Deep Learning Lab Exercise 2

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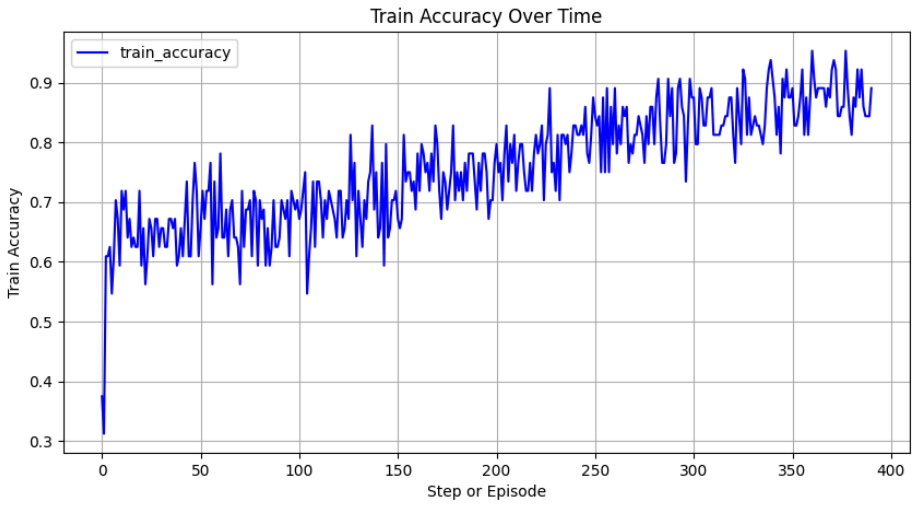
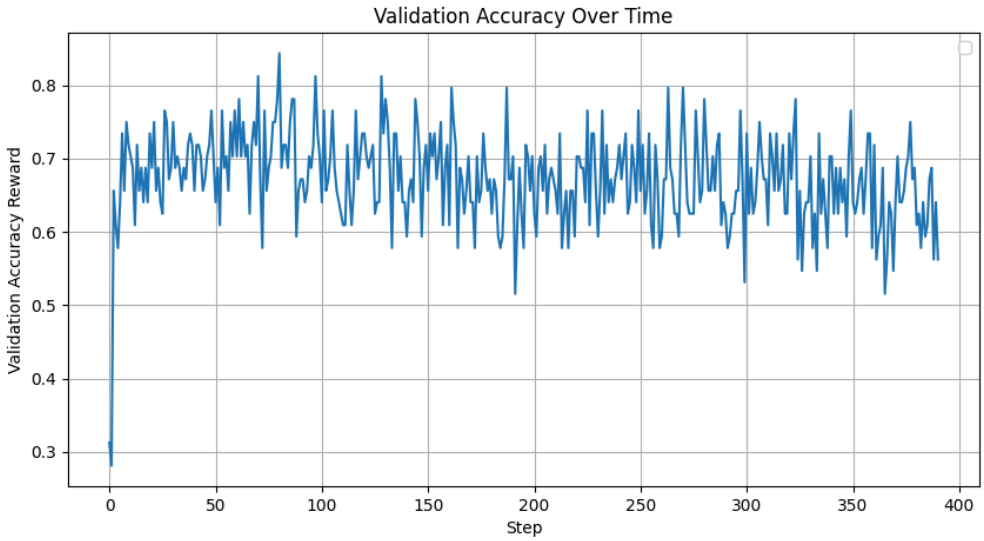
1. Imitation Learning

Hyperparamter settings:
Lr:1e-4 batch_size=64 history_length=1 num_minibatches=15000





Results:
Mean: -83 Std:24.6
Notes:
Even after changing the distribution of the data and increasing the bias of left, right, and accelerate compared to straight model is still overfitting. I believe that adding the history would have improved performance but any history addition caused memory issues even with a small number of samples.

