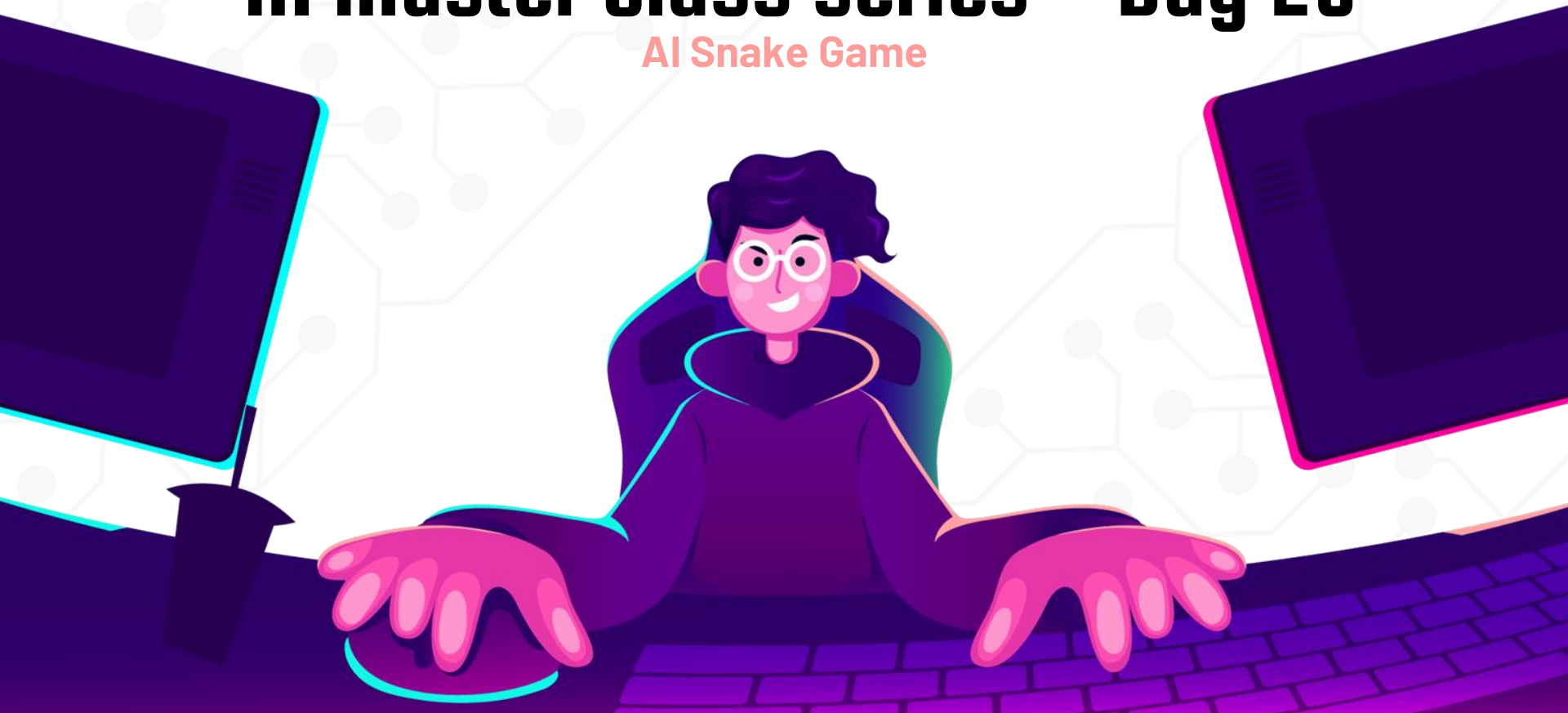
PANTECH SOLUTIONS
Technology Beyond the Dreams

AI Master Class series – Day 25

AI Snake Game



Day-25 Agenda.

01.

AI Snake Game

AI Snake game & Reinforcement Learning

02.

Deep QLearning

Deep learning + Qlearning

03.

Path Solver

Path solver algorithm

04.

AI Snake Game

Manual & AI Snake Game

05.

Q & A

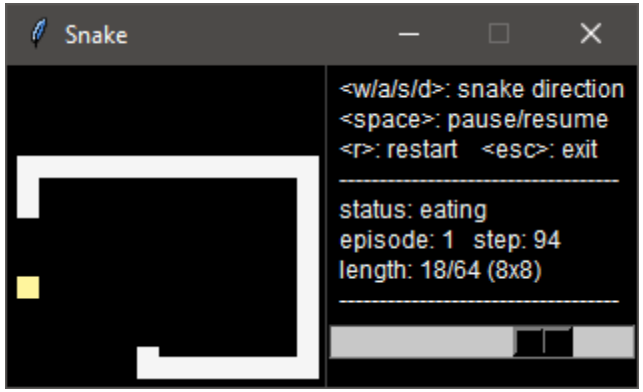
Installing Library

Pygame: pip install pygame

```
D:\__Technology___Beyond_Dreams\Machine_Learning\ML\Machine Learning\AI\GAME_AGENTS\Snake>pip install pygame
Defaulting to user installation because normal site-packages is not writeable
Collecting pygame
  Downloading pygame-2.0.0-cp37-cp37m-win_amd64.whl (5.1 MB)
     |████████████████████████████████| 5.1 MB 2.2 MB/s
Installing collected packages: pygame
Successfully installed pygame-2.0.0
```

