AI Project Proposal
K21-4579, K214619, K21-4874
BCS-6E

Objective: To develop an AI-controlled Pong game that can effectively play against human players using the NEAT algorithm.

Background: Pong, a classic two-player game, currently lacks an intelligent AI opponent. The game is traditionally played by humans or against a basic computer-controlled opponent.

(Brief) Literature Review: The NEAT (NeuroEvolution of Augmenting Topologies) algorithm is a method for evolving artificial neural networks with varying structures. It has been successfully applied in various domains, including gaming.

(Proposed/Tentative) Approach:

- Environment Setup using Python and Pygame.
- Implementation of the NEAT algorithm to evolve neural network topologies.
- Training of AI players through gameplay, using genetic operators to enhance performance over generations.
- Testing and fine-tuning against human and AI opponents for optimal performance.

(Proposed/Tentative) Dataset (optional): Not applicable, as the AI's learning and adaptation are based on real-time gameplay.

Evaluation Metrics:

- The AI's ability to adapt paddle movement in response to the ball's trajectory.
- The challenge level presented by the AI, adjustable to easy, medium, and hard difficulty levels.
- The AI's capacity for real-time learning and improvement from each game session.

Salient Features:

- **Adaptive Gameplay:** AI dynamically adjusts its strategy based on gameplay.
- **Challenging Difficulty Levels:** AI difficulty can be scaled to suit the player's skill level.
- **Real-time Learning:** Continuous learning and strategy refinement by the AI.

Tools and Technologies:

- **Python:** For game development and AI logic.
- **Pygame:** To create the game environment and manage game dynamics.
- **NEAT Library:** For implementing the NEAT algorithm.
- **IDE:** Development tools like PyCharm, Visual Studio Code, or Jupyter Notebook.