University of Stuttgart
Germany

Simple Touch Prediction With Built-In IMUs

Intermediate Presentation

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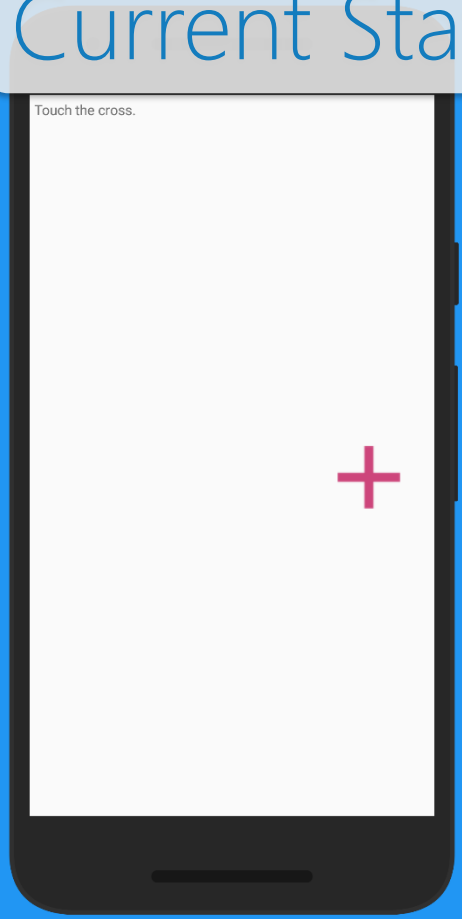
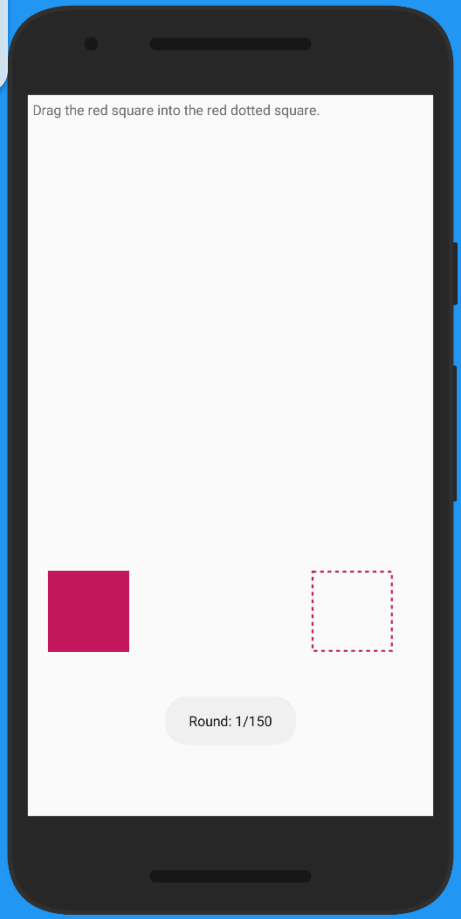
FaPra Machine Learning and Computer Vision for HCI | Pfaffenwaldring 5a | 22.01.19

Visualization and
Interactive Systems Institute

Current Status





- Finished our data collection study
- Now we are training models

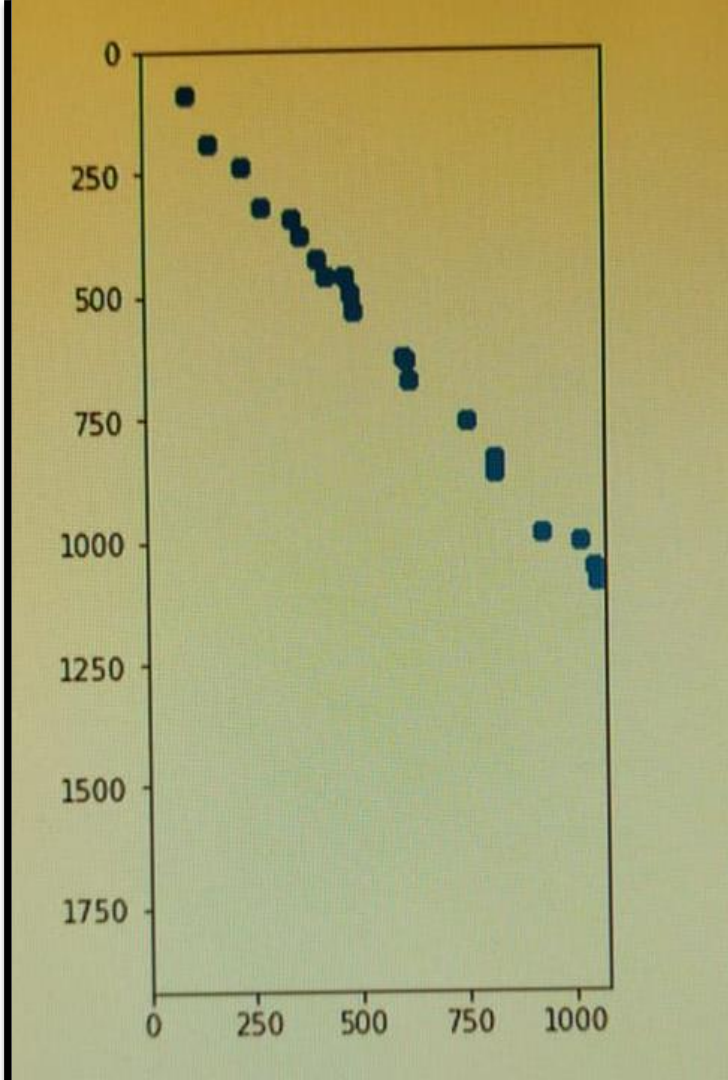
Our Failure

For the touch task we tracked:

- Time of touch

- X coordinate of cross
- Y coordinate of cross

- X coordinate of actual touch
- Y coordinate of actual touch



Our Failure

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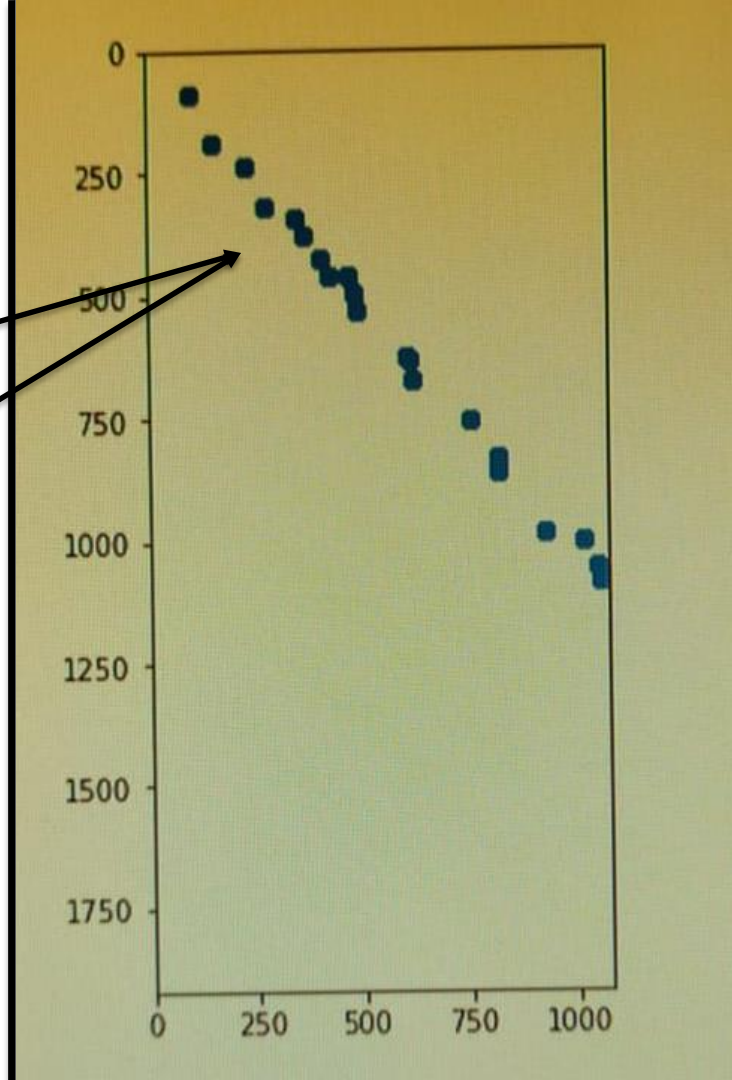
- Time of touch
- X coordinate of cross
- Y coordinate of cross
- X coordinate of actual touch
- Y coordinate of touch



