Meeting 05/08/2020

Shuo Zhang

Progress So far

- **GAZEBO Correctness Check**
- **Search for the best NN model**
- **Plan using the best NN model**
  (Adjusted Planner: No node added into the search list if in the opposite direction)
- **Rollout the planned actions**
- **Issue Analysis**

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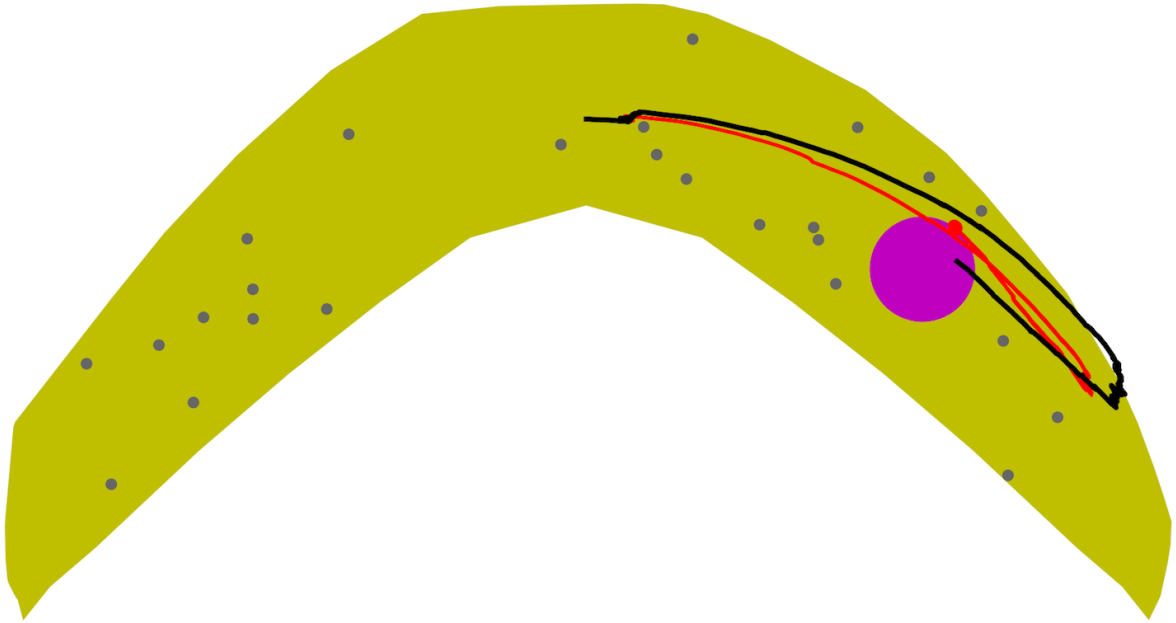
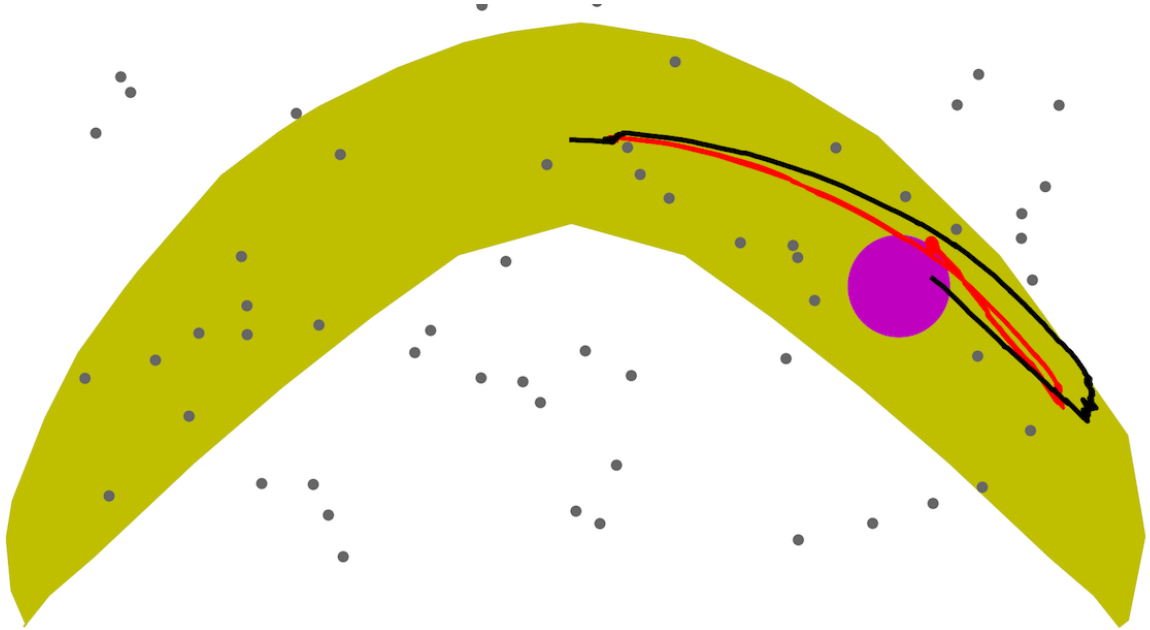
Correctness Check of "my" GAZEBO



My Results using Avishai's actions



Avishai's Results using Avishai's actions

So, GAZEBO on my laptop works well!