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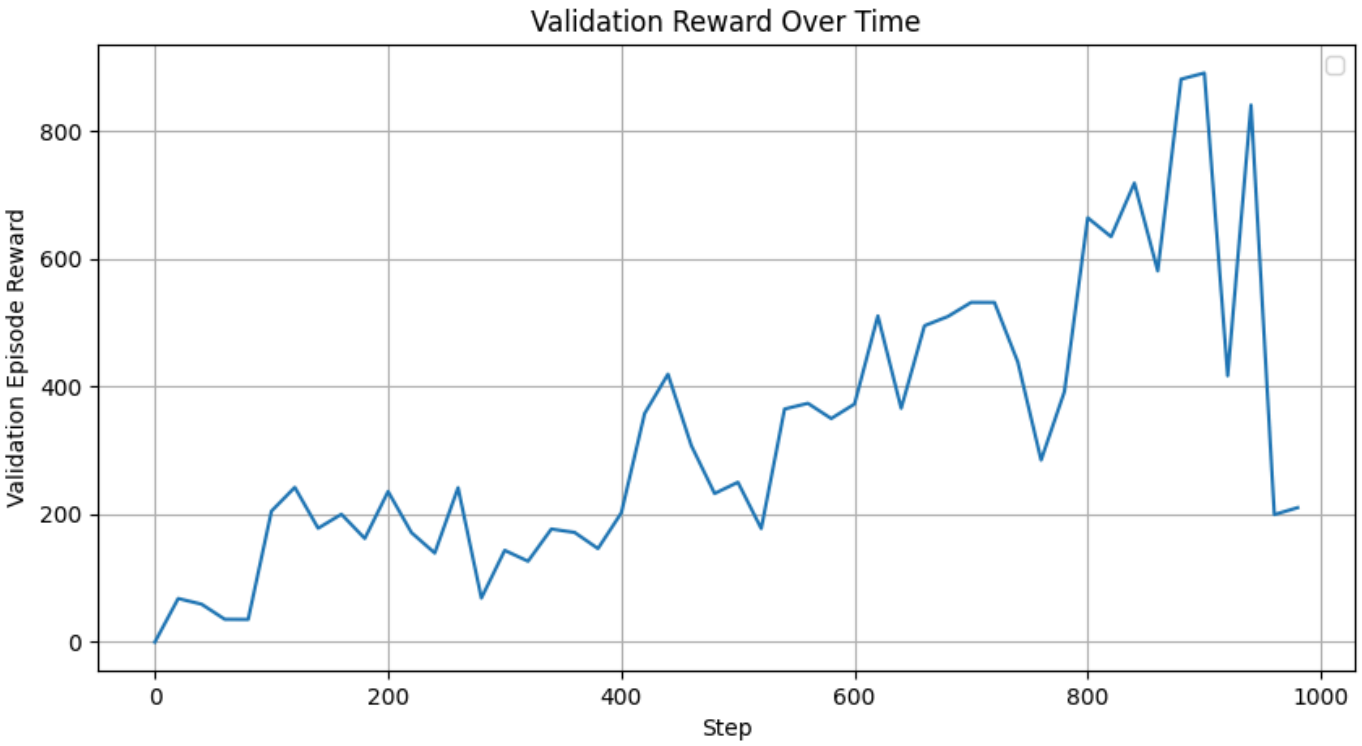
2. Reinforcement Learning:

2.1 Best Model

Hyperparameter settings for best model:
Lr = 1e-3 epsilon=0.1 gamma=0.95 batch_size=64 frameskip=3 episodes=1000
Results:
Mean:709 STD:116



Notes:
As advised I used variable timesteps throughout training it went like this:

Episode range	Number of timesteps
<100	100
<400	300
<800	700
<1000	1000

Also I used changing probability distributions throughout the episode according to the timesteps, early timesteps in the episode favour acceleration the most, then brake probability increases throughout the episode while acceleration probability decreases

Timestep Range	Probability [Straight,Left,Right,Acc,Brake]
Timestep<30	[0.3, 0.1, 0.1, 0.5, 0.0]
Timestepy<500	[0.3, 0.1, 0.1, 0.25, 0.15]
a clear photo of	[0.3, 0.1, 0.1, 0.1, 0.3]

2.2 Other settings:

Using same hyperparamters as the best model but with frameskipping=5 resulted in results mean=626 and std=224, I have noticed from monitoring the testing that high frame skipping results in the car reacting late to seeing a turn and hence going off track.

When using frameskipping=1, achieved mean=699 and std=132