Current Status

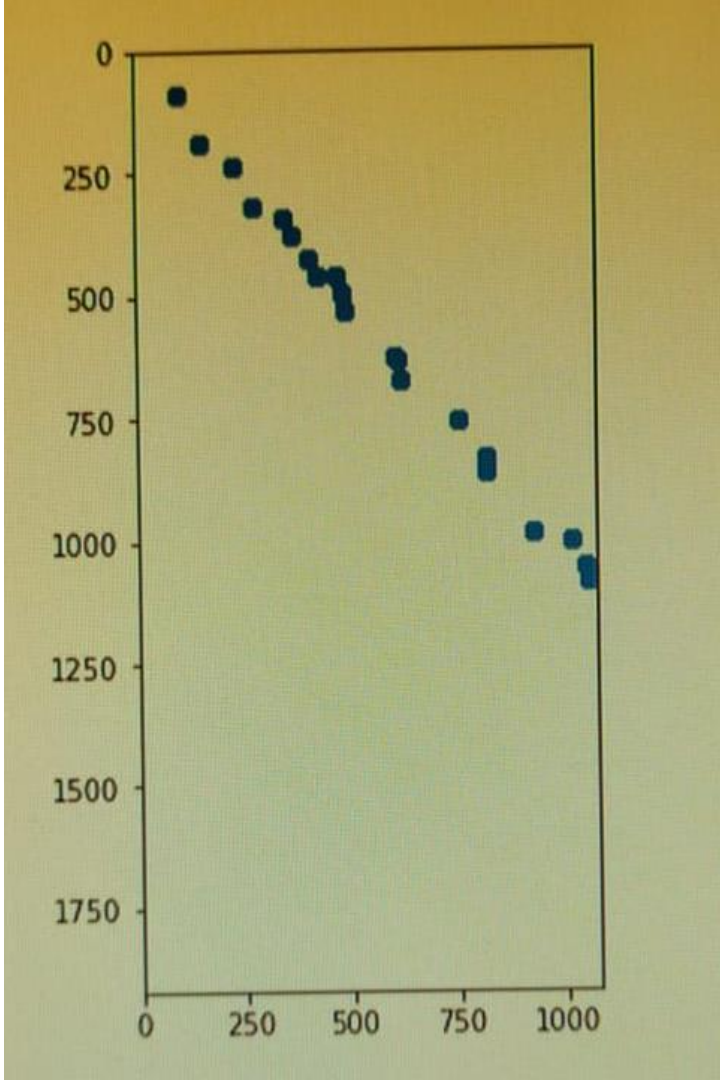
3 types of plots for our most promissing models:

- Predicition plots
  - Show prediction and actual touches
  - And their relation
- Origin plots
  - Move actual touches to origin
  - Move respective predicitions in the same order
- Acc / Val_Acc plots
  - Acc and Val_Acc over time (epochs)

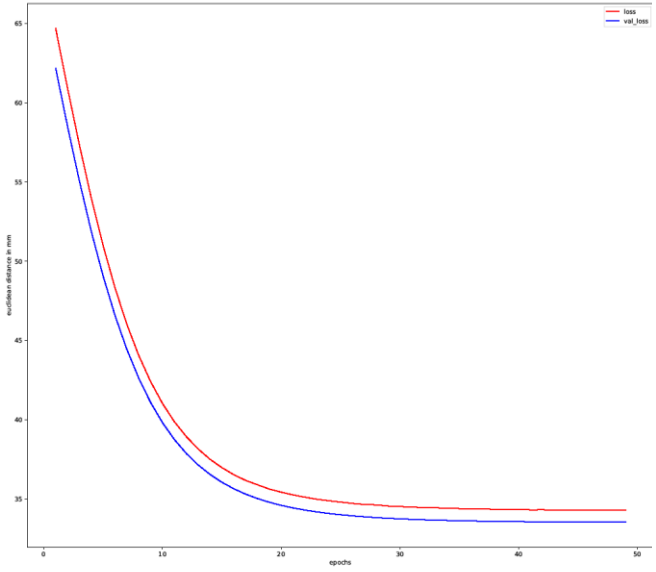
Preprocessing

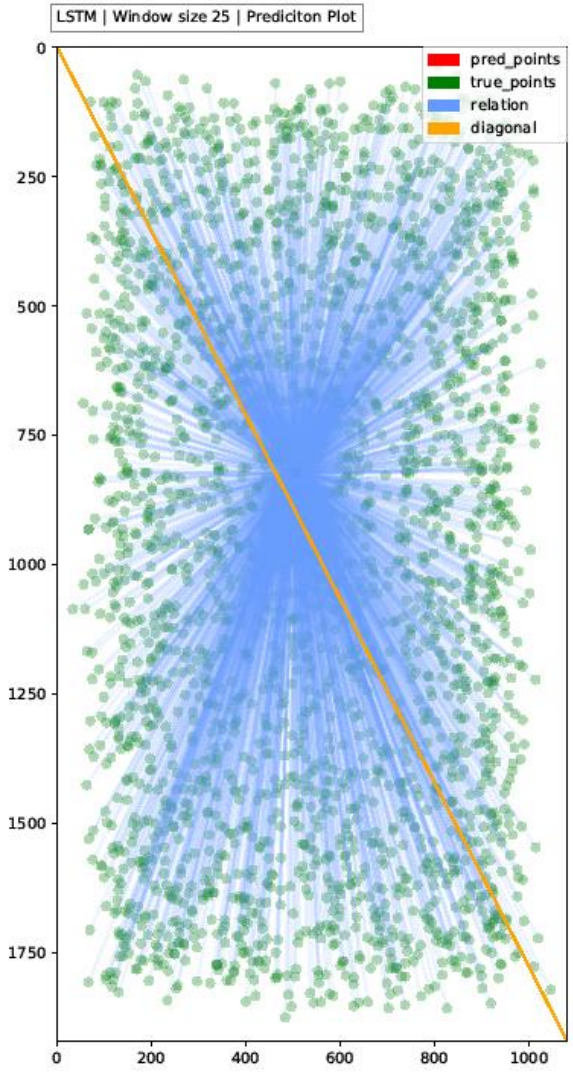
- ✓ Segmentation
- ✓ Remove duplicates
- ✓ Sensor data alignment
- ✓ Data generator
- ❑ Model training