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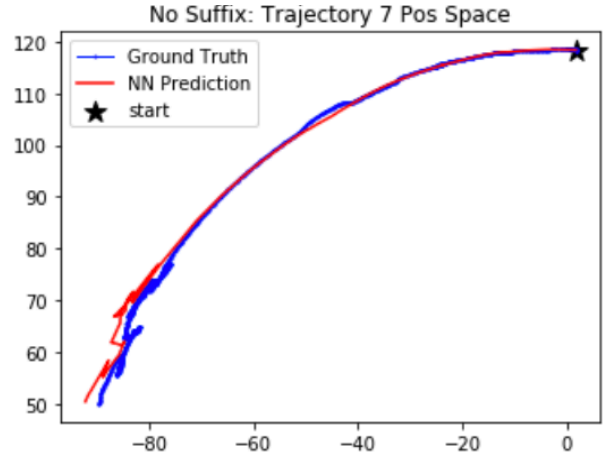
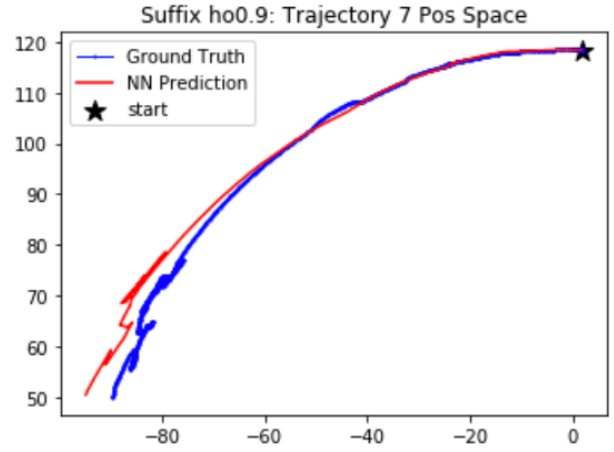
Search for the Best NN Model

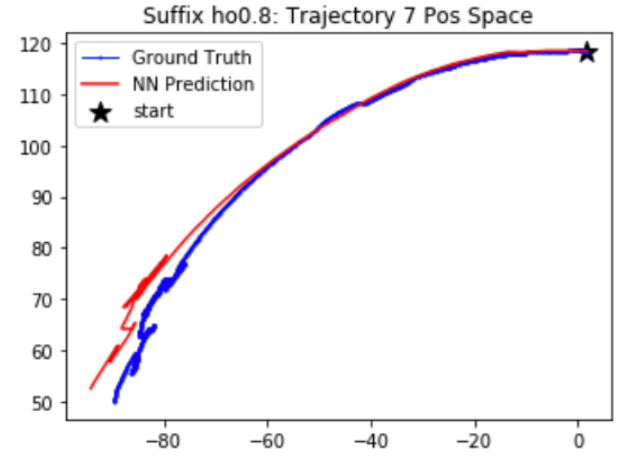
- All available 9 models we have:

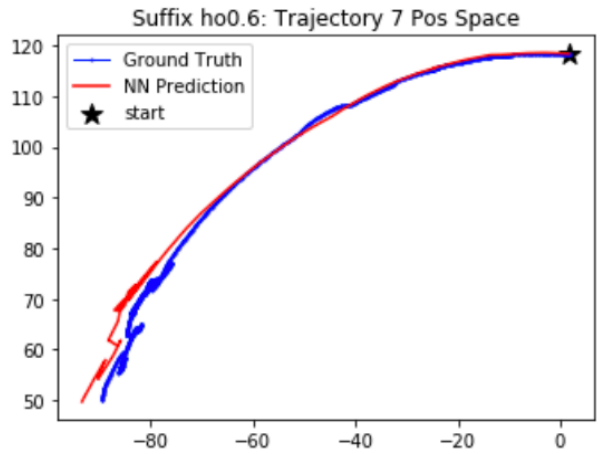
1) no suffix
2) suffix ”ho40”
3) suffix ”ho0.5”
4) suffix ”ho0.6”
5) suffix ”ho0.7”
6) suffix ”ho0.8”
7) suffix ”ho0.9”
8) suffix ”ho0.95”
9) suffix ”ho0.99”

