

### **Description of Files:**

- Projection Models - Contains the models used for projection. The models are labeled based on their description in the paper.
- Results - contains the testing demonstration results for each model.
- Simulation Code - contains the model used to run simulations and generate data for our experiment
- Simulations.mp4 – This video shows our task demonstration compared with the learned model prediction. We also show some attempts at lifting the table with one arm to demonstrate that the table requires both arms to lift, and failure cases where the peg-in-hole are not inserted properly before lifting.

### **Model Dependencies:**

#### Simulation Models

- bumpy
- pandas
- pybullet

#### Projection Models

- statistics
- torch
- pandas
- numpy
- random
- csv
- dgl

### **Projection Model Runtime:**

Models were trained on a laptop with an i7-8750H processor and Nvidia 1050Ti Max-Q GPU.

2500 demonstrations for the table lift task takes about 2 hours to run

4500 demonstrations for the peg-in-hole task takes about 3.5 hours to run

### **Projection Model Instructions:**

Training code and evaluation code are saved in the 'Model' folder. Training and evaluation are contained within the same model.

Within each model, there are 7 files relevant to the model.

1. Main - runs all of the models to get the projection
2. A1PrimitiveData - Data reading for planning
3. A2SoftmaxModel - Prediction models for planning
4. A3TrainSoftmax - Data processing and training/evaluation for planning
5. B1DataProcessing - Data reading for dynamic model
6. B2ODEModel - Prediction models for dynamic model

## 7. B3TrainODE - Data processing and training/evaluation for planning

To run the models, run the Main file in each model. There are a few modifications that are made to get either the training or testing data.

1. In the A1 and B1 files, make sure the directory in the BaxterDataset constructor is pointing to the correct CSV file.
2. A3 - The Options can be modified for the run. Description of the options are in the comments. The options here decide whether to load the previous model or train a new model.
3. B3 - The Options can be modified for the run. Description of the options are in the comments. The options here decide whether to load the previous model or train a new model.
4. Main - Options can be modified for the run. Run this to generate the projections.