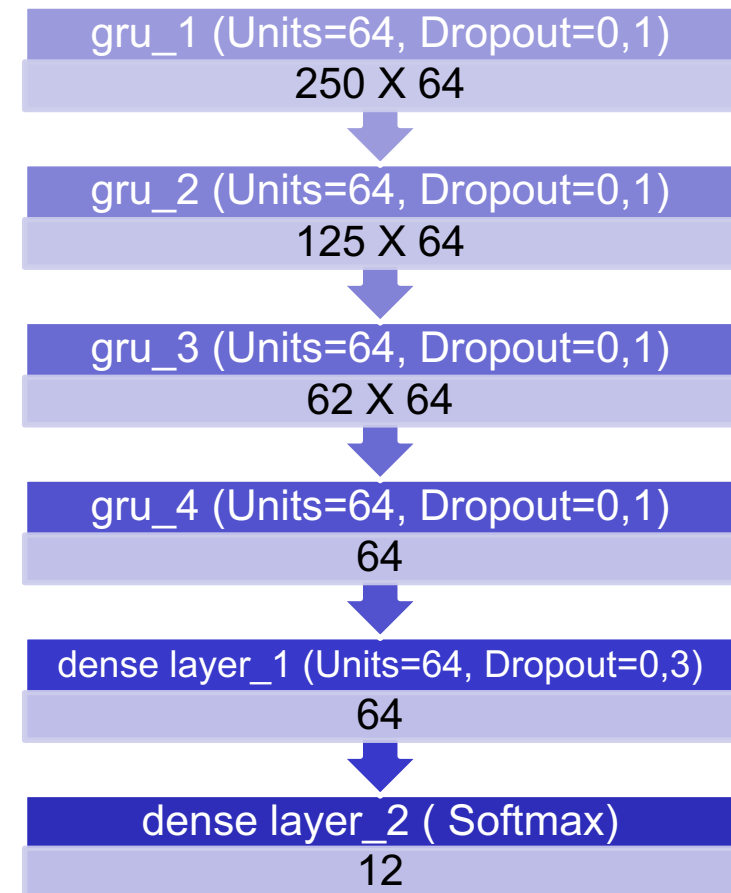


The number and the duration of samples for dynamic activities (labels 7-12) are much smaller than that for static activities! It's an imbalanced data set.

