**National University of Computer & Emerging Sciences**

**Karachi Campus**



**BattleChess**

**Project Proposal**

**Artificial Intelligence**

**Section: E**

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**Introduction**

The project aims to develop a strategic battle game, "Battle Chess," which expands upon the classic game of chess by introducing diverse unit types, obstacles on the game grid, multiple victory conditions, and reinforcement mechanics. This enhanced version will incorporate elements of tactical strategy games, offering a more dynamic and engaging gameplay experience. The game will be designed with AI integration, allowing for both single-player and potentially multiplayer modes. The core of the game will involve intelligent unit movement, strategic combat, and resource management, challenging players to adapt to varying battlefield conditions and opponent strategies.

**Existing System**

Traditional chess serves as the foundation for this project. It is a two-player strategy board game played on an 8x8 grid with 64 squares arranged in an 8x8 square. Each player begins with 16 pieces: one king, one queen, two rooks, two knights, two bishops, and eight pawns. Each piece moves differently, with the goal of checkmating the opponent's king by placing it under an inescapable threat of capture.

Similar systems include:

* **Chess Variants:** Many chess variants exist, such as Chess960 (Fischer Random Chess), which randomizes the starting position of non-pawn pieces, and Three-Check Chess, where a player wins by checking the opponent's king three times. These variants introduce new starting positions or winning conditions to the traditional game.
* **Tactical Strategy Games:** Games like Fire Emblem, Advance Wars, and Final Fantasy Tactics incorporate diverse unit types, terrain obstacles, and strategic combat on a grid-based system. These games often feature role-playing elements, unit leveling, and complex storylines.
* **AI Chess Engines:** Programs like Stockfish demonstrate advanced AI capabilities in playing chess. These engines utilize sophisticated algorithms to evaluate board positions and determine optimal moves.

**Problem Statement**

While traditional chess is a highly strategic game, it has some limitations:

* **Limited Unit Diversity:** Chess has only six distinct piece types, which can lead to repetitive gameplay.
* **Static Board:** The chessboard is static, lacking obstacles or terrain variations that could influence strategy.
* **Single Victory Condition:** The only way to win in chess is by checkmating the opponent's king.
* **Lack of Reinforcements:** Traditional chess does not allow for adding new units to the board during the game.

This project aims to address these limitations by introducing new features to enhance strategic depth and replayability.

**Proposed Solution**

The proposed "Battle Chess" system will address the limitations of traditional chess by incorporating the following:

* **Diverse Unit Types:** In addition to the king/commander, the game will feature archers, knights, cavalry, healers, and siege weapons, each with unique movement patterns, attack ranges, and special abilities.
* **Dynamic Game Grid:** The game grid will include obstacles, such as walls or rivers, that affect unit movement and line of sight, adding a tactical layer to gameplay.
* **Multiple Victory Conditions:** Players can win by capturing the enemy commander or by controlling specific checkpoints on the board for a set number of turns.
* **Reinforcement Mechanics:** Under certain conditions, such as capturing a reinforcement point or after a set number of turns, players can deploy additional units.
* **Civilization-Based Starting Combinations:** Different starting unit combinations and special abilities will be available based on the selected civilization type, adding strategic variety and replayability.
* **AI Opponent:** An AI opponent will be implemented to provide a challenging single-player experience.

**Salient Features**

The key features of the "Battle Chess" system include:

* Multiple unit types with unique abilities (King/Commander, Archer, Knight, Cavalry, Siege Weapon).
* Obstacles on the game grid that affect unit movement
* Multiple victory conditions (killing all enemy units, controlling all checkpoints).
* Unit reinforcement mechanics.
* AI opponent for single-player mode.
* Turn-based gameplay.
* Unit attacks and HP loss.
* 2D visual representation of the game state.
* User interface for unit selection and movement.

**Tools & Technologies**

The following tools and technologies are anticipated for the development of the "Battle Chess" system:

* **Programming Language:** Python or Javascript
* **Framework:** Pygame or React
* **Operating System:** Windows/Linux
* **AI Implementation:**
  + **Minimax with Alpha-Beta Pruning:** This algorithm will be used to determine the AI's optimal moves by evaluating possible future game states.
  + **Heuristic Evaluation Function:** A custom evaluation function will be designed to assess the desirability of different board configurations, considering factors such as unit positions, health, and control of key areas.