Instructions for running TLC program:

1. First Download SUMO latest version and all the packages from: https://sumo.dlr.de/docs/Downloads.php
2. Have the complex.net.xml file and well as complex.sumocfg in the same folder as the .py files.
    a. The complex.net.xml file contains the mapping of the roads
    b. Complex.Sumocfg runs the simulation
3. We have two programs for heavy and light traffic flow.
    a. Heavy traffic flow run instruction:
        i. **GPU running time of 500 episodes around 6 hours**
        ii. Make sure that the complex.net.xml, complex.rou.xml , complex.sumocfg, train_dnn.py, complex.py, model_evaluation.py, and avg_wait.py files are all in the same folder.
        iii. To run the simulation simply run complex.py. This will begin the training process and should take more than 10 hours. Setting the variable, N, in the main section of the file to a smaller value will decrease simulation time. This will also decrease the number of episodes and thus result in a poorly trained model.
        iv. To evaluate the model that has already been trained, you can run the evaluate_model.py. This will initialize a sumo simulation gui and allow you to visualize the agent in action.
        v. To create the plots you see in our paper and presentation you can run avg_wait.py
    b. Light traffic flow :
        i. **CPU running time of 100 episodes more than 12 hours**
        ii. Make sure that the complex2.net.xml, complex2.sumocfg, complex2.py , weight_file_new.h5 and light_eva.py files are all in the same folder.
        iii. To run the simulation and train the agent run, complex2.py file. Training of the agent for 100 episodes takes around 16 hours and more. It is possible to reduce the training time by reducing the N value in generate_routfile() function. This results in lower number of cars being generated and therefore reducing the amount each episode takes however it also limits the number experiences that the network can learn from.
        iv. The weights of the light traffic flow trained model has already been saved in the weight_file_new.h5 file. To evaluate the light traffic model, run the light_eva.py file. It opens the SUMO and runs the simulation. To see the static model shown in our simulation video, run the default_static function instead of the trained_NN and you will see the static simulation.