LSTM

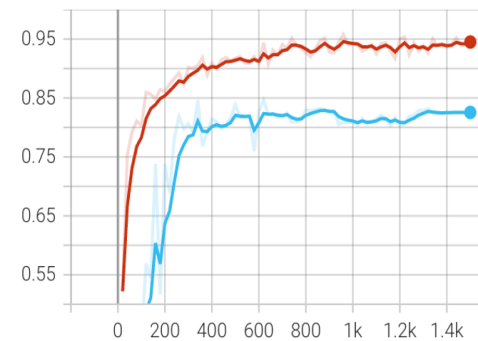


GRU



Deep Learning Lab: HUMAN ACTIVITY RECOGNITION

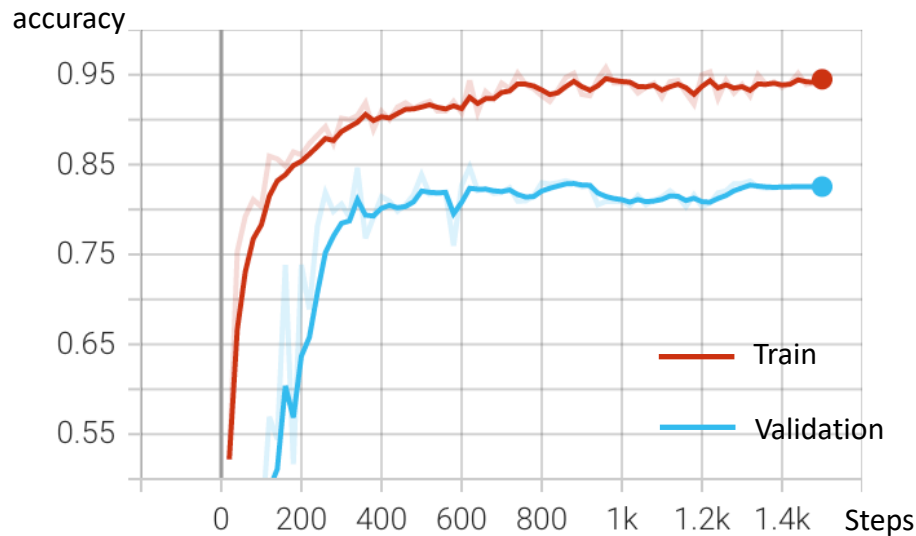
2. Training process



Train and validation accuracy on HAPT



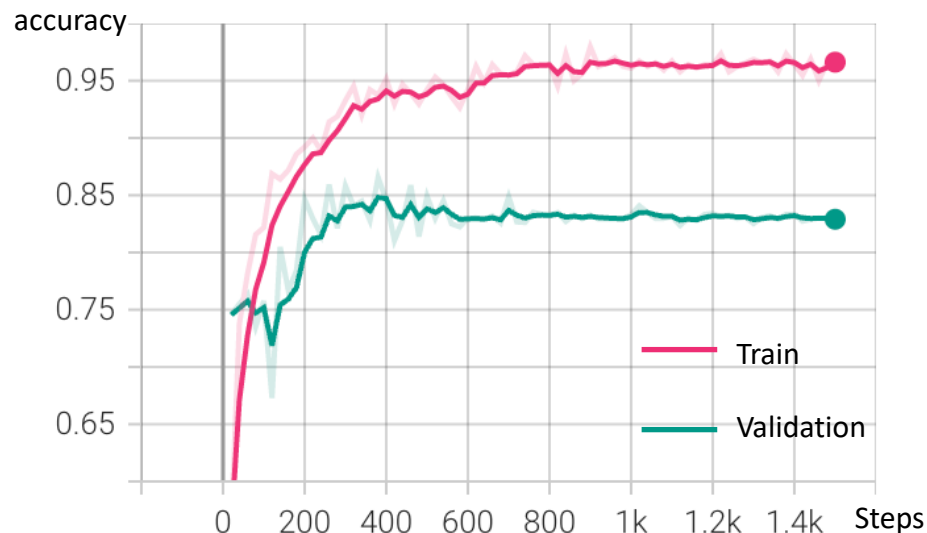
LSTM



Final Results: Train-Acc = 95,21%
Val-Acc = 82,55%
Training time = 9m55s

Related Data: Total params: 61,068
Trainable params: 60,812
Non-trainable params: 256

