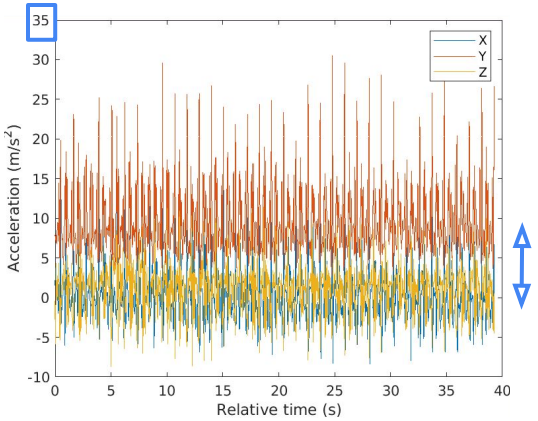
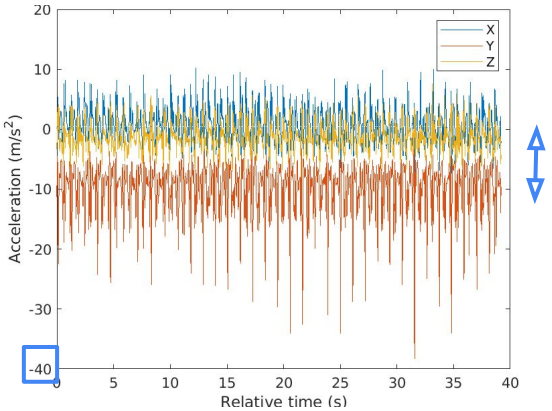
Monty.AI

Silly Walk Detection

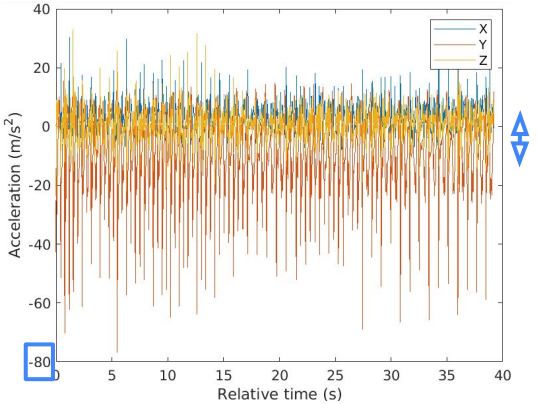
What is the magic behind Monty.AI ?