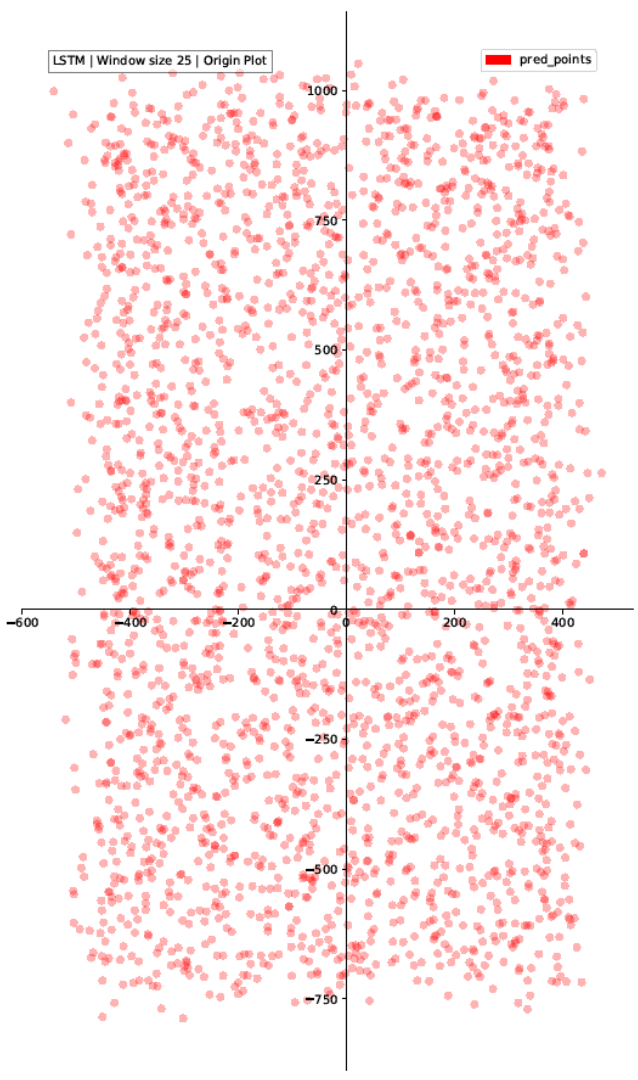
Model Accuracy



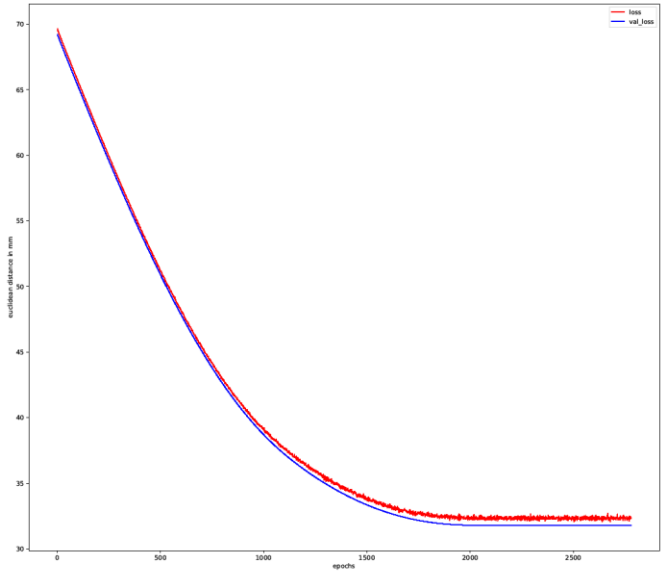
Model Plots

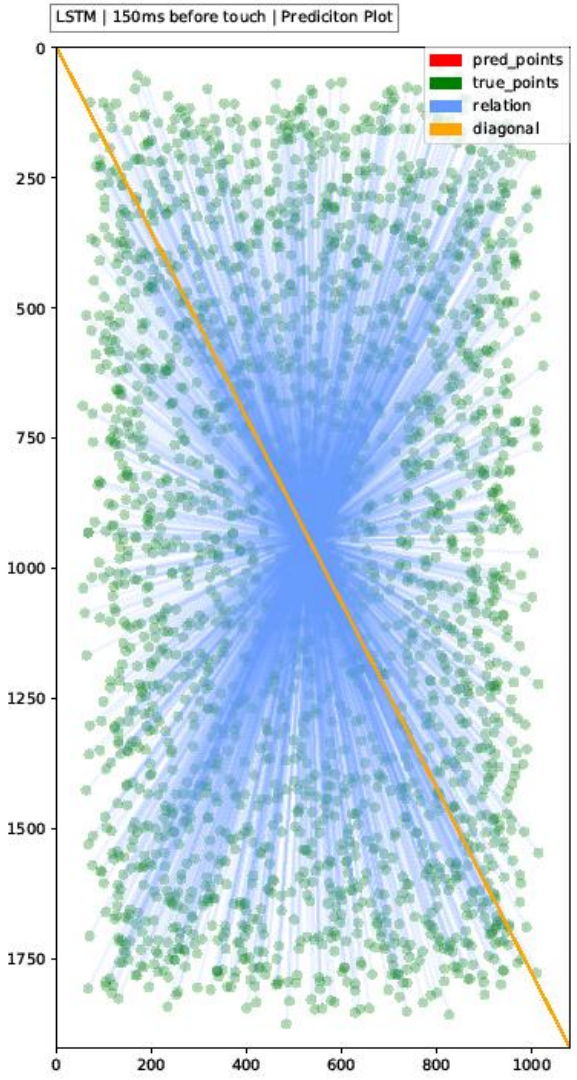

loss
val_loss
euclidean distance in mm
epochs

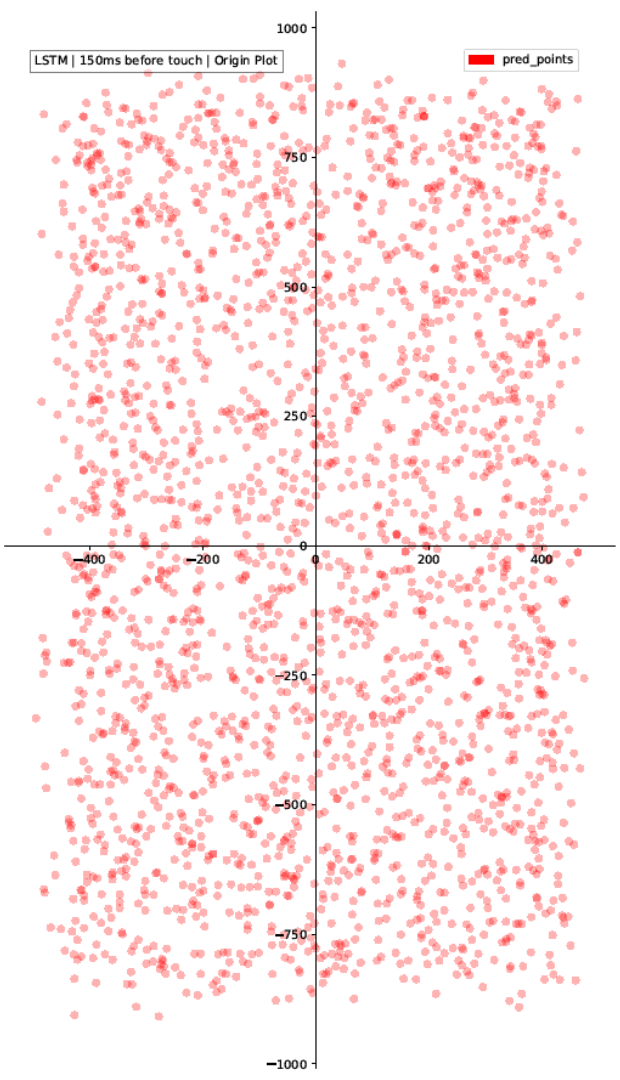

LSTM | Window size 25 | Prediciton Plot
pred_points
true_points
relation
diagonal


