

# Activities of Daily Living- Recognition with Wrist- worn Accelerometer

**Lecture:** Deep Learning Architecture and Models

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# Agenda



PROBLEM STATEMENT



APPROACH



EVALUATION

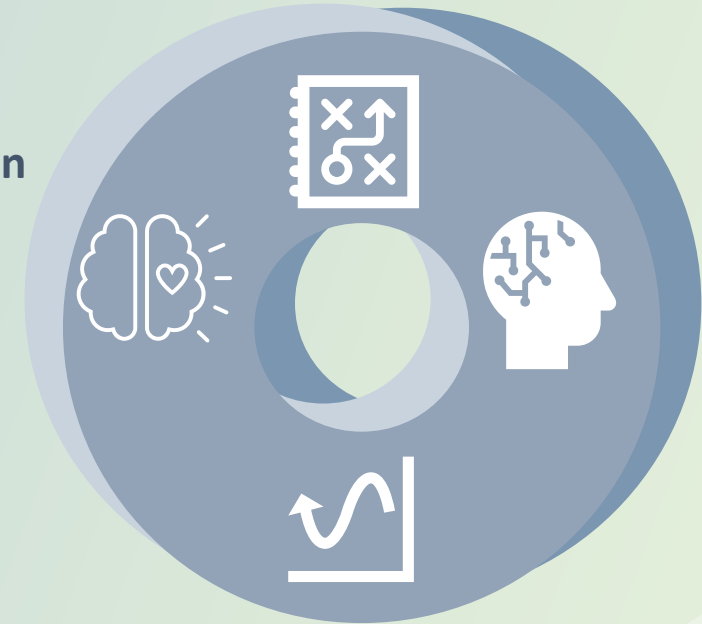
# Problem Statement

"Analysis of human behavior recognition algorithms based on acceleration data" [1]

## Activities of Daily Living (ADL)



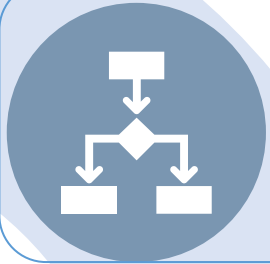
## Recognition of Human Motion Primitives