GRU

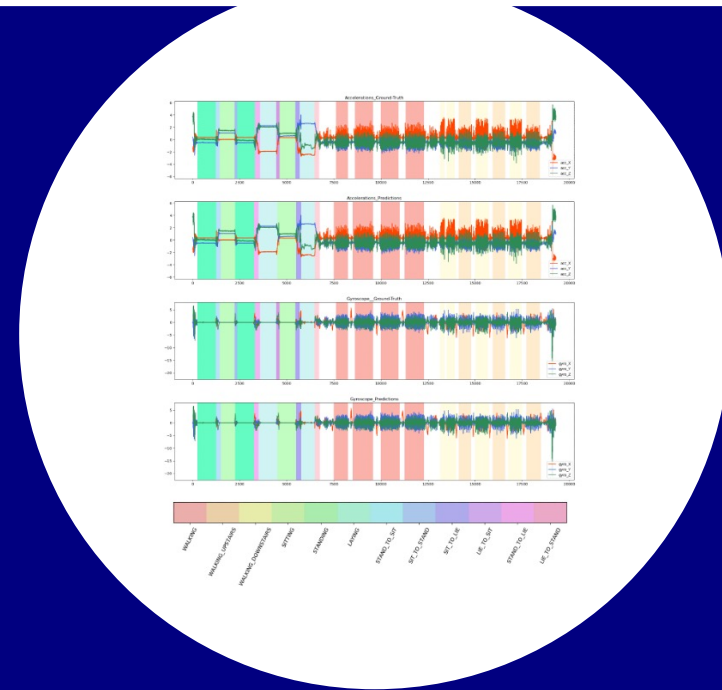


Final Results: Train-Acc = 97,34%
Val-Acc = 82,80%
Training time = 15m26s

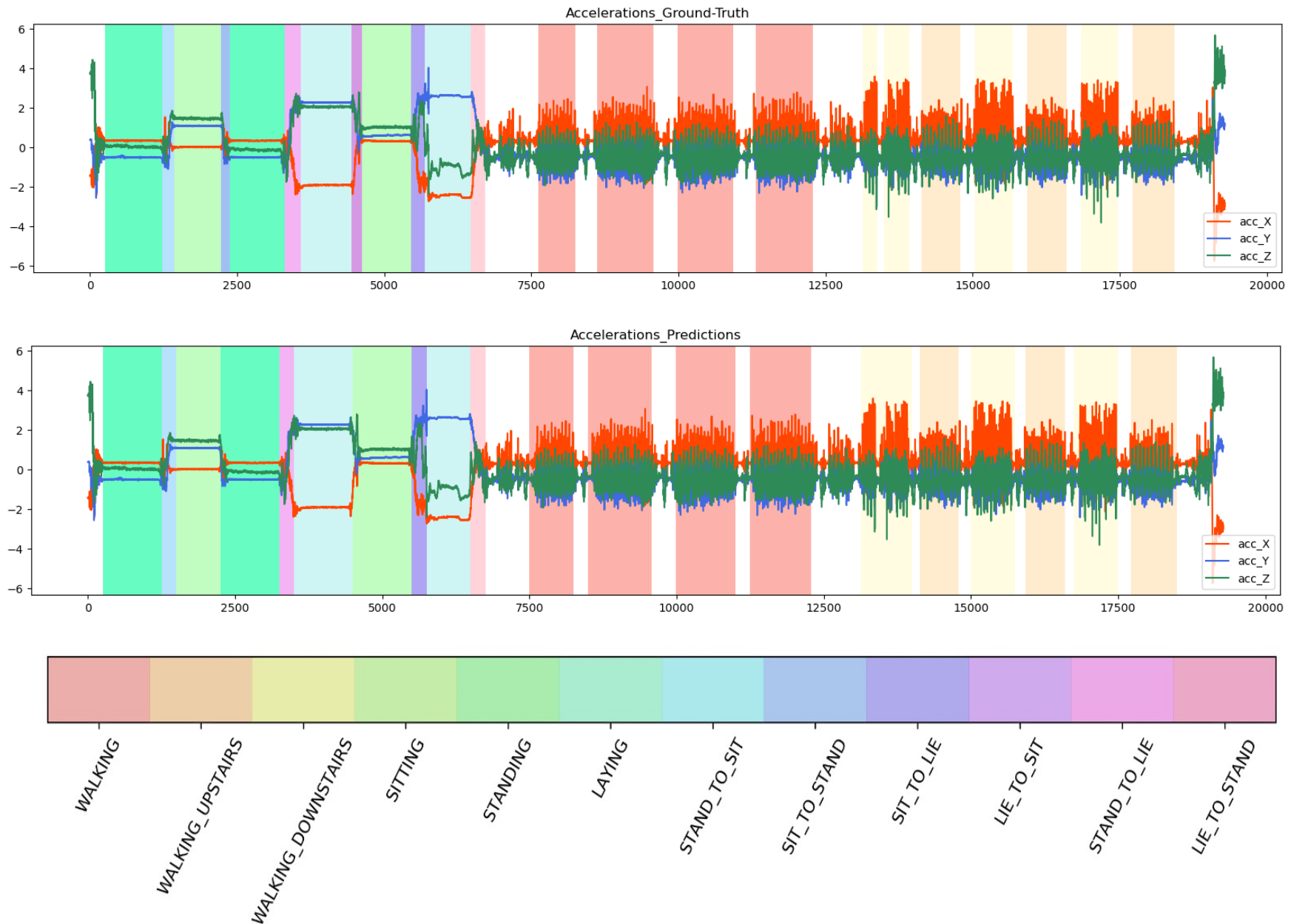
Related Data: Total params = 94,412
Trainable params = 94,028
Non-trainable params = 384