LSTM | Window size 25 | Origin Plot
pred_points

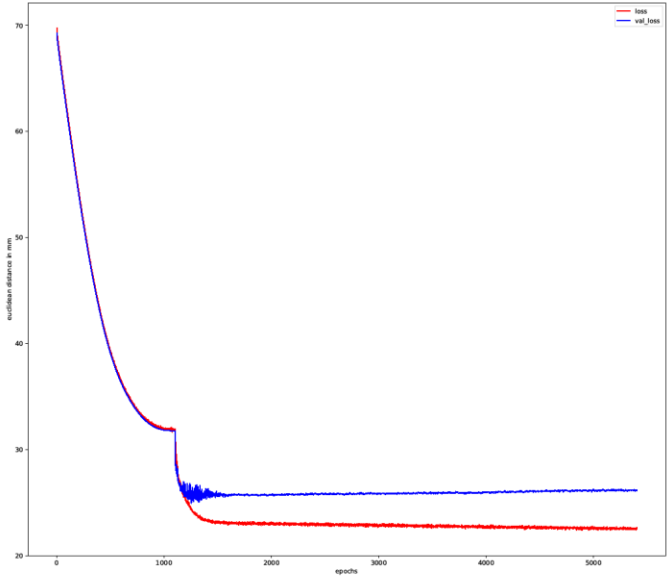
Model Plots

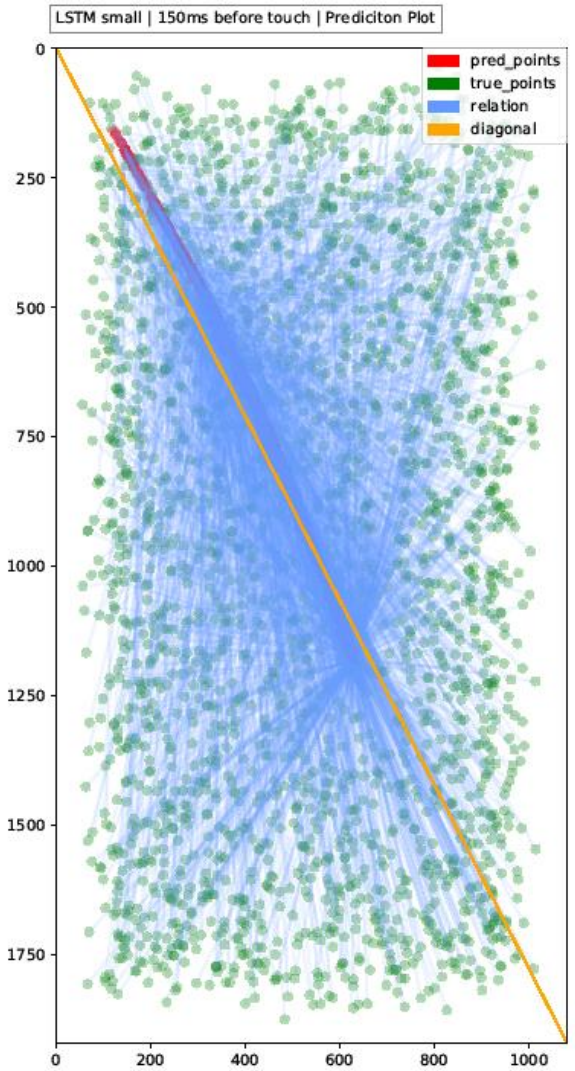

loss
val_loss
euclidean distance in mm
epochs

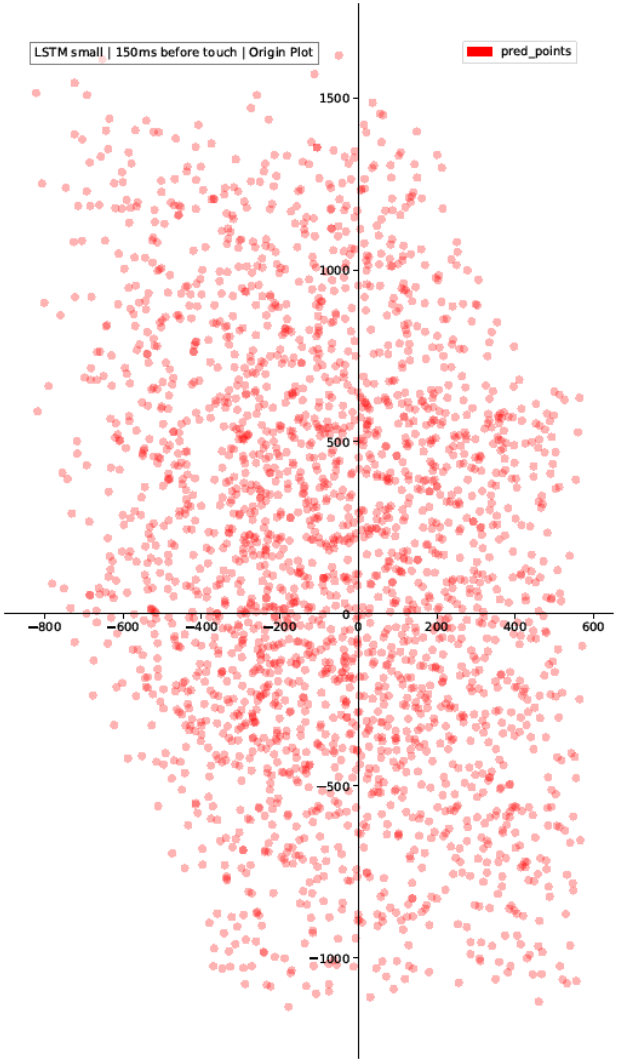

LSTM | 150ms before touch | Prediciton Plot
pred_points
true_points
relation
diagonal


LSTM | 150ms before touch | Origin Plot
pred_points

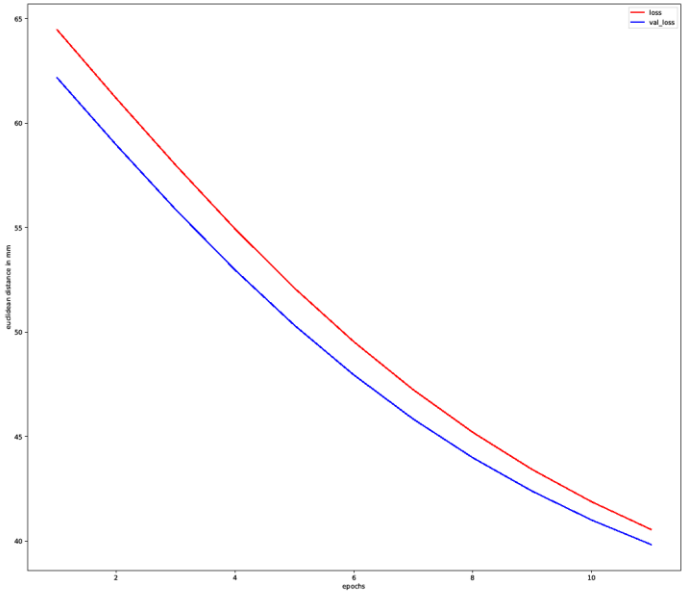
Model Plots

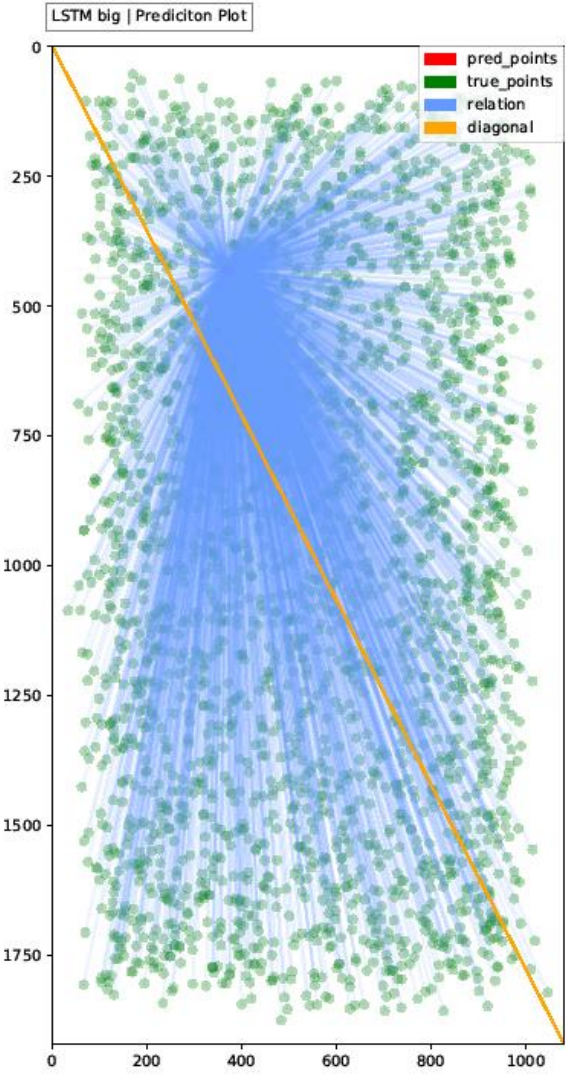

loss
val_loss
euclidean distance in mm
epochs
0
1000
2000
3000
4000
5000
20
30
40
50
60
70

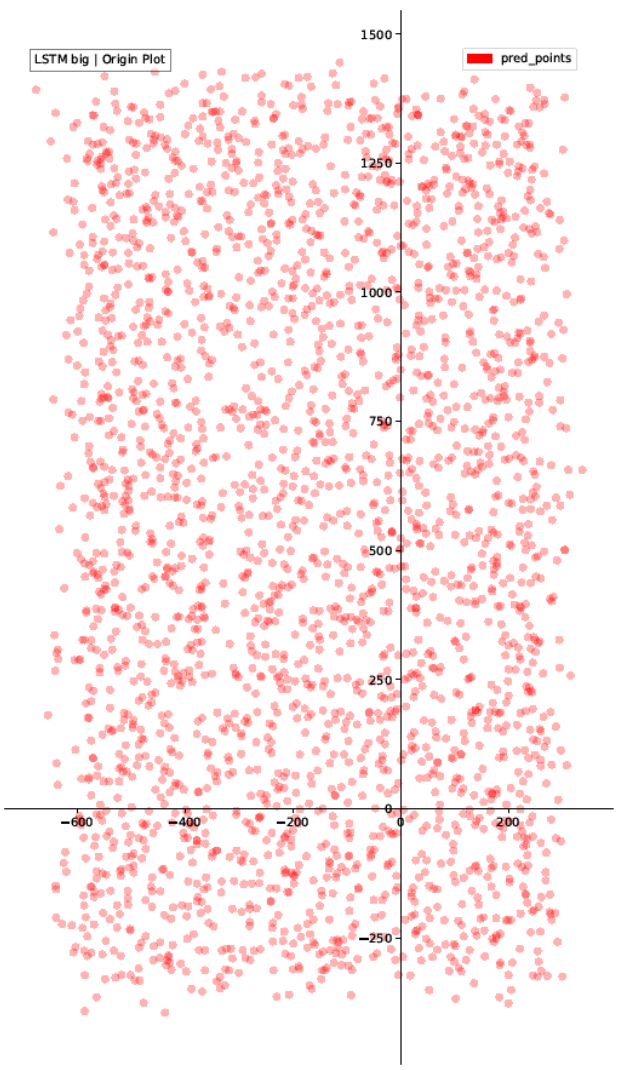

LSTM small | 150ms before touch | Prediciton Plot
pred_points
true_points
relation
diagonal
0
250
500
750
1000
1250
1500
1750
0
200
400
600
800
1000


