Hacettepe University

DESIGN PROJECT PRESENTATION

The Team

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A WEB BASED GAME WITH A REINFORCEMENT LEARNING

About the Project

Our project can be divided into three parts.

Website

Game

Artificial Intelligent

Website

- ReactJS is used to create the frontend. ReactJS is a JavaScript library that makes it faster and more efficient to develop than other languages.

- Node.js is used to create the backend. Node.js is an open source server environment that is simple to learn and use, and when combined with React, it allows you to harness the full power of JavaScript to create frontend and backend code.

Website - Frontend

- Higher-Order Component is an advanced technique for reusing logic in React components. It is a pattern created out of React's compositional nature. We used this method to design the frontend in order to code effectively.

- Material-UI is simply a library that allows us to import and use different components to create a user interface in our React applications.

Website - Backend

- We utilized Express.js to build the backend. Express is a Node.js web application framework with a wide range of functionality for developing web and mobile apps. It was intended to construct web apps with simplicity and saves a lot of coding time.

- We opted to utilize "sequelize" in node.js because we are utilizing MySQL for our database. Sequelize is a modern node.js Object-Relational Mapping (ORM) for MySQL. ORM just allows us to write in our own language rather than SQL. This feature also saves a lot of time and makes the code more understandable.

Artificial Intelligent

- We used two different algorithms while developing the Artificial Intelligent.
  - PID Control Algorithm
  - Genetic Algorithm

Artificial Intelligent - PID Control Algorithm

- PID control algorithm is a proportional–integral–derivative controller is a control loop mechanism employing feedback that is widely used in industrial control systems and a variety of other applications requiring continuously modulated control. A PID controller continuously calculates an error value e(t) as the difference between a desired setpoint (SP) and a measured process variable (PV) and applies a correction based on proportional, integral, and derivative terms.

Artificial Intelligent - Genetic Algorithm

- A genetic algorithm is a search heuristic that is inspired by Charles Darwin's theory of natural evolution. This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.

Game

- Basicly, this is a simple game that provides motivation to play using a very basic human sense. This sense is the instinct to always get better in the game.

- Main porpose of this project is training a control artificial intelligence with using players' play data. To prove that statement, we use a basic phcsics engine.

Game

- We have three different play options. Those are single player, multiplayer and AI observation level. In those levels, we have random generated obstacles, game structure that gets harder over time and ghost AI player that shows you what would do better in your next game.

Why we are doing this Project ?

- Unmanned vehicles have become increasingly popular in recent years. The testing of this vehicles might be quite pricey. So we believe that if we can imitate the actual world and successfully incorporate the desired circumstances into the game, we may be able to lower the cost of these testing.

Video

Thank You !

Questions ?