Deep Learning Lab: HUMAN ACTIVITY RECOGNITION

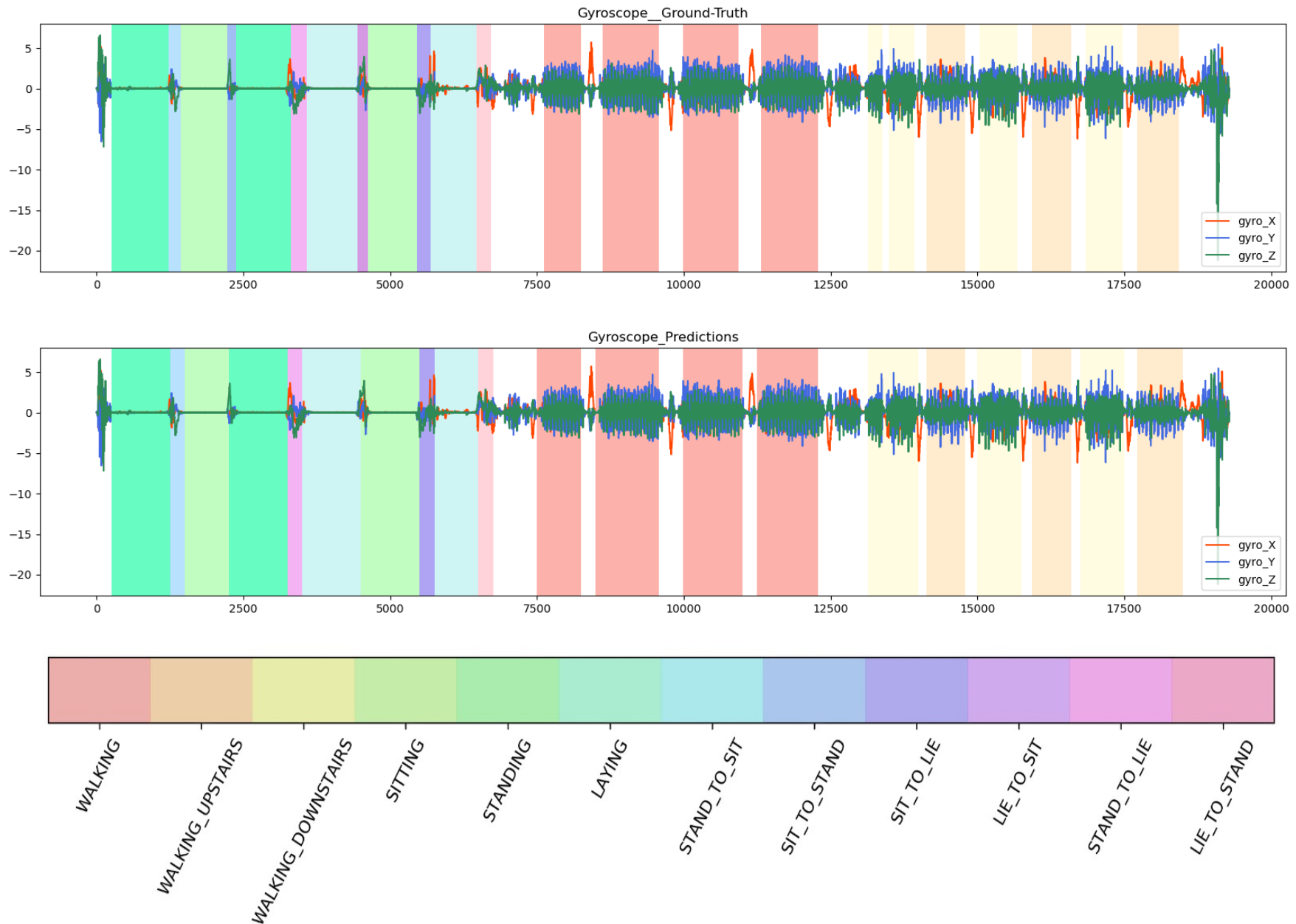
3. Training result