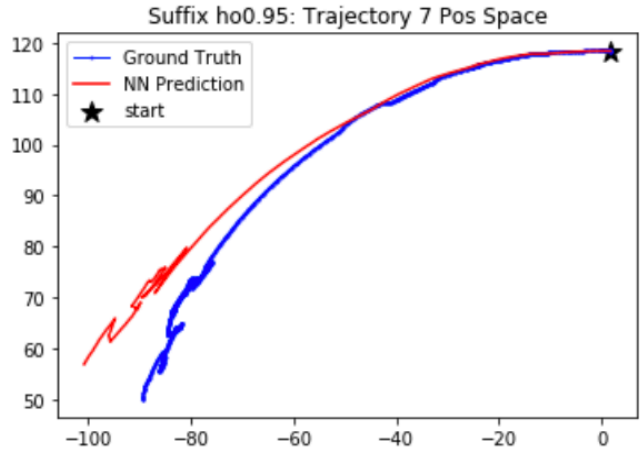
- **Results: Model “no suffix” works best generally**

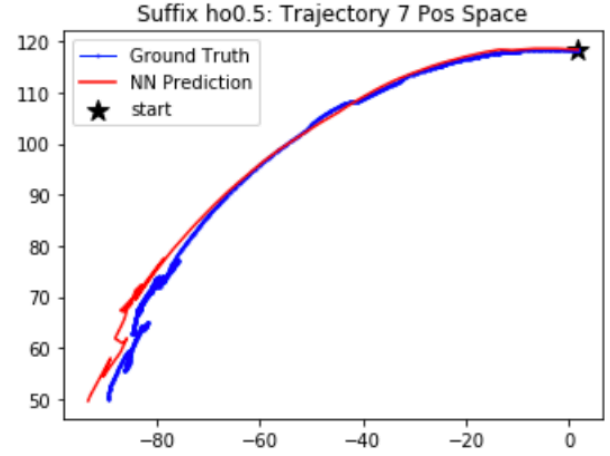

No Suffix: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

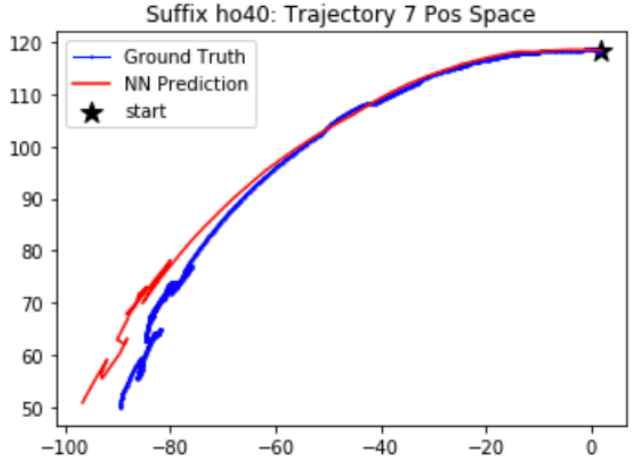

Suffix ho0.9: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

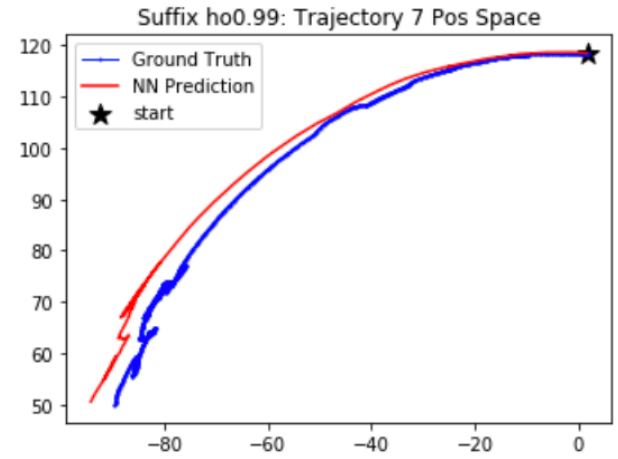

Suffix ho0.8: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

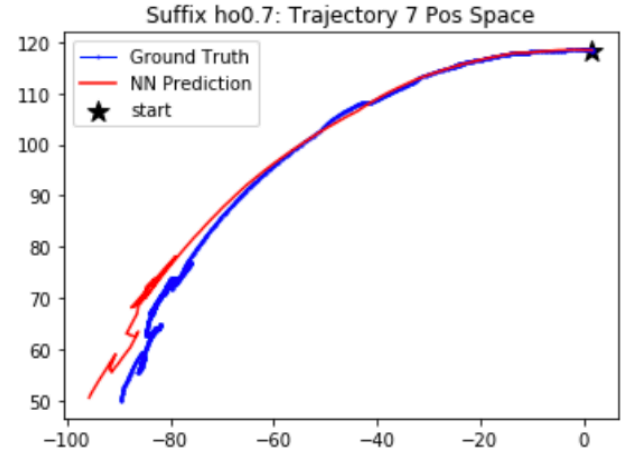

Suffix ho0.6: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