## Algorithm based on deep learning

- learn the features directly from the data

# Approach



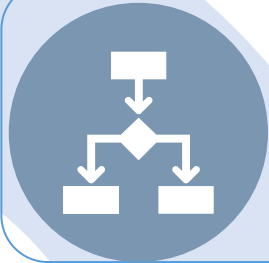
Data



Model



Training



Data

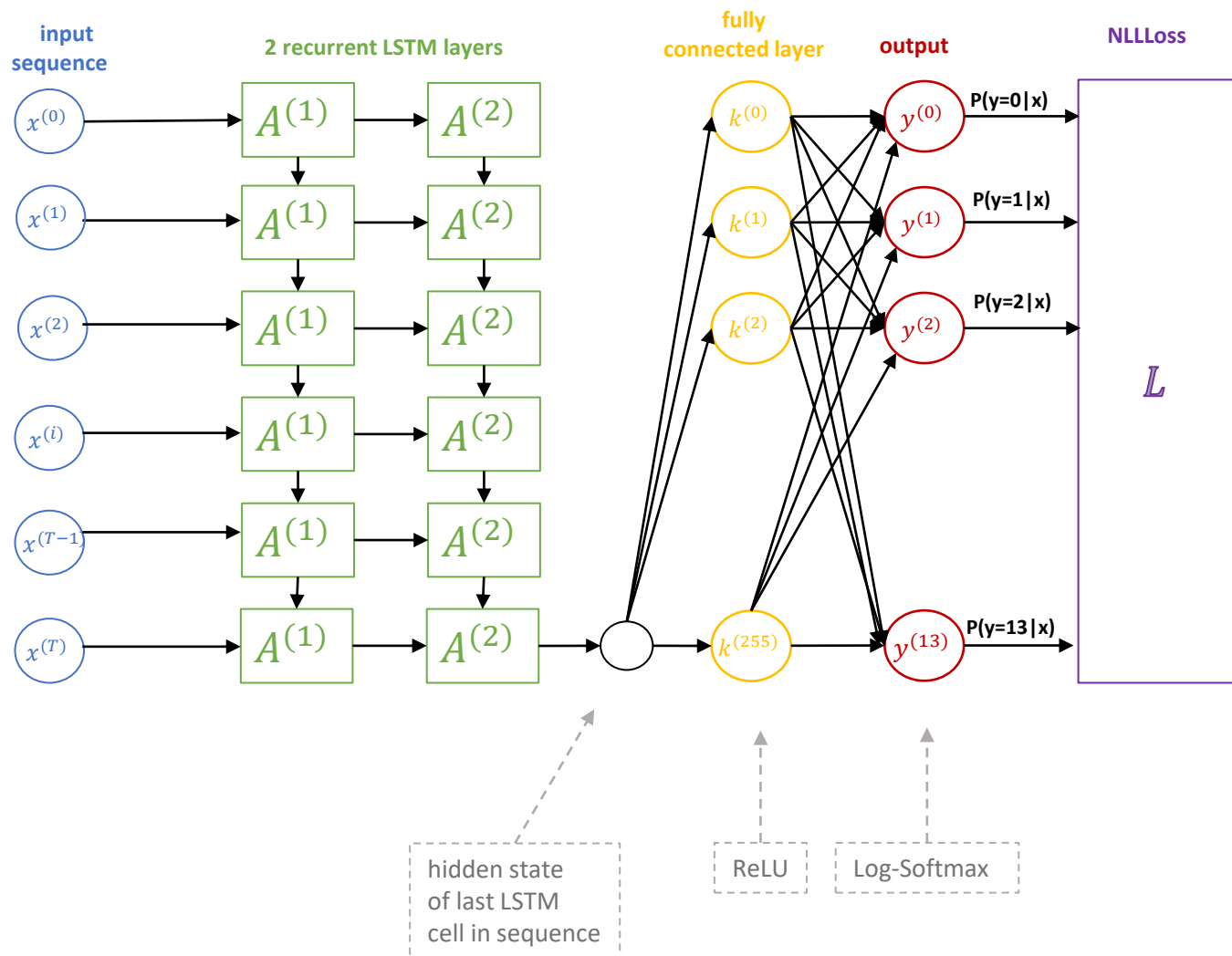


# Approach

## The Dataset for ADL Recognition with Wrist-worn Accelerometer

- Labelled accelerometer data recordings available for public usage for creation or validation of acceleration models
- 16 different volunteers recorded their performance of simple daily activities
  - 14 activities
  - Examples: walking, brushing teeth, eating soup etc.
  - Collected by one tri-axial accelerometer on the right-wrist of the volunteer
- **Idea:** Create a public testbench for a better comparison of human motion primitives detection algorithms

# Approach



# Approach

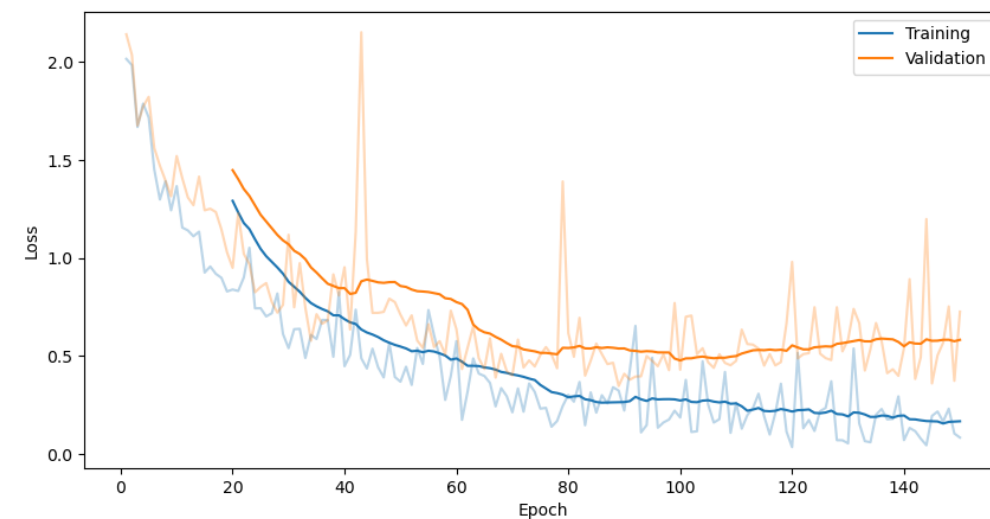
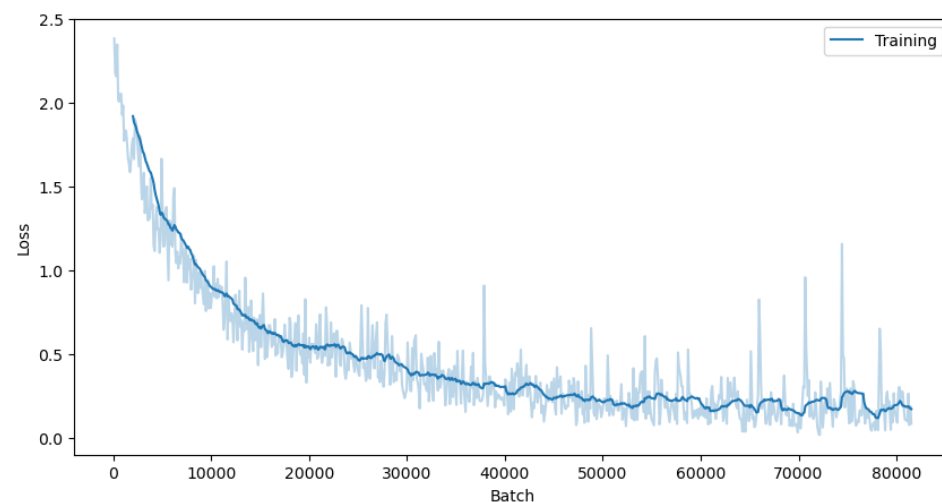
**Optimizer:** Adam