Visualisation on exp.02 user 01 with GRU



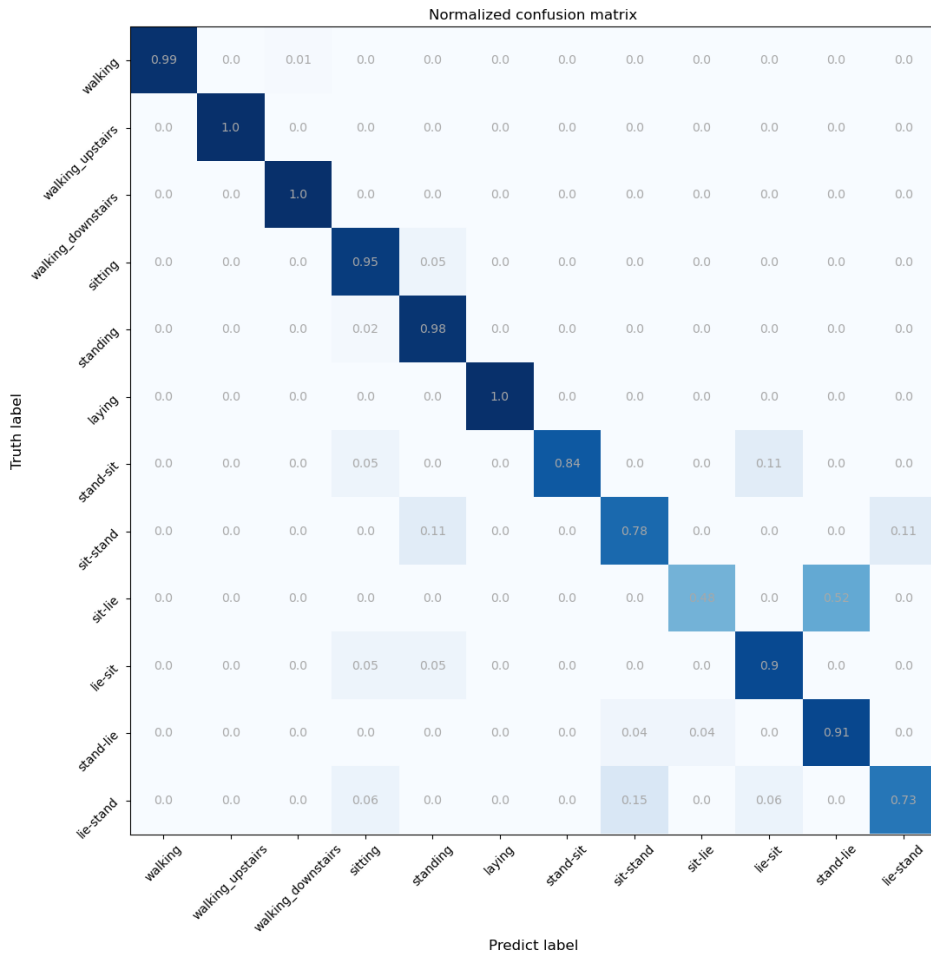
Visualisation on exp.02 user 01 with GRU