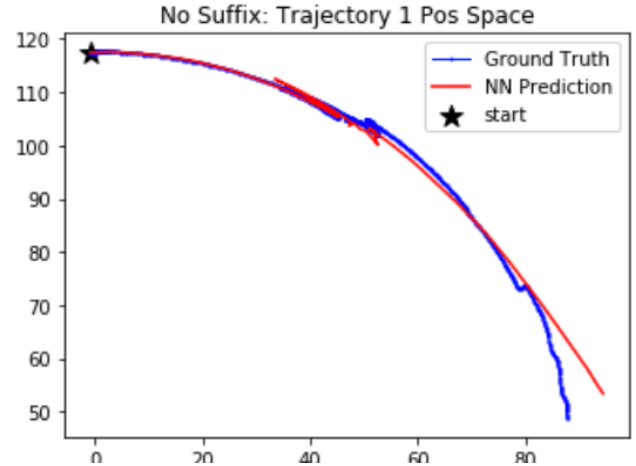

Suffix ho0.95: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

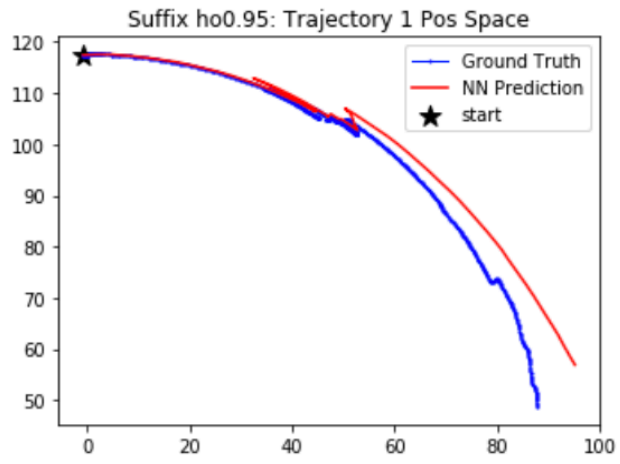

Suffix ho0.5: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

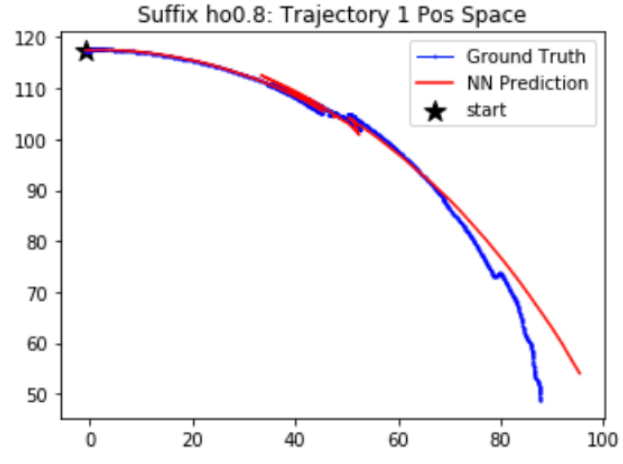

Suffix ho40: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

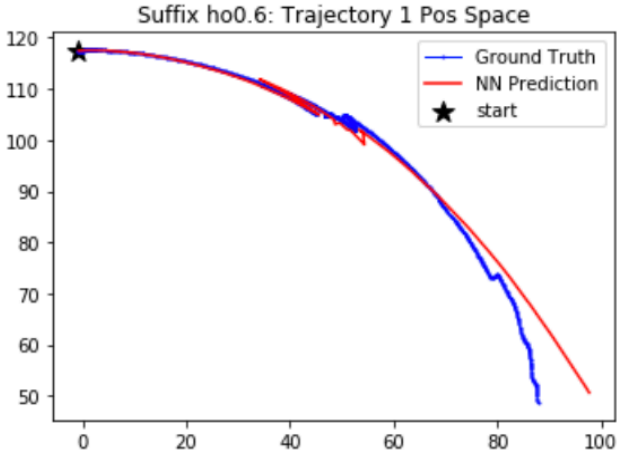

Suffix ho0.99: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

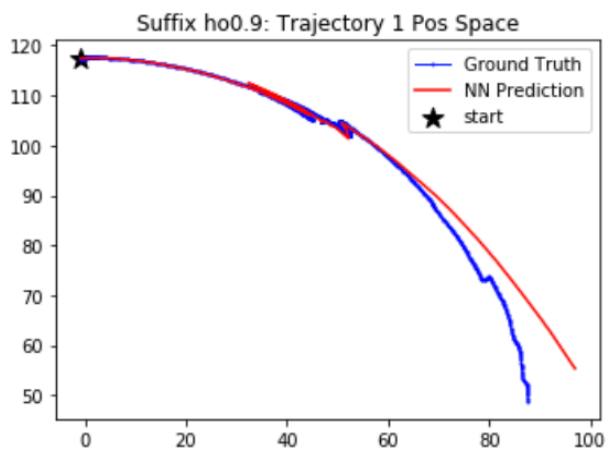