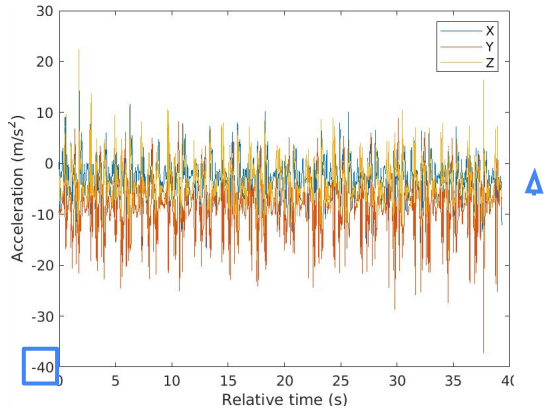
Normal Walk



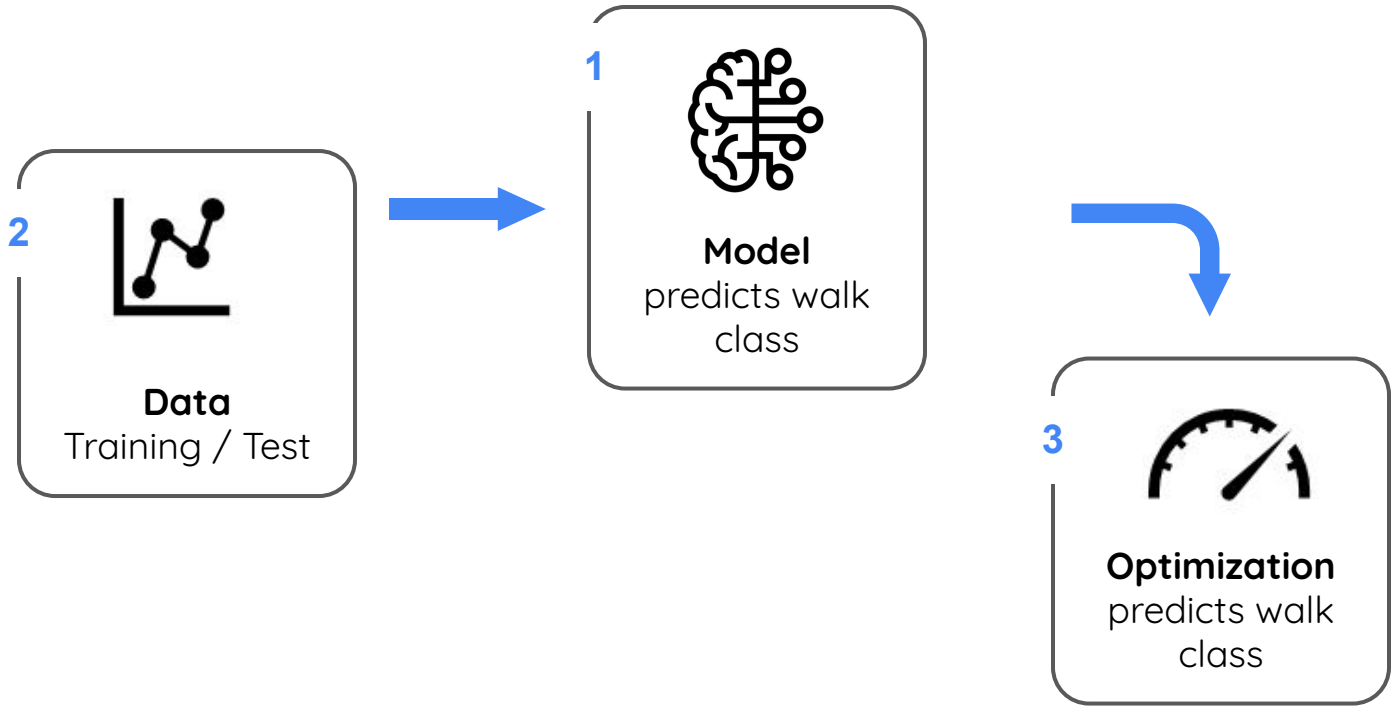


Silly Walk



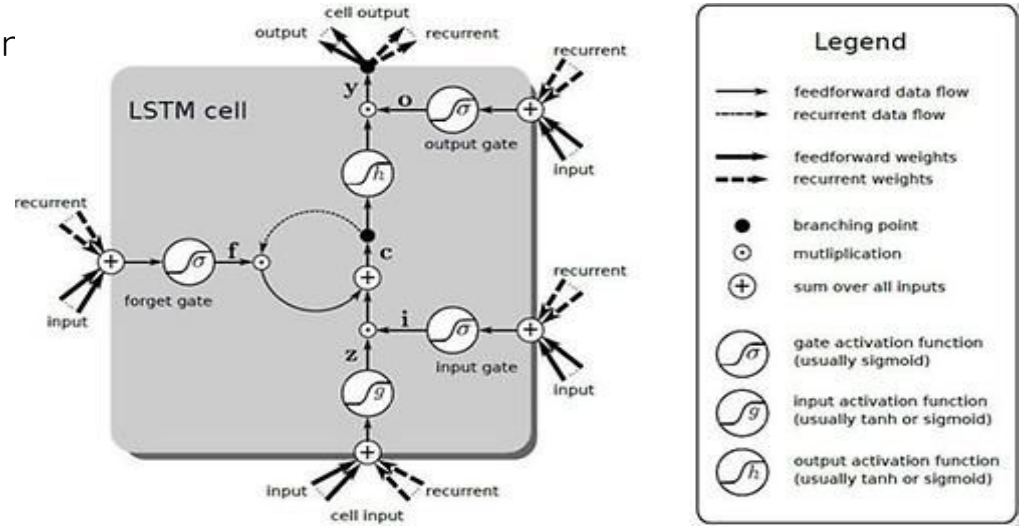


What is the magic behind Monty.AI ?



LSTM Model - Introduction

- Recurrent Neural Network
- Data sequences can be processed
- Training without feature extractior