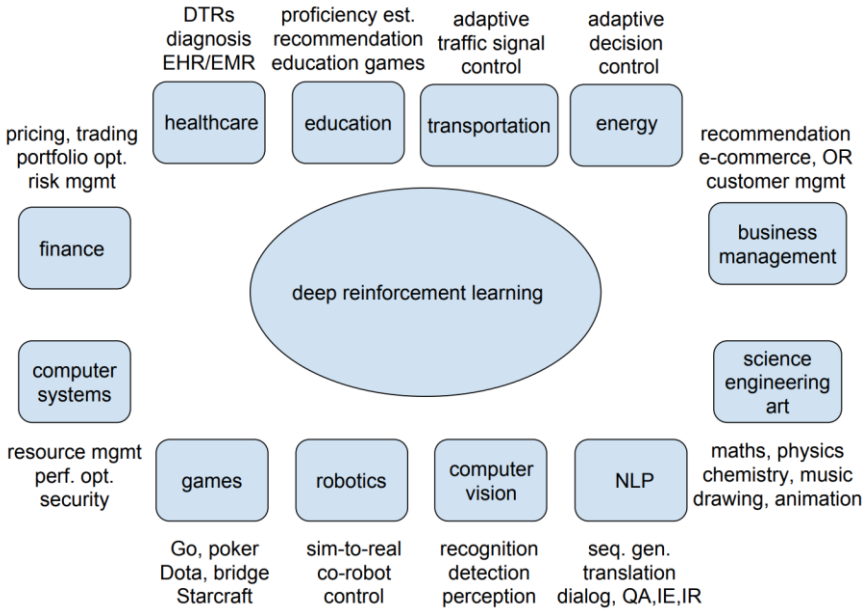
AI Snake Game

- The single-player variant of Snake is a well-known and popular video game that requires a player to navigate a line-based representation of a snake through a two-dimensional playing area, while avoiding collisions with the walls of the playing area and the body of the snake itself.
- A score and the snake length are increased whenever the snake is moved through items representing food.



Reinforcement Learning

- Reinforcement learning (RL) is an area of machine learning concerned with how software agents ought to take actions in an environment in order to maximize the notion of cumulative reward.
- Reinforcement learning is one of three basic machine learning paradigms, alongside supervised learning and unsupervised learning.



Shortest Path – Path Solver

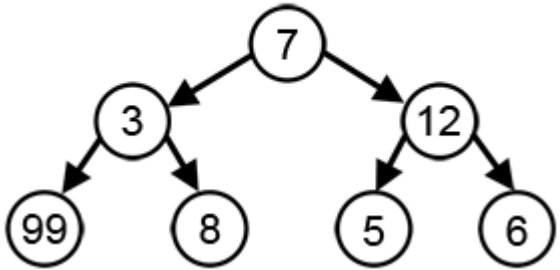
- Path Solver uses breadth-first search to find the shortest path.
- Intuitively, we expect the path to be as straight as possible so there will be less scattered empty points on the map.
- The trick for implementation is that during each iteration, the adjacent point in the last traversed direction will be traversed first.

Longest Path – Path Solver

- The longest path problem on the game map (i.e., a cyclic, undirected and unweighted graph) is NP-hard.
- Path Solver uses a heuristic algorithm to find suboptimal solutions.
- Suppose we want to find the longest path from point A to point B on a 4*4 game map.
- The solver first finds the shortest path between the two points and then extends each pair of path pieces until no extensions can be found:

Greedy Path – Path Solver

- A greedy algorithm is a simple, intuitive algorithm that is used in optimization problems.
- The algorithm makes the optimal choice at each step as it attempts to find the overall optimal way to solve the entire problem.
- It will choose what appears to be the optimal immediate choice, so it will choose 12 instead of 3 at the second step and will not reach the best solution, which contains 99.

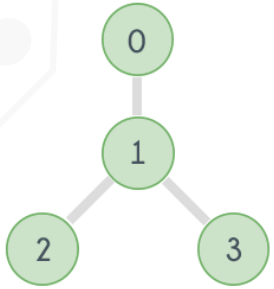


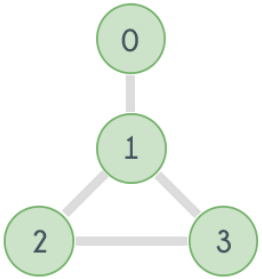
Greedy Solver in Snake Game – Path Solver

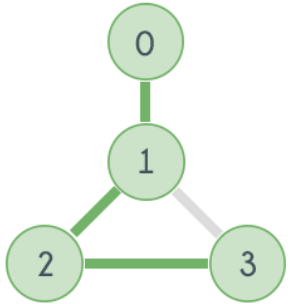
- The snake to eat the food along the shortest path if it thinks the snake will be safe.
- Otherwise, it makes the snake wander around until a safe path can be found.
- As it needs paths searching, it depends on [Path Solver]

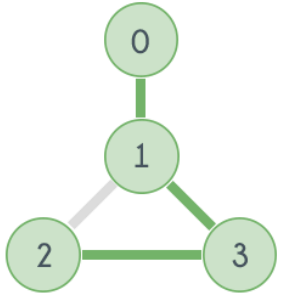
Hamiltonian Path – Path Solver

- Hamiltonian Path is a path in a directed or undirected graph that visits each vertex exactly once.
- The problem to check whether a graph (directed or undirected) contains a Hamiltonian Path is NP-complete, so is the problem of finding all the Hamiltonian Paths in a graph.









Deep QLearning

Qlearning

- Q-learning learns the action-value function Q(s, a): how good to take an action at a particular state.

DQLN

- A reinforcement learning algorithm that combines Q-Learning with deep neural networks to let reinforcement learning work for complex, high-dimensional environments, like video games, or robotics.

! PRACTICAL SESSION !

Manual Snake Game using Pygame

AI Snake Game

Thanks!

Connect with me on **LinkedIn:**
link in Description

Product & Project:
www.pantechsolutions.net

Course:
Learn.pantechsolutions.net

Tomorrow session

Speech Emotion Analysis