Suffix ho0.7: Trajectory 7 Pos Space
Ground Truth
NN Prediction
start

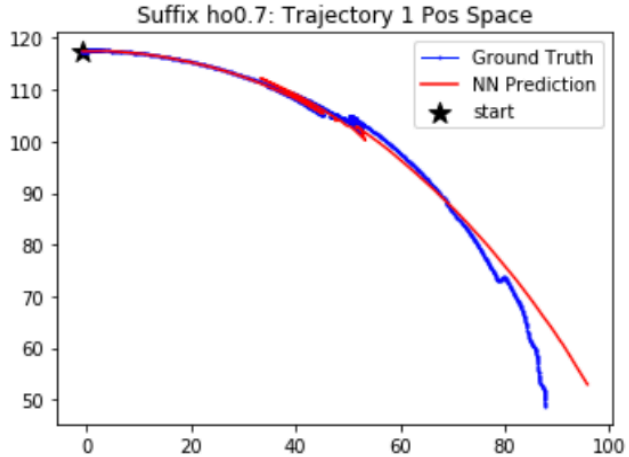

No Suffix: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start

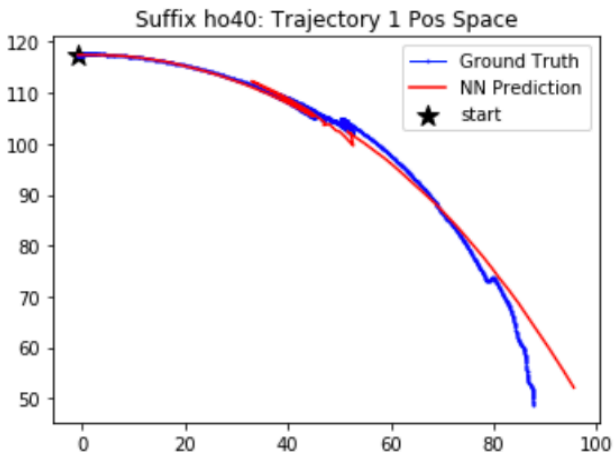

Suffix ho0.95: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start

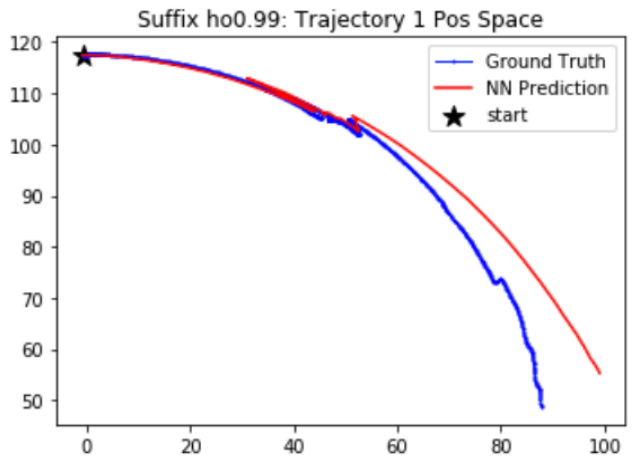

Suffix ho0.8: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start

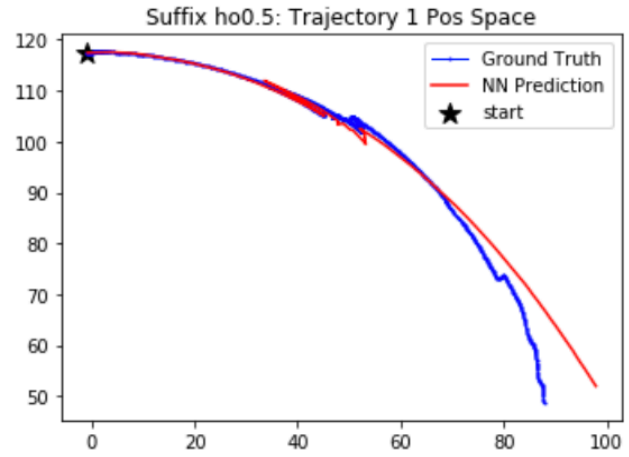

Suffix ho0.6: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start