LSTM small | 150ms before touch | Origin Plot
pred_points
1500
1000
500
0
−500
−1000
−800
−600
−400
−200
0
200
400
600

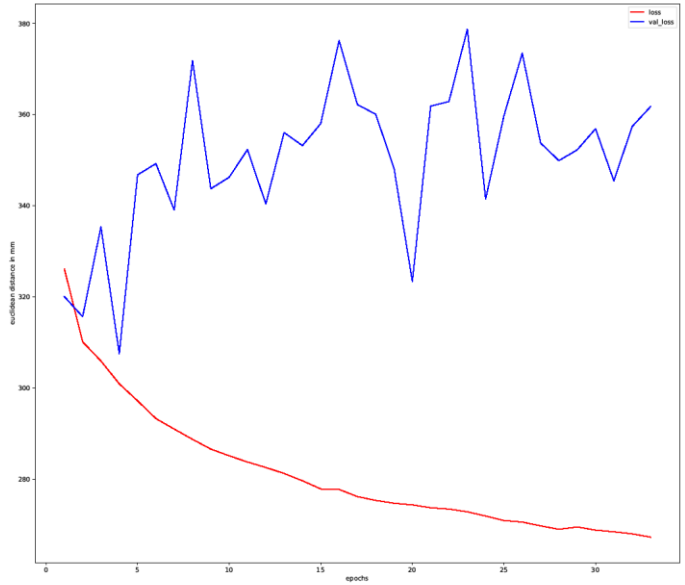
Model Plots

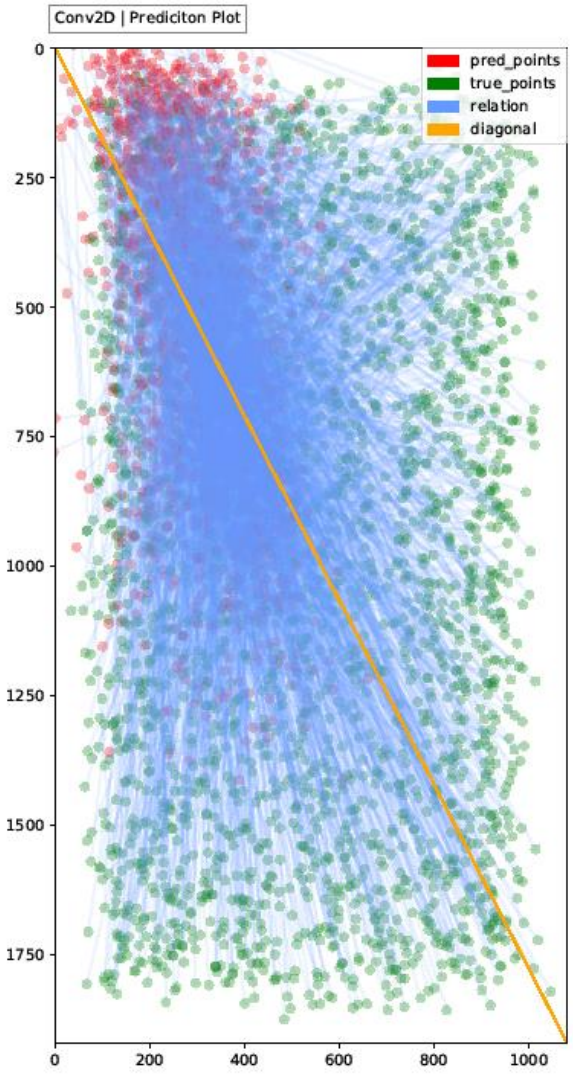

loss
val_loss
euclidean distance in mm
epochs

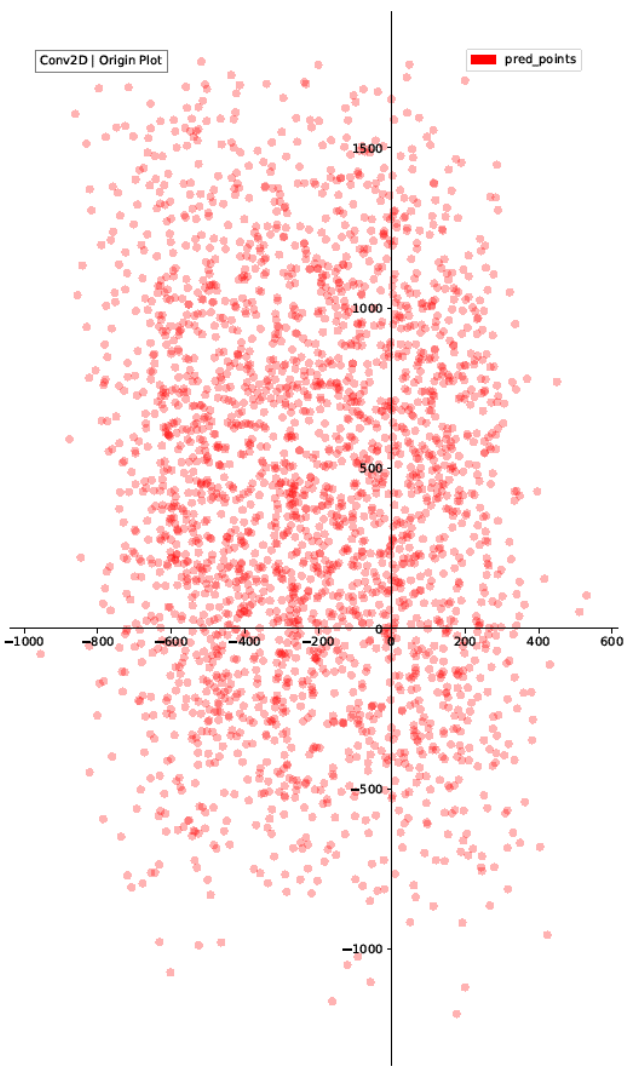

LSTM big | Prediciton Plot
pred_points
true_points
relation
diagonal


LSTM big | Origin Plot
pred_points