**Learning Rate:** 0.001

**Batch Size:** 1

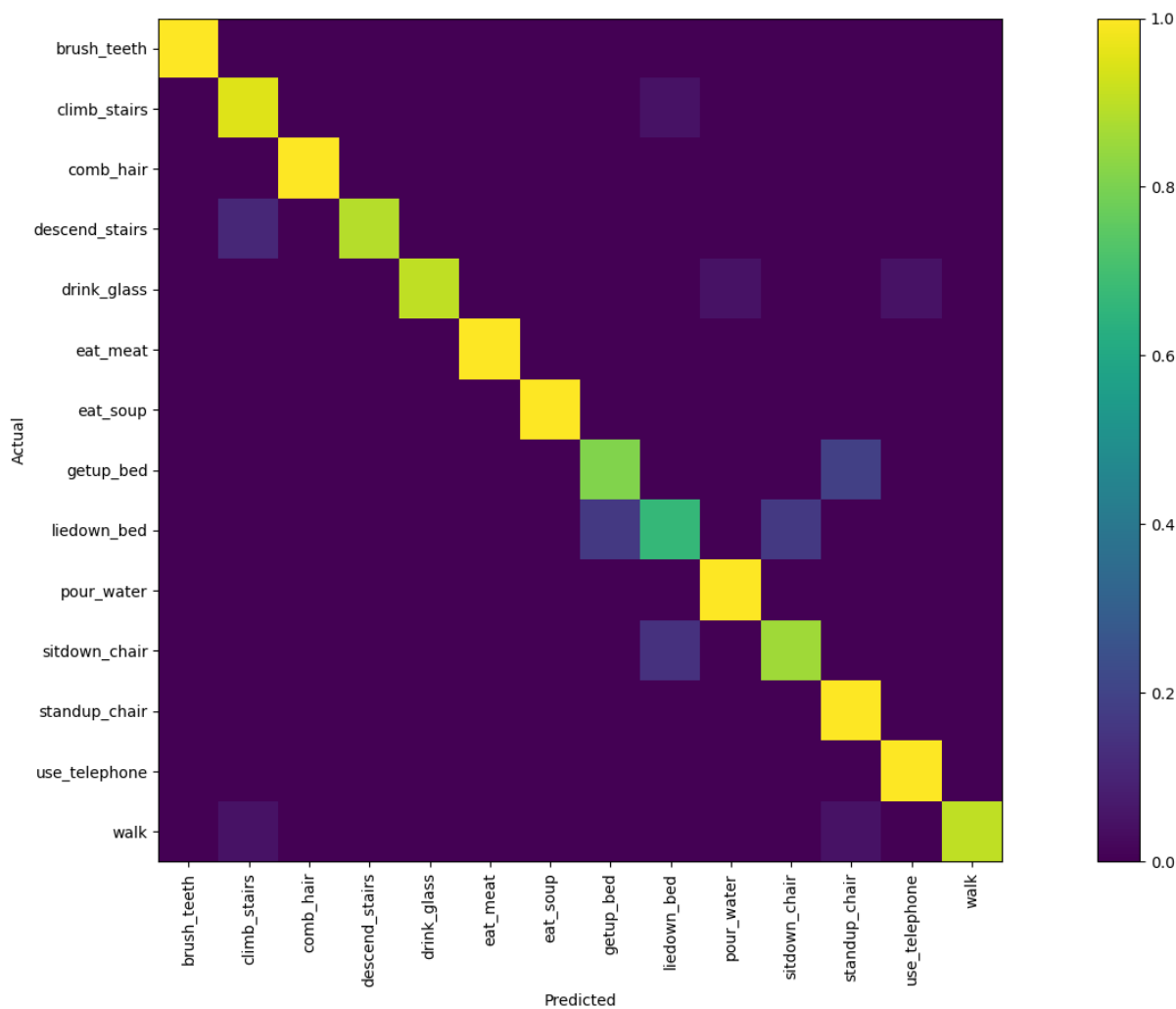
**Epochs:** 150

**Percentage of Data used for  
Training / Validation / Test:** 0.7 / 0.1 / 0.2



Training

# Evaluation



Accuracy: ~ 91.62%

Activity	TP (Base)	TN (Base)	TP (Ours)	TN (Ours)
Climb Stairs	38.3%	85.78%	95.24%	98.78%
Drink Water from a Glass	90.91%	86.59%	90.48%	100%
Pour Water	95%	71.55%	100%	99.63%
Sit down on chair	0%	100%	85.71%	98.72%
Stand up from chair	35.71%	93.96%	100%	98.17%



# Conclusion and Further Improvements

- Efficient and accurate tracking of human motion primitives
  - Low training , validation and test loss after training (compared to a baseline model)
  - High accuracy of the prediction
- Possible Further Improvements
  - Extend model to include other activities
  - Test with different optimizers
  - Compare to other algorithms

# Thank you for your attention!



*You can find us on GitHub!*