Suffix ho0.9: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start


Suffix ho0.7: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start


Suffix ho40: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start


Suffix ho0.99: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start


Suffix ho0.5: Trajectory 1 Pos Space
Ground Truth
NN Prediction
start

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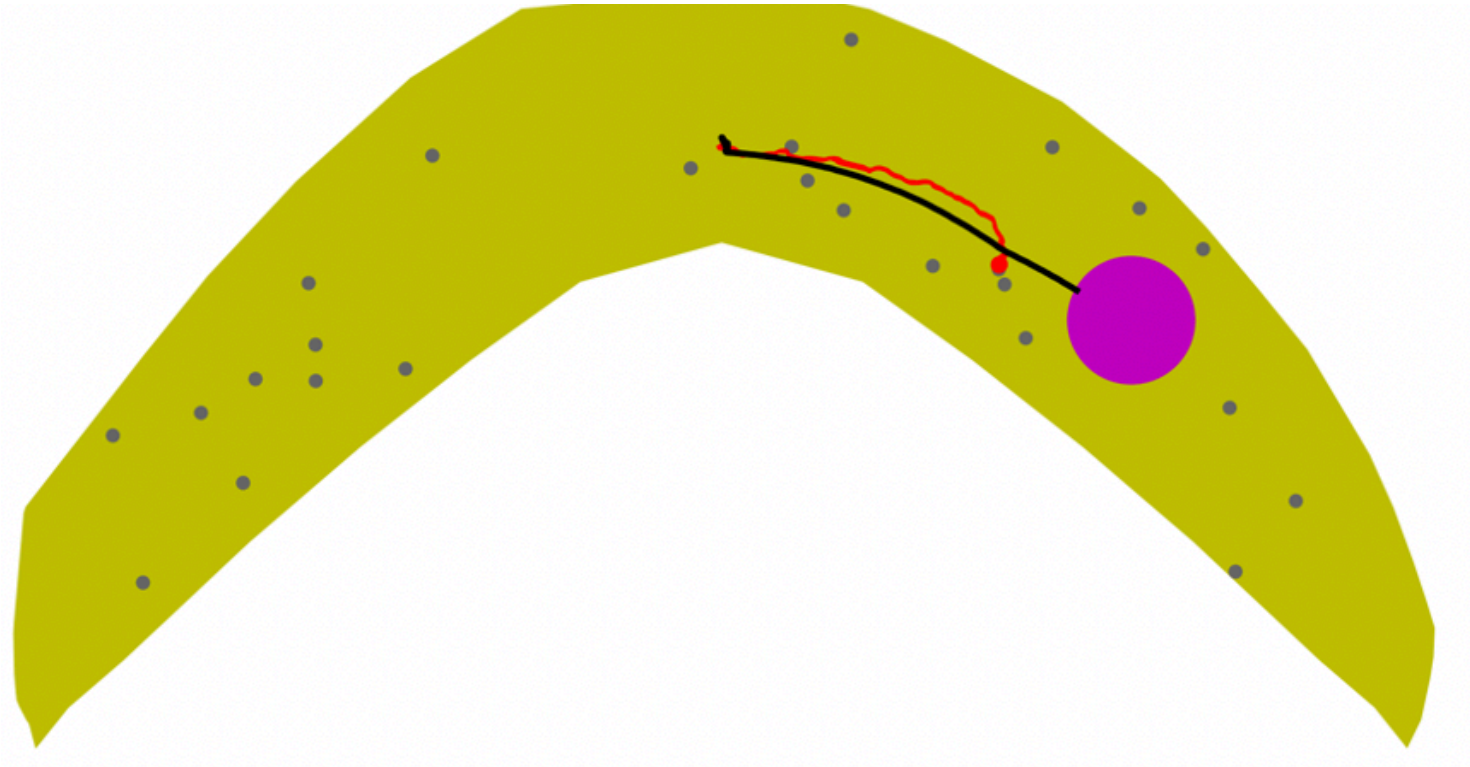
Goal 8 Obstacle 0.75mm

