

Report 2

• **Name:** Shikhaliyev Anar

Project Title:

Design and development of a board game that incorporates elements of tactical decision-making and strategic planning

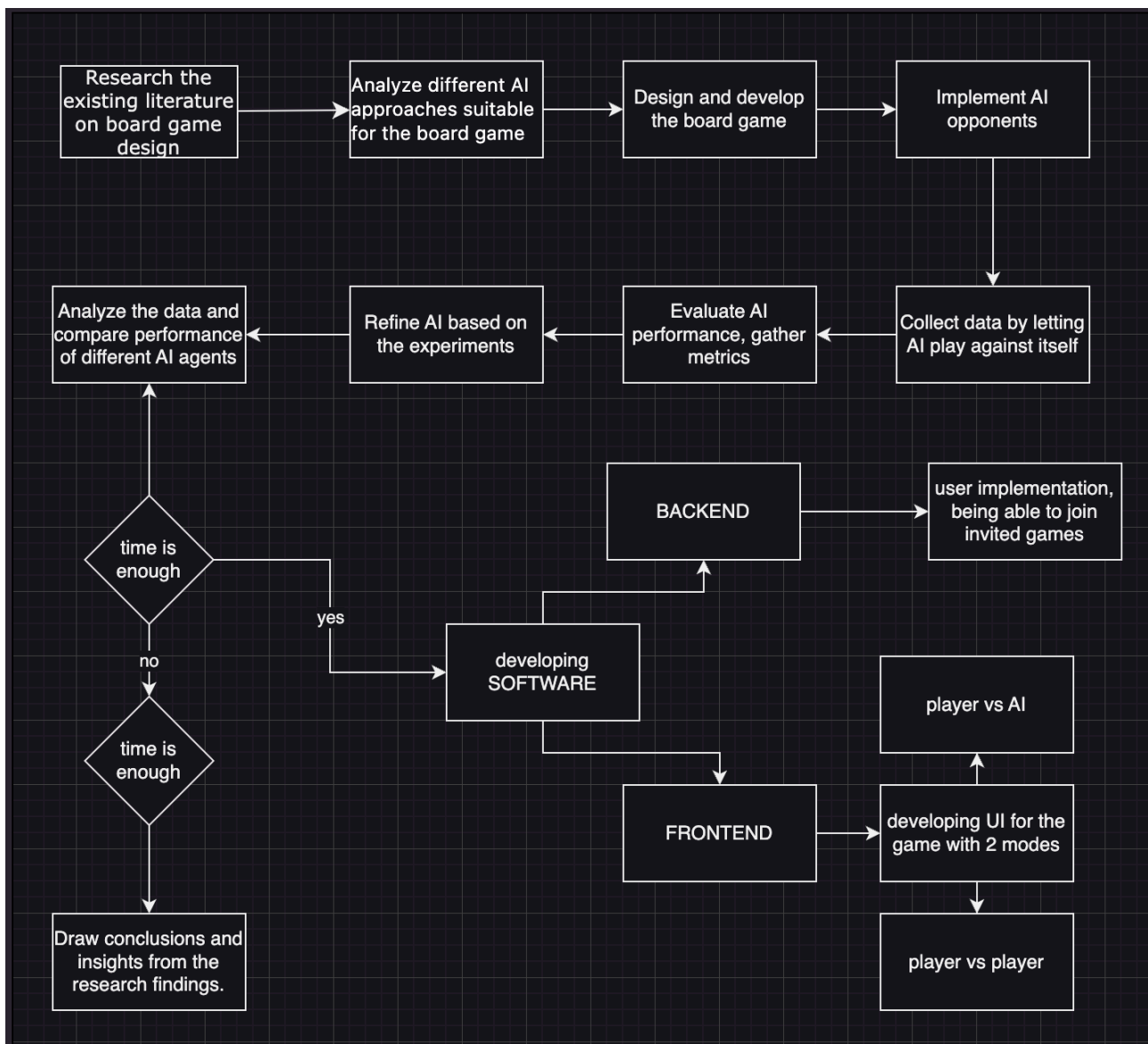
What are you going to do?

I am going to design and develop a board game that enables players to play against one another and most importantly play against AI. I want to analyze different AI approaches such as heuristics, tree-traversal algorithms - minimax, alpha-beta pruning, adversarial search algorithms, and other techniques to improve performance such as memorization.

QUESTIONS:

- *Selected strategy for the research (qualitative/quantitative) and the plan (would be great to have it as a flow diagram);*

Flow diagram



The strategy for this research involves combination of both qualitative and quantitative approaches. The qualitative aspect involves analyzing different AI approaches, game mechanics, and decision-making algorithms to understand their strengths and limitations. This analysis involves studying existing board games such as chess, GO and even Pacman. The quantitative aspect involves collecting data on AI performance, such as win rates and game duration, through experimentation and playtesting.

In the flow diagram above, software development part was **not** explained in details because our main interest is gathered on the creating AI agents for the game. But, if it is the case, I am going to build a web-site using React or Next.js for the front-end part and NestJS or Express for the backend part. A user will be able to create an account, initiate a game or join a game created by other users and surely they also will be able to play against AI.

- *Strategy for the Data Collection. Links to the dataset (could be external or in your repo);*

The strategy for data collection involves collecting gameplay data to evaluate the performance of AI opponents. The data can be collected by letting AI play against itself or by gathering human gameplay data. The collected data will be used to measure the AI's performance in terms of win rates, game duration, and overall gameplay experience.

Since there is no existing dataset available for this specific board game, the dataset will need to be created during the research process. The dataset may include game states, player moves, AI decisions, and outcomes. If needed, this data can be stored in a structured format such as CSV or JSON for further analysis.

- *Data cleansing approaches - what did you discover? what problems did you get?*

For this part, since I will be generating my own data, it will not cause me any problem. However, considering potential issues. I will check for any missing or incorrect values in the dataset and remove or correct them accordingly, normalize the data if necessary to ensure fair comparisons between different AI algorithms or game scenarios, validate the consistency and integrity of the collected data to ensure accuracy in the analysis process.