Machine Learning Engineer Nanodegree

Capstone Proposal

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April 15, 2018

Proposal

THE MAZE RUNNER

Domain Background

Domain Background of this project if a agent is in a maze and agent want to find a way to the finishing point , then how can agent solve or find a way to a destination in a minimum number of steps. To find a optimal path (minimum number of steps or minimum time taken) from one position to another position in a maze. Agent can run any number of times to explore all maze. Agent can learn form its previous runs or steps to improve.

Problem Statement

Problem statement is to find a optimal way in a maze by agent from starting point to destination point in minimum time taken and minimum steps taken. In a maze there can any number of walls (so that agent can't penetrate through it) and any number of dead zones (after go to the dead zone agent start form its starting point).

Datasets and Inputs

A 2- dimensional environment containing walls (where agent can not penetrate through it),dead zones (after that agent cannot move further and again start from starting point), source point pair (or starting point eg: bottom right) and destination point (ending point eg: topmost left point). Agent can move in four directions (move forward, move left , move right, move backward) and receive reward according to state. Agent start from bottom right most corner ie.. starting point and finish point is top-left most corner.

Solution Statement

This problem can be solve by using Q learning algorithm. In first run agent take random steps to explore all the maze (approximately 70-80% of maze) and make a Q table and updates its value after receiving rewards (a reward is depending on which state a agent land) . In second run agent agent moves towards the destination by choosing the correct steps with the help of Q table.

Benchmark Model

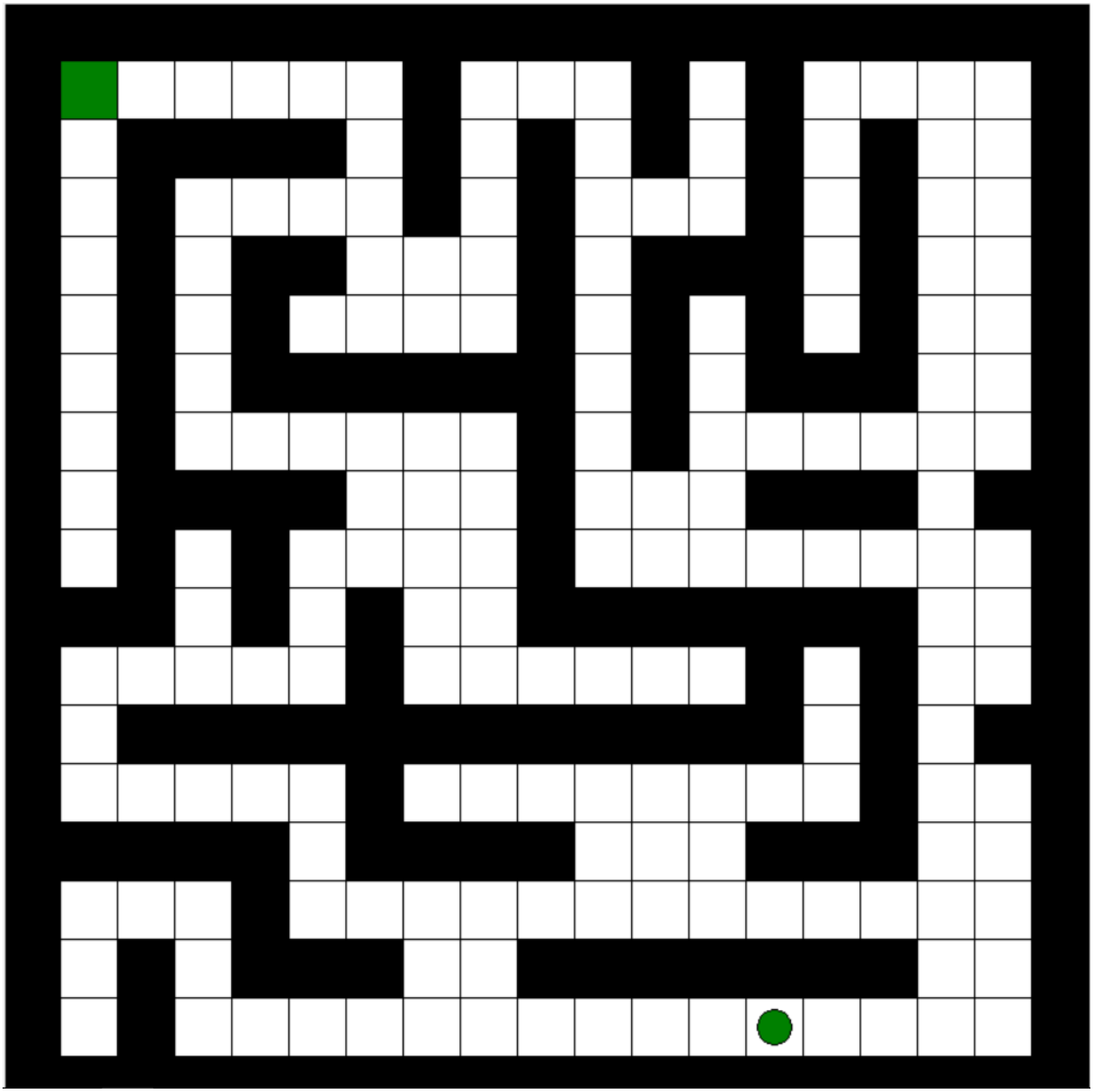
Benchmark model is the number of steps taken by an agent to reach its destination by using Depth-First Search Algorithm.
It is an integer type from zero(if agent is already on finishing point) to infinite(if agent never reaches its destination). Our goal is to minimize the steps take by agents.

Evaluation Metrics

The evaluation metric is the number of steps taken by agent to reach its destination but in this time Q-learning Algorithm is used.

Project Design

A virtual maze is generated using python program . In maze – walls is present in which agent can not penetrate thorough it. Finishing point is present on the top left most corner and starting point is bottom right most corner.



First the agent run and find the shortest path to the destination using Depth-first Search algorithm. We note down the number of steps taken by agent in depth first algorithm.

After that agent run and find the shortest or optimal path to its destination using Q learning algorithm. Note down the number of steps taken by agent.

Then we compare the results of depth first algorithm and Q leaning algorithm.