Confusion Matrix on HAPT test result

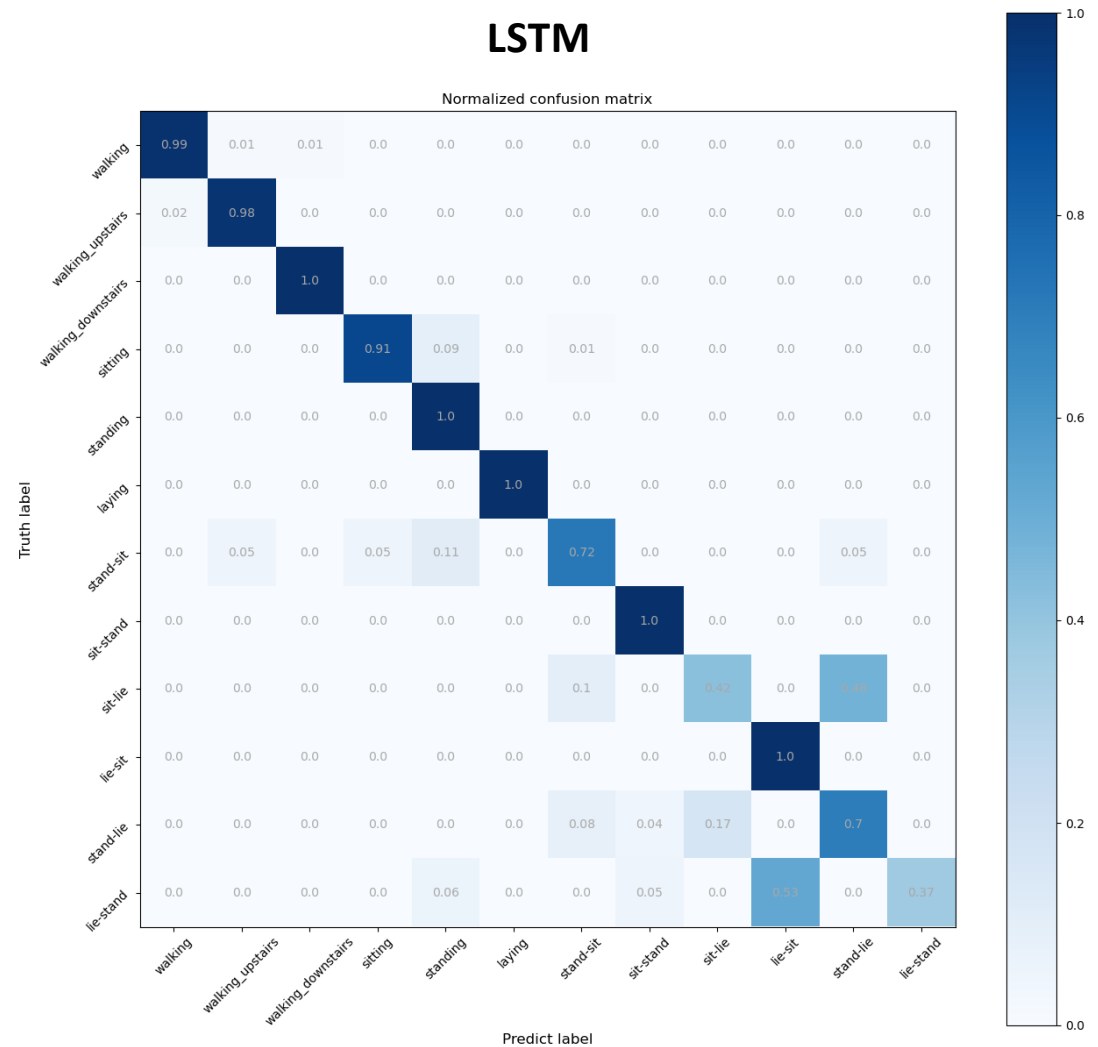


GRU



95,82% Test Accuracy is achieved

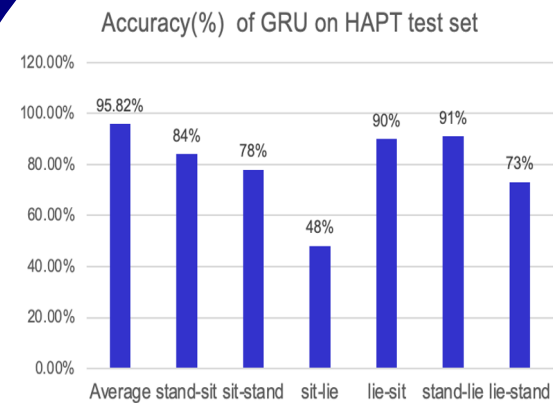
LSTM



94,40% Test Accuracy is achieved

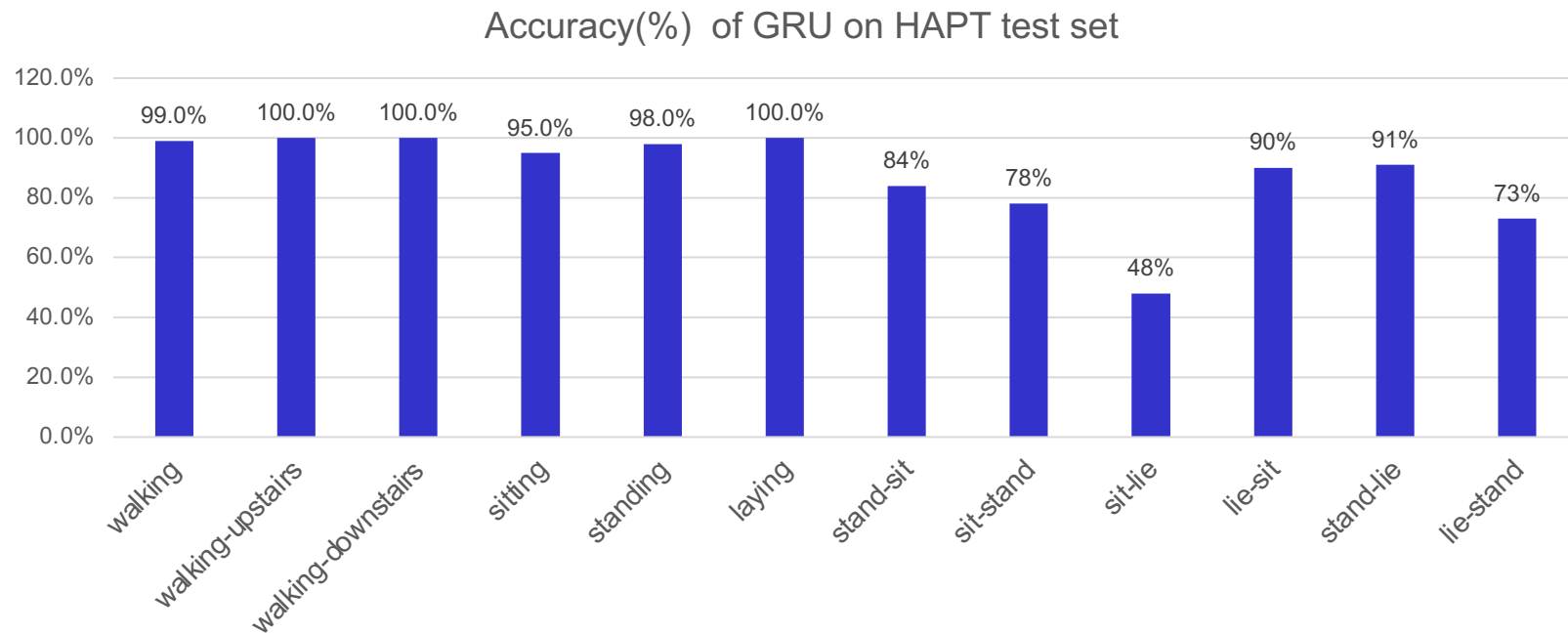
Deep Learning Lab: HUMAN ACTIVITY RECOGNITION

4. Conclusion