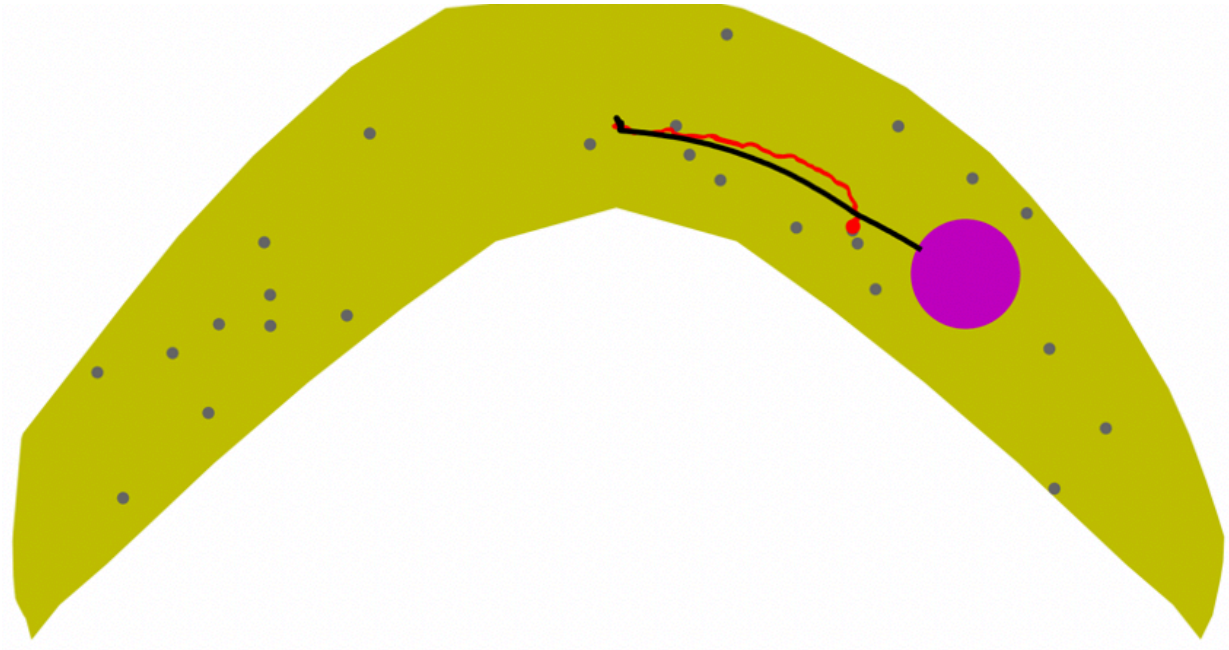


Issue Analysis

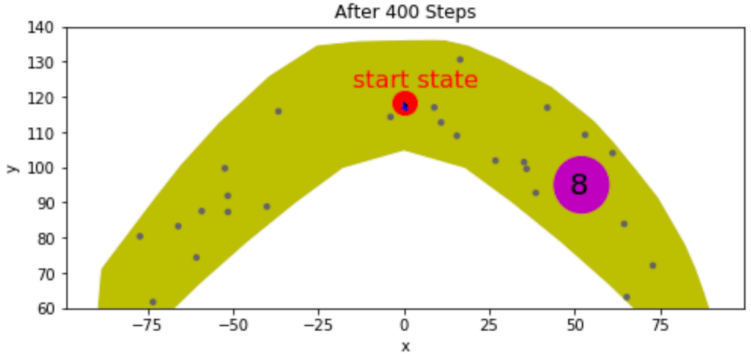
- Planned Actions: 665 steps totally

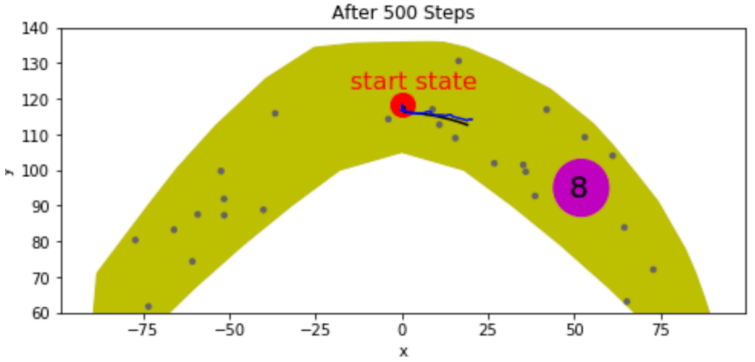
1) First 400 actions: (1, 1) (moving down)
2) Later 265 actions: (1, 0) (moving right)

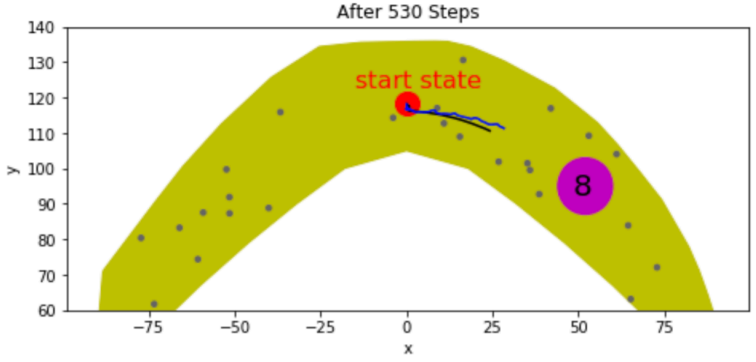
- Rollout path: collision with obstacle after about 598 steps

