Project Name:

Ping Pong Game

Project Description:

The idea behind this project is to create a two-player Pong game where Player 1 is controlled by a human and Player 2 is an AI agent. The AI tries to track the ball's movement and adjusts its paddle accordingly, making the game more challenging for the human player. The goal is to improve the AI's performance over time through game interactions.

Goal:

Create an interactive Pong game where one player competes against an AI opponent.

Implement an AI agent that can react to the ball's position and predict its movement.

Improve the AI's performance over time through continuous gameplay.

PEAS:

Performance Measure:

Objective: The goal in the game is to win by scoring points.

Performance Indicators:

Number of points scored by each player.

Responsiveness and accuracy of the AI's paddle.

AI's ability to track the ball and move its paddle accordingly.

Environment:

The game environment includes the playing field, two paddles, and the ball.

The field is bounded by walls where the ball can bounce.

The environment updates dynamically based on the positions of the ball and paddles.

Actuators:

Actuators: The paddles are moved by:

Player 1 using the **Up** and **Down** arrow keys on the keyboard.

Player 2 (AI) automatically moves its paddle based on the ball's position.

Sensors:

Sensors: The data the AI uses to make decisions includes:

Ball's position on the game screen.

Position of the AI's paddle.

Screen boundaries to determine when to bounce the ball off the walls.

Agent Type:

Agent: The AI agent is designed to make decisions using a search algorithm, like **BFS (Breadth-First Search)** or another AI approach.

The agent adapts its behavior based on the ball's movement.

The AI's decision-making is based on detecting the ball's position and predicting its trajectory.

Agent Characteristics:

Deterministic: The AI's actions are predictable and follow fixed rules (like moving up or down to intercept the ball).

Sequential: The AI's actions depend on the sequence of game events (ball movement, paddle positioning).

Learning: The AI can improve its performance through repeated gameplay interactions.

Problem Formulation:

Problem:

The AI (Player 2) needs to prevent the ball from passing its paddle by tracking the ball's position and adjusting its paddle accordingly.

The challenge for the AI is predicting the ball's next position and moving the paddle in time to intercept the ball.

Inputs:

Ball's Position: The ball moves unpredictably across the screen, bouncing off walls and paddles.

Paddle Position: Both players' paddles are confined within the screen's boundaries.

Outputs:

Points: A point is scored when the ball passes the opponent's paddle.

Movement: The paddles move in response to either the player's actions or the AI's decisions.

Objective:

The AI's objective is to predict the ball's movement and adjust its paddle position to effectively block the ball.