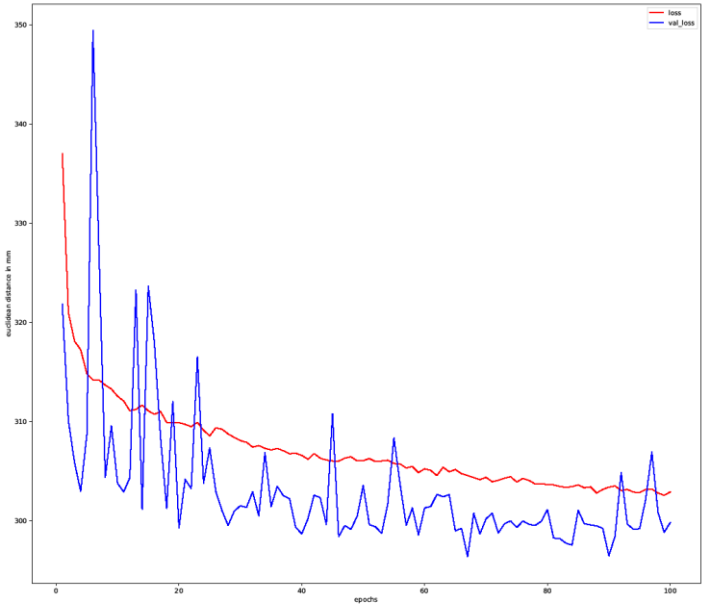
Model Plots

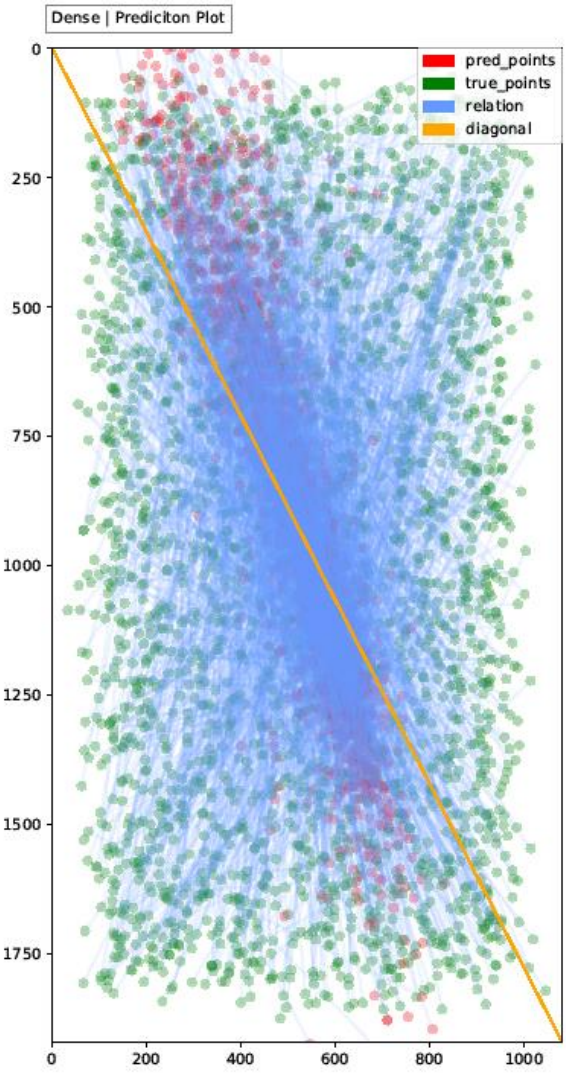

loss
val_loss
euclidean distance in mm
epochs

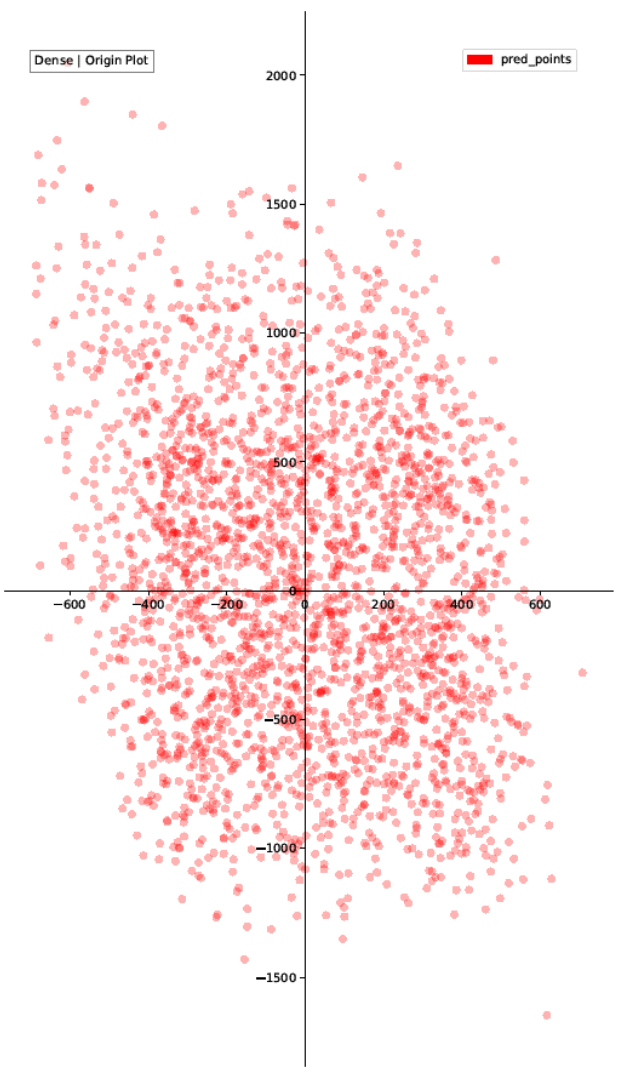

Conv2D | Prediciton Plot
pred_points
true_points
relation
diagonal


Conv2D | Origin Plot
pred_points

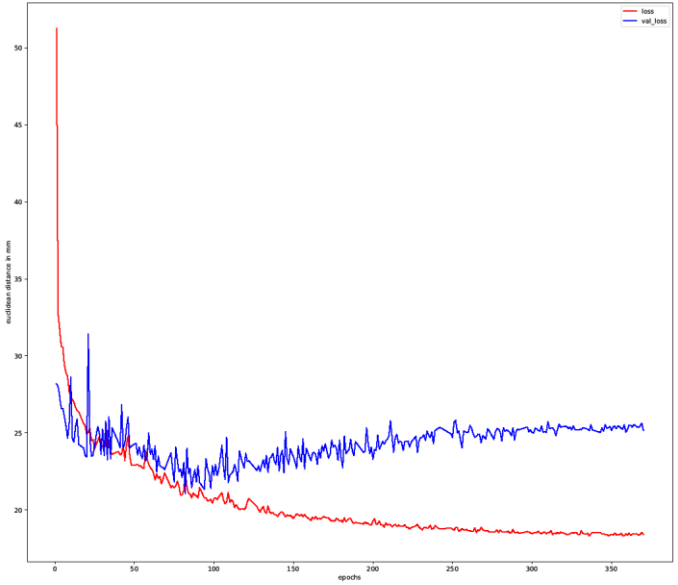
Model Plots

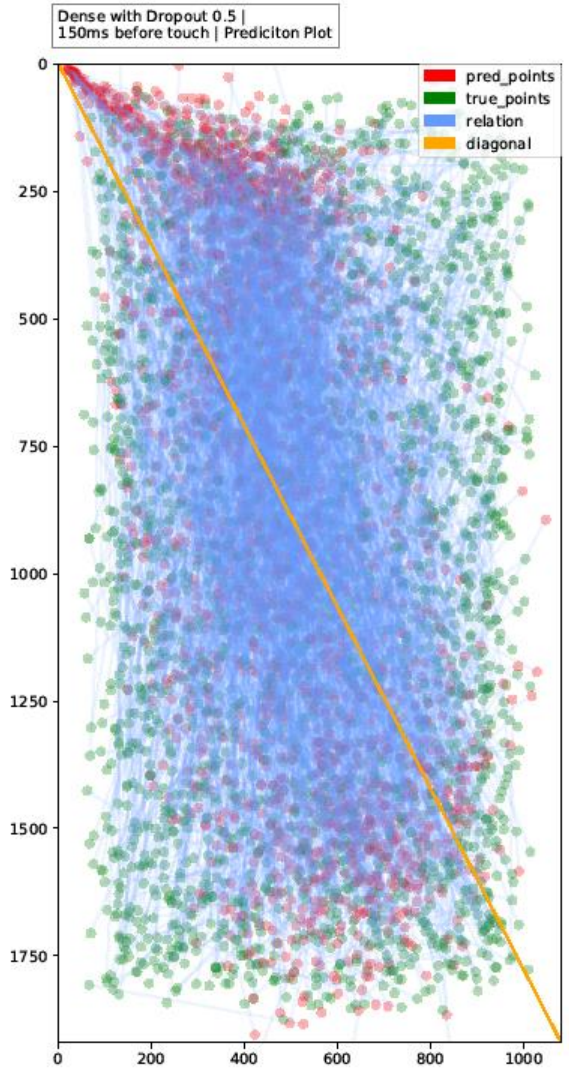

loss
val_loss
euclidean distance in mm
epochs