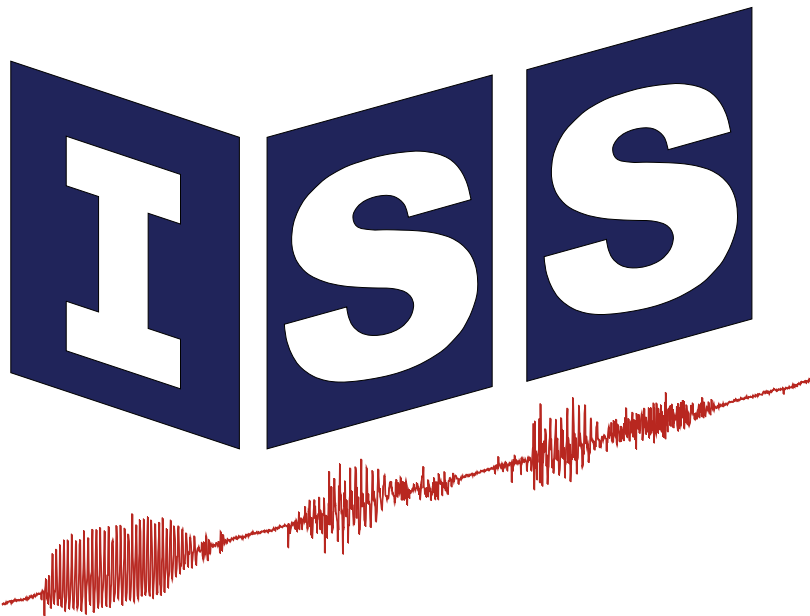


Both models have achieved high accuracy, which proves that the RNN networks can be applied for human activity recognition and have good performance.

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.



Thanks for your Attention !



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