**Project Title**

Go Bang Game

**Project Code**

<Project code assigned by the Project Office>

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# Abstract

This project holds great significance in modernizing the traditional Five in a Row game, known as Go-Bang, for a digital platform. By harnessing Unity, C#, and Python algorithms, we aim to provide players with an engaging and visually appealing gaming experience, transcending physical limitations.

The game faced a couple of challenges. First, its user interface didn't look very good or appealing, which made it less enjoyable for players. Secondly, another significant challenge was the absence of artificial intelligence (AI) integration within the game. This meant that there was no AI opponent available to provide a single-player gaming experience. To address this, we'll implement Python algorithms, including techniques like minimax with alpha-beta pruning, to create an adaptive AI opponent. Through rigorous testing and iteration, we aim to fine-tune the AI's decision-making process.

Our project's main contribution is the integration of this AI opponent, offering a challenging single-player experience with adjustable difficulty levels. The development process will follow a structured methodology encompassing research, planning, design, implementation, testing, and deployment phases. Detailed research into game mechanics and AI strategies will guide the project, with the game's user interface and mechanics designed using Unity and C#. This endeavor will breathe new life into the classic Five in a Row game, accessible on digital platforms, providing players with a visually captivating and intellectually stimulating gaming experience.

This project holds great promise in several ways. It will bring the traditional Five in a Row game into the digital age, making it available on modern platforms for everyone to enjoy. Players can look forward to an engaging and visually appealing gaming experience that not only looks great but also challenges them intellectually. Customizable grid size and multiplayer modes will enhance social interactions within the game. The most exciting aspect of this project is the smart AI opponent we're developing. It will provide a tough challenge for single players, making the game more interesting and replayable .Whether you're a casual player or a serious gamer, there's something for everyone to enjoy in this new version of Five in a Row.

# Background and Justification

In the existing landscape of Five in a Row, commonly known as Gomoku, several significant limitations persist. These include the absence of an integrated AI opponent, leading to a lackluster single-player experience. Moreover, subpar user interfaces hinder player engagement, and a dearth of creative elements diminishes overall enjoyment. Furthermore, the absence of an online mode limits player interactions, while the lack of pre-designed levels deprives players of varied challenges. These deficiencies underscore the pressing need for a comprehensive reimagining of this classic game. This project seeks to bridge these gaps by not only integrating an adaptive AI opponent backed by Python algorithms but also by revamping the user interface for a more intuitive and engaging experience. The introduction of customizable grid sizes and multiplayer modes will address diverse player preferences. Additionally, the incorporation of pre-designed levels will provide players with a structured progression, enhancing replayability and enjoyment. By breathing new life into the classic Gomoku, we aim to offer a fresh, invigorating gaming experience that caters to a wide range of players, from casual enthusiasts to seasoned strategists.

1. **Project Methodology**

**Research and Game Conceptualization:**

Game development process will begin by conducting extensive research on the traditional Five in a Row game (Go-Bang), including its rules, strategies, and historical significance. Analyze the expectations and preferences of the target audience for a digital gaming experience. Brainstorm and conceptualize the game's design, focusing on how to modernize the traditional game for digital platforms. Consider factors such as user interface, gameplay, and accessibility.

**Scope:**

Defining the scope of the game, specifying the features, customization options, and multiplayer modes that will be included.

**Game Design and Development:**

The project will proceed with the use of Unity and C# to design the game's user interface, incorporating elements that enhance visual appeal and user engagement.

We will implement Python algorithms, including minimax with alpha-beta pruning, to create the AI opponent, ensuring it offers varying difficulty levels and competitive gameplay.

Following that , we will develop the game's core mechanics, including customizable grid sizes and multiplayer modes, to cater to diverse player preferences.

**Testing and Iteration:**

We will conduct through testing of all game components, including user interface elements, AI opponent behavior, and gameplay mechanics.

Gather feedback from playtesting sessions to identify any bugs, usability issues, or areas for improvement.

Iteratively refine the AI's decision-making process based on testing results, striving for a balanced and challenging experience.

**Deployment and Launch:**

We will prepare for deployment by optimizing the game for the chosen digital platforms, ensuring it runs smoothly and efficiently.

Thoroughly test the game in its live environment to resolve any last-minute issues..

The game will be officially launched on selected digital platforms, making it available to a wide audience.

**Documentation and User Guidance:**

We will document the game's rules, controls, and customization options in user-friendly guides and tutorials.

Priority will be to ensure that players have access to clear instructions and information about the game's features and mechanics.

**Evaluation and Feedback:**

Evaluate the game's performance against the initial project goals and user expectations.

Collect feedback from players through surveys, reviews, and direct communication to identify areas for improvement and future updates

**Tools:**

* Unity
* Visual studio
* Python
* Python frames and Libraries

# Project Scope

**The scope of this project includes:**

* Development of a Five in a Row game with customizable grid size, two-player gameplay, and user-friendly controls.
* Implementation of a move validation mechanism to ensure fair gameplay.
* Design and integration of an AI opponent using Python algorithms, providing varying difficulty levels for single-player gameplay.
* Incorporation of multiplayer support for players to compete against friends or online opponents.
* Deployment of the game on web, mobile, and desktop platforms.

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# High level Project Plan

**Weeks 1-2: Setup and Basic Interface Design**

- Unity Setup and VS Code extension and libraries

- Design Basic Interface

- Create Stones for game in Adobe Photoshop

- Implement Basic 12x12 Grid in Unity

**Weeks 3-4: Scripting and Basic Functionality**

- Integrate Unity with VS Code

- Verify script functionality

- Implement navigation grid and stones

- Review basic design

- Take user input in VS Code

- Verify button functionality

- Check controls

- Perform overall functionality checks

**Weeks 5-6: Enhancements and User Management**

- Create different game levels

- Implement sounds, shop mode, and reward timers

- Design Sign Up and Log In pages

- Set up and manage databases and user profiles

- Implement profile updating functionality

- Develop Log Out page

**Weeks 7-8: Multiplayer Functionality**

- Enable Human-to-Human gameplay

- Allow modification of grid size

- Implement winning conditions

**Weeks 9-11: AI Development**

- Implement Human-to-Machine gameplay

- Incorporate Min-Max Algorithm

- Integrate Alpha-Beta Algorithm

- Verify functionality of AI gameplay

- Check game conditions (winning, draw)

**Weeks 12-14: Advanced Gameplay and Review**

- Implement Machine-to-Machine gameplay

- Review and fine-tune all game features

**Week 15: Testing**

* + Rigorously test the game for bugs and performance issues

**Week 16: Deployment**

* + Prepare and deploy the game across targeted platforms

# References

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