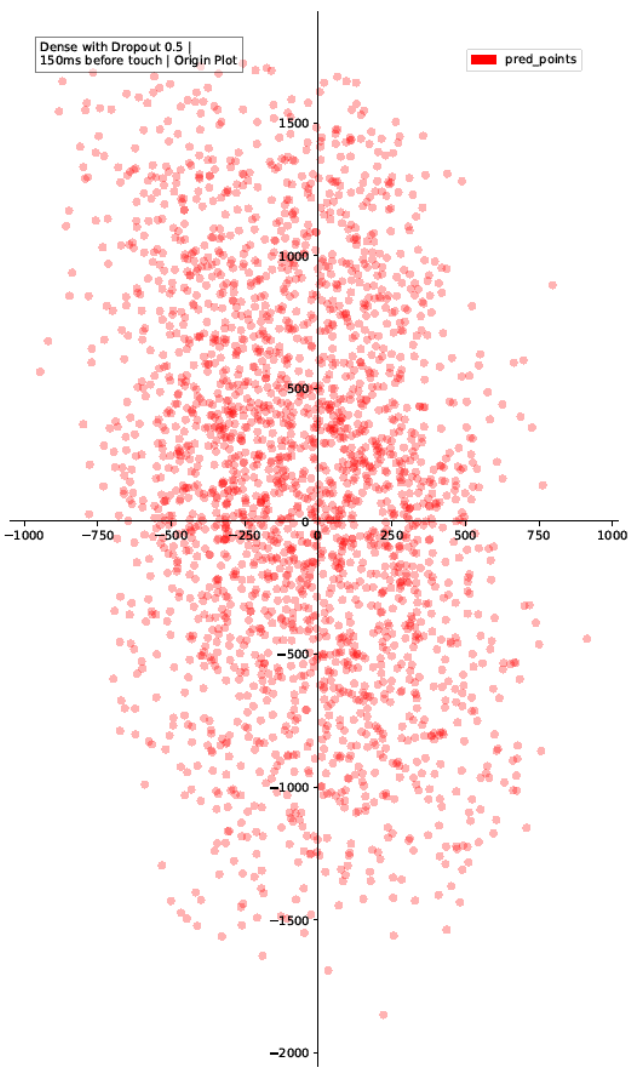

Dense | Prediciton Plot
pred_points
true_points
relation
diagonal


Dense | Origin Plot
pred_points

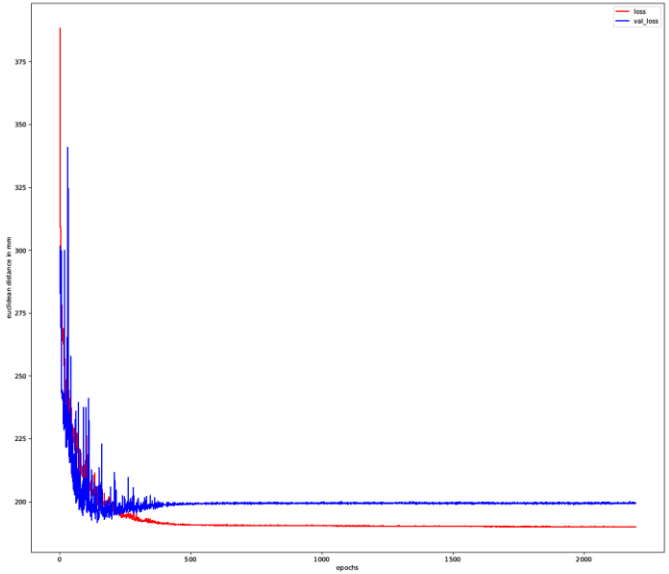
Model Plots

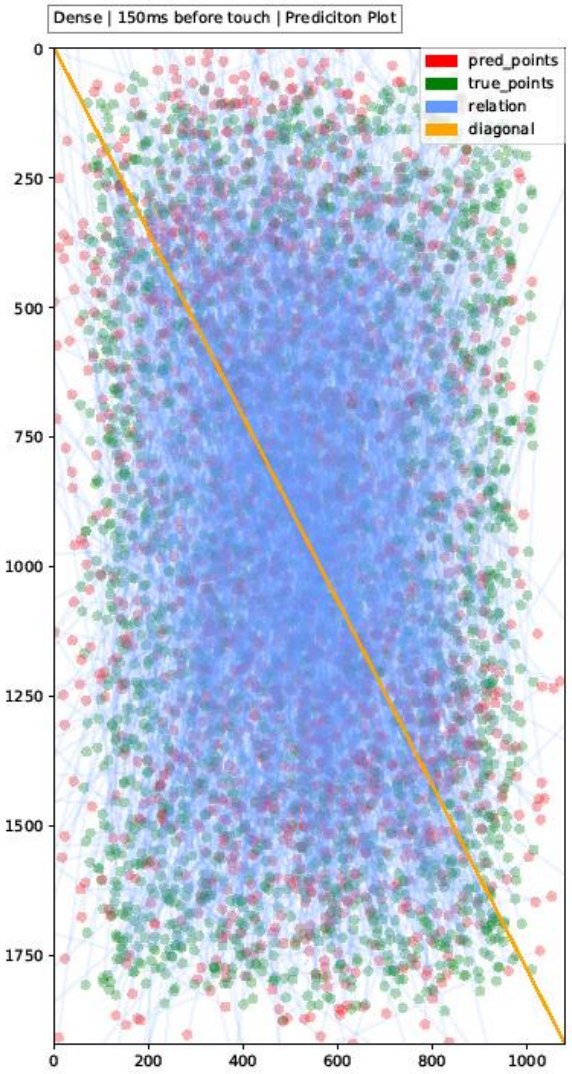

loss
val_loss
euclidean distance in mm
epochs

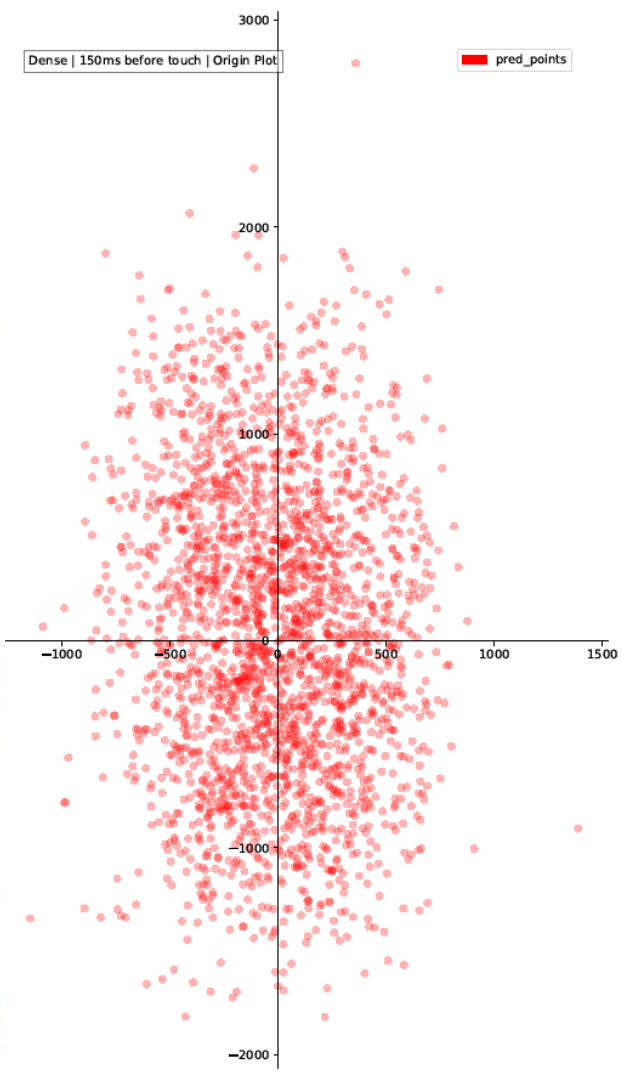

Dense with Dropout 0.5 |
150ms before touch | Prediciton Plot
pred_points
true_points
relation
diagonal