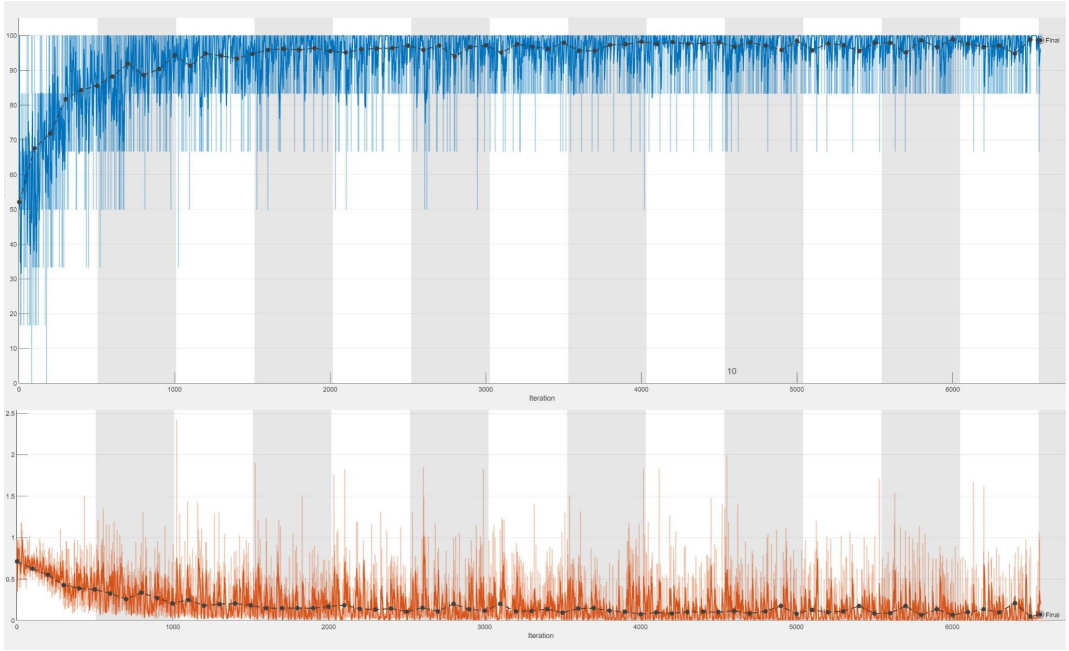


LSTM Model - Hyperparameter Optimization

- for each hyperparameter choice ⇨ training of an independent model
- performance of each model is obtained with the validation data
- the model with the best accuracy as the main model with the optimal hyperparameters

LSTM Model - Finding Hyperparameters

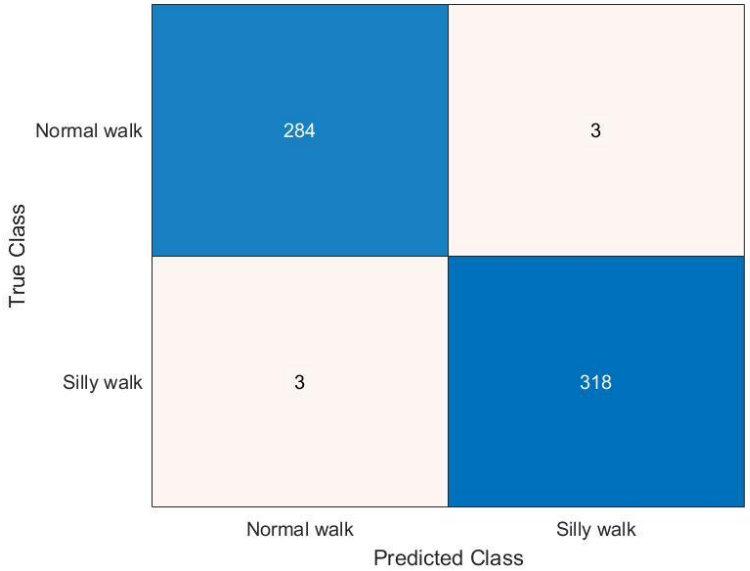
- blue line: accuracy in each iteration
- orange line: loss in each iteration



LSTM Model - Evaluation

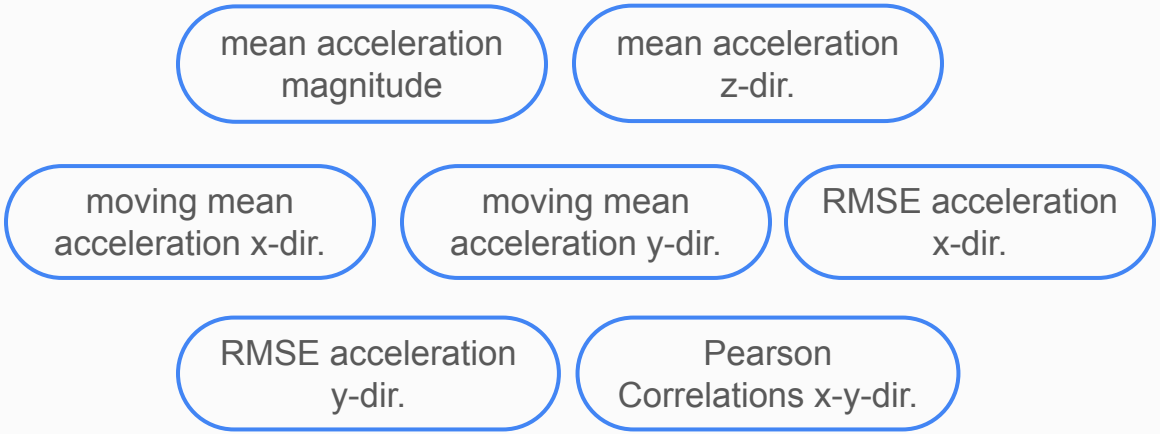
- Accuracy : 99.2%
- Training duration : 456.1 seconds

