**Topic**: Application of Deep Q-Networks (DQN) and Grid Sampling technique in solving the Mountain Car Open AI gym environment.

**Objective**: The objective of this research project is to evaluate the effectiveness of DQN and Grid Sampling algorithms in solving the challenging Mountain Car environment. The study aims to assess the performance of both algorithms in terms of their learning speed, stability, and the quality of the learned policy. Additionally, the project intends to identify the key factors that impact the performance of each technique and compare their strengths and limitations.

**Related Work**: Prior research has investigated the use of DQN and Grid Sampling in different RL environments. Some studies have reported the effectiveness of DQN in learning policies in continuous state and action spaces, while others have found it to be unstable in certain environments. Similarly, Grid Sampling has been observed to perform well in small discrete environments, but its performance may suffer in larger and continuous environments. Additionally, some research has combined both techniques to achieve better performance**,** but not pertaining the mountain car environment. This project aims to study the agents and their performances based on grid sampling and DQN, in the mountain car environment.

**Technical Outline**: The project will implement the DQN and Grid Sampling algorithms using Python and TensorFlow libraries, applied to the Mountain Car environment. This environment presents a challenging continuous state and action space problem, making it an ideal testbed for evaluating the performance of the two techniques. The study will evaluate each algorithm's performance in terms of their learning speed, stability, and quality of the learned policy. Furthermore, the project will compare the performance of each algorithm under different hyperparameters and network architectures. Finally, the project will investigate the potential benefits of combining the techniques to achieve better performance.