Dense with Dropout 0.5 |
150ms before touch | Origin Plot
pred_points

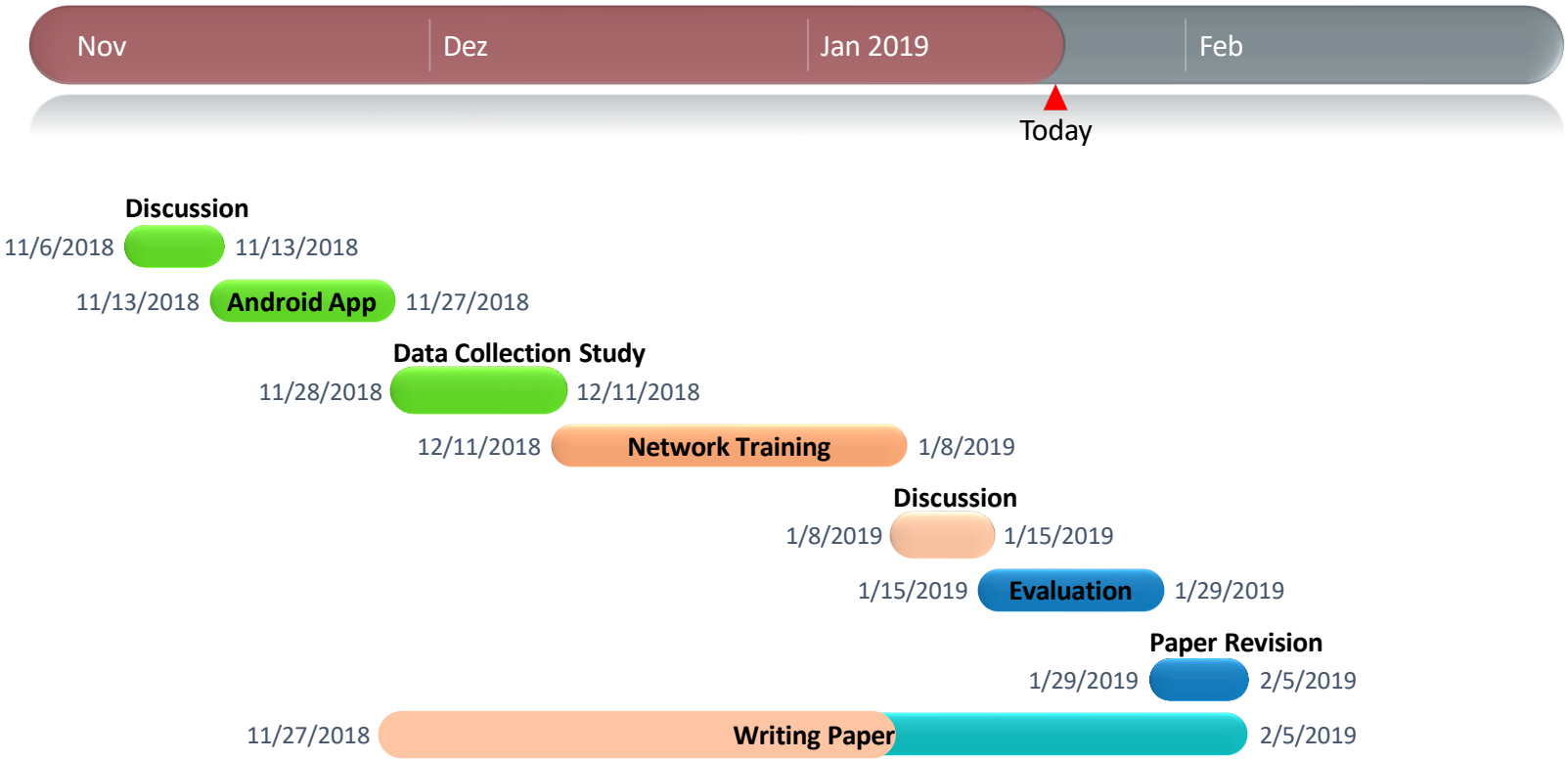
Model Plots


loss
val_loss
euclidean distance in mm
epochs

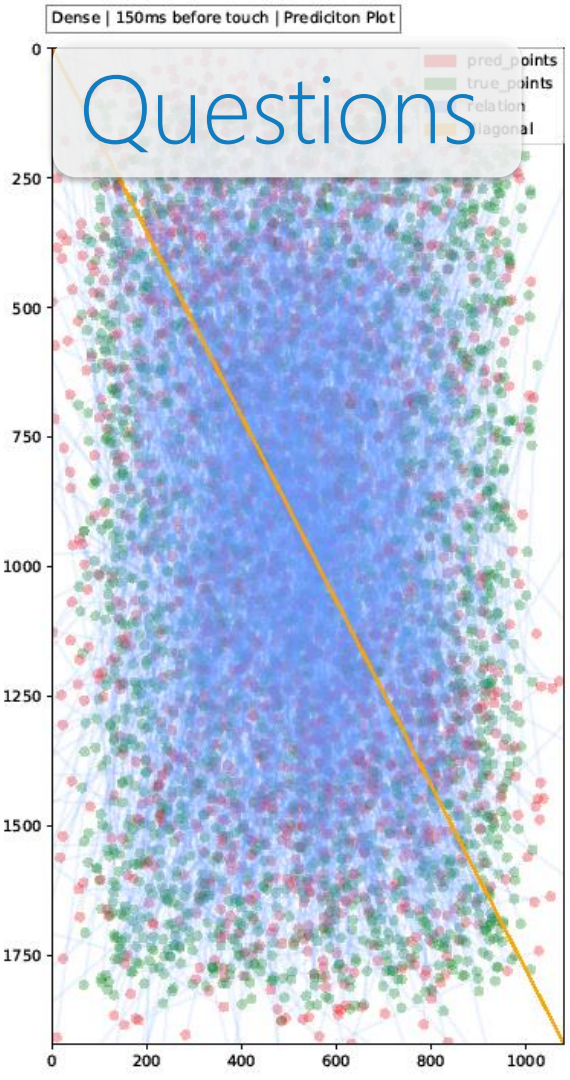

Dense | 150ms before touch | Prediciton Plot
pred_points
true_points
relation
diagonal

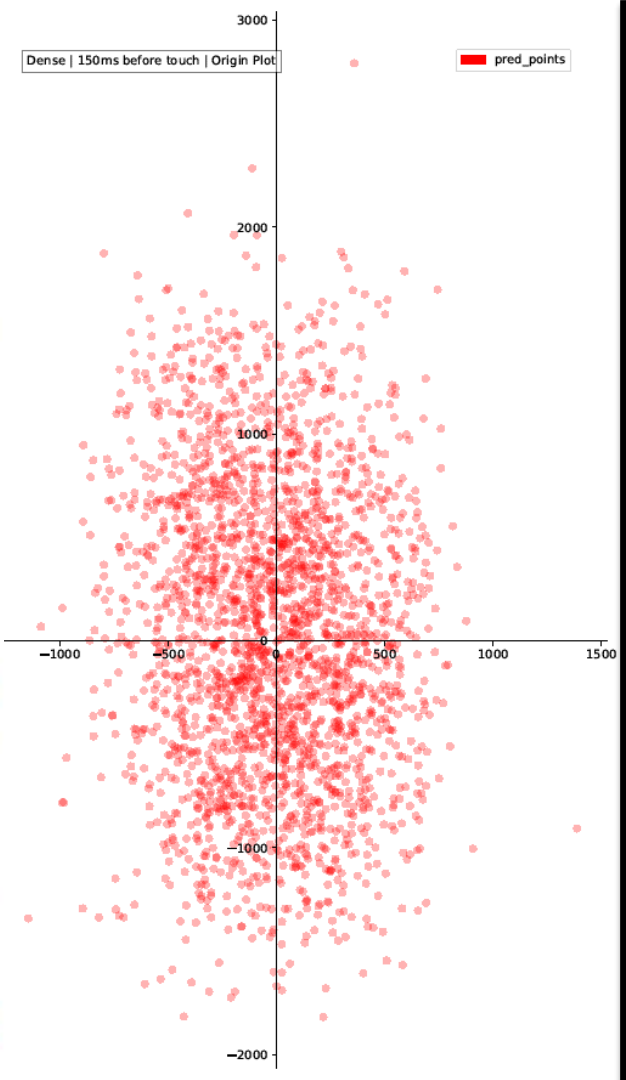

Dense | 150ms before touch | Origin Plot
pred_points

Agenda


Nov
Dez
Jan 2019
Feb
Today
Discussion
11/6/2018
11/13/2018
11/13/2018
Android App
11/27/2018
Data Collection Study
11/28/2018
12/11/2018
12/11/2018
Network Training
1/8/2019
Discussion
1/8/2019
1/15/2019
1/15/2019
Evaluation
1/29/2019
Paper Revision
1/29/2019
2/5/2019
11/27/2018
Writing Paper
2/5/2019

Questions





- We are trying to improve our results.
- We are going to reduce our features.
- Only using dense layers isn't really a fancy approach. Is this this still OK?