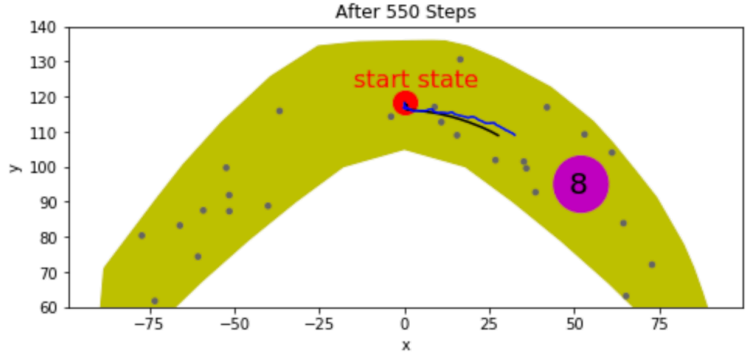


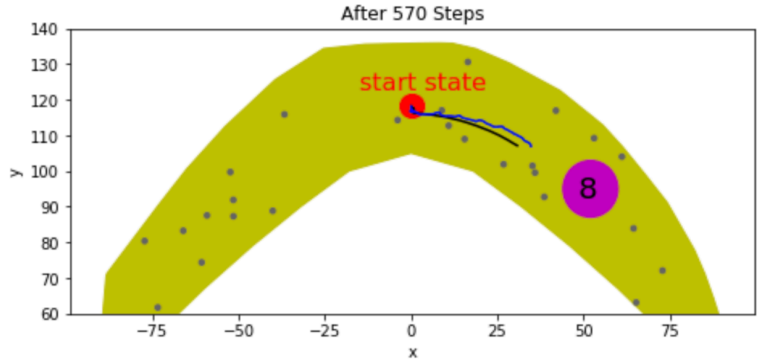
Step-by-Step Analysis

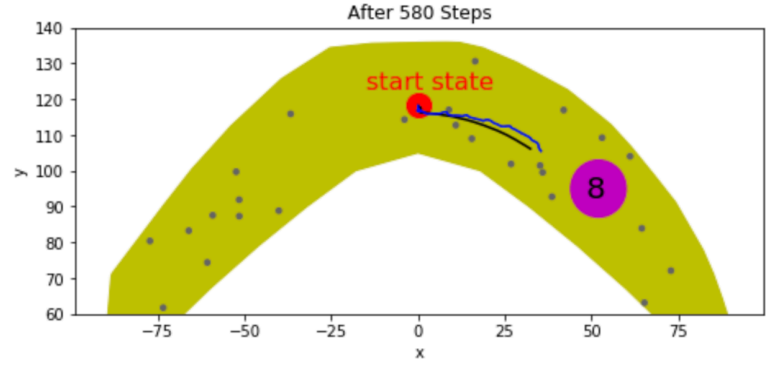


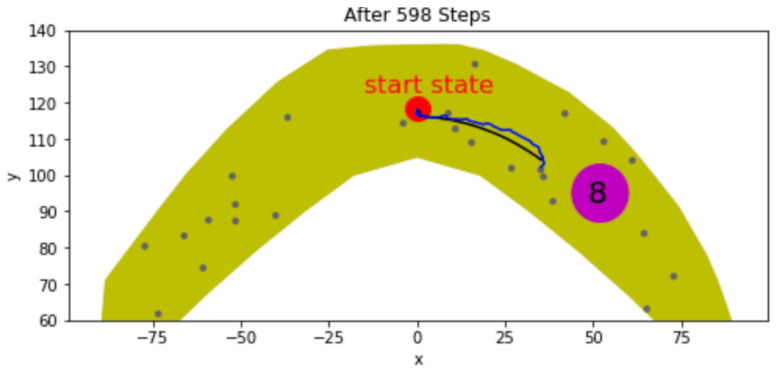


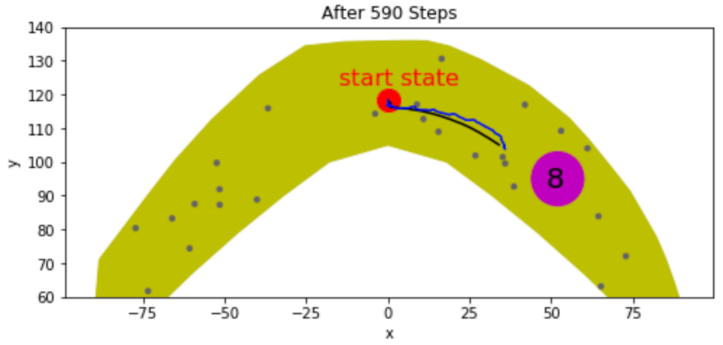












Discussion

- Model is not accurate enough in some cases
- Possible cases might be:
  - After many trivial steps are executed, such as 400 steps of (1, 1) only leading to a very small progress, the model became inaccurate. (Raw data has never such cases, like 400 steps of (1,1) pushing gripper to move downside. So, the NN model never learned such cases)

  - Because load prediction is always not as good as trajectory prediction, so when the values of load matter much, the trajectory prediction, based on the inaccurate load, would be bad. 400 steps of (1, 1) would lead to a relatively high load, which might influence the trajectory prediction afterwards, to a great extent.

  - Maybe predictions for steps, (1,1) or (-1,-1), themselves are not accurate enough, although predictions for (1,0),(1,-1),(0,1),(-1,1) are every good.