Confusion Matrix



KNN and SVM Approach

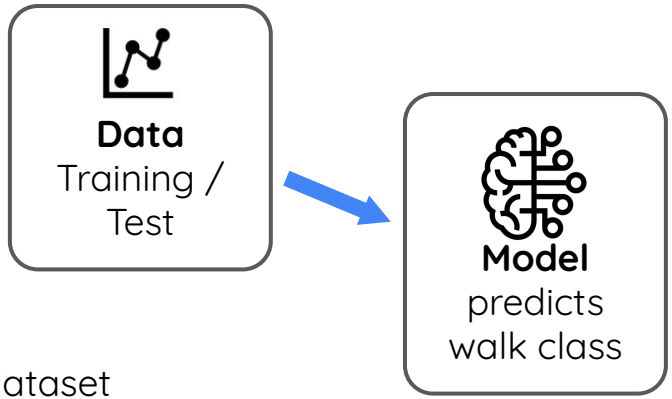
Features (KNN & SVM)



Approaches in Comparison

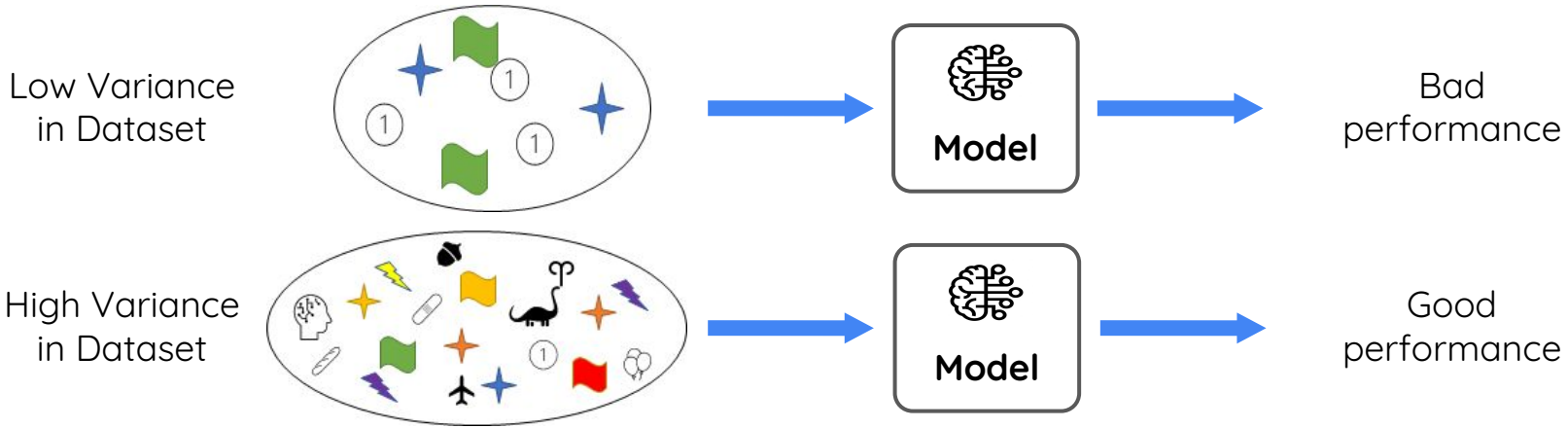
	KNN	SVM	LSTM
Input	single features	single features	time sequences
Preprocessing effort	high	high	small
Training time	10.11s	6.46s	456.1s
Accuracy	91.6%	90.3%	99.92%

Data Acquisition - Importance

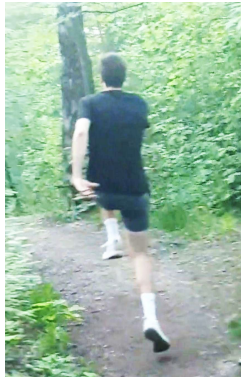


Train/Test Data is the foundation of all trained models
→ Model performance heavily relies on collected data

Goal of data acquisition process: Maximize the variance of the dataset



Data Acquisition - Strategy



Data Collection process accounted for:

- Variance in walking style
  - even/uneven surface
  - fast/slow walking, or a mixture
  - uphill/downhill
  - different Silly walk styles

- Variance due to smartphone
  - Different smartphones (Samsung, iPhone etc)
  - Different smartphone positions
  - Different sampling rates

- Variance in worn pants

- Varying users

→ nearly 200 minutes of measured walks and >5000 samples

→ Huge database with high variance for robust classification with accuracies >99%

Contribution

💪 regular team meetings

💪 collaboration tool → Miro

💪 initial clear worksplit

Robert Jacument

- preprocessing & pipeline
- data acquisition

Adam Misik

- GUI expert
- data acquisition

Onat Inak

- LSTM
- data acquisition

Leonie Freisinger

- KNN
- data acquisition