VR CHESS: A FLUTTER BASED CHESS APPLICATION

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Abstract

In the current modern era of entertainment through technology, the game industry is getting the high revenues and user feedbacks around the globe. In this research we have developed a mobile based Chess game using Flutter, in which user can play by tapping on the screen for the pieces to move. It has a variety of application and piece themes with an easy-to-understand interface. The game also has many more options like game modes (Player one vs. Player two /Player one vs. AI Bot), time limits, side selection (black, white, or random), and AI bot difficulty level. The main objective of this game is to provide an entertainment platform to the user with user friendly environment with some extraordinary choice of user interface.

Keywords: Mobile application, Flutter, Chess Game, Game Development.

1. Introduction & Related Work

The main objective of this project is to provide voice recognition in a chess mobile application using flutter, in which a user can give voice commands to the game and the pieces will move
by those commands. This application takes to the problem we try to solve is the people with incapability, like the ones who lose the hands/arms can’t play chess. Most of the game players want to play any game with an easy technique, enhanced gameplay which is not included in other chess applications.

Smartphones as a gaming field are entered in their advancement mode. More designers ran to this medium. Various new solutions are coming to advertise those offer designers and distributing houses a various choice of adaptation models which join in-app buys with different strategies. [1] In 2012 European Parliament notify their state members to take a step for the introduction of chess in schools for education programs because Scientists discovered proof that the game, which challenges memory, estimation, visual abilities, and basic reasoning capacities, may reduce intellectual decrease and defer the impacts of dementia. [2] A 3D chess game for iPhone users. They have two modules one for chess validity and the other for 3d space transformation. They address the game data using different matrices for putting pieces position, players’ pieces, and model arrays. The model array is a set of vertices that describe our models in the 3D space. [3] A mobile chess application which can be played by voice. A Java speech recognition library is used to build a recognizer name as CMU Sphinx-4. Then there is a decoder that decodes the input into words with the help of knowledge base modules, consist of an acoustic model, dictionary, language model, and grammar model. [4] A chessboard is design that is connected to mobile which stores all the movement on the board into the application database to review later. [5] Previously speech input in games is mainly for interaction between the players but now the gaming industry is moving towards voice command games. One genre in voice command games is relay on pitch and volume where input is given through highness and lowness of voice. [6] Varun named hardware is used for audio recognition. Dynamite Time Warping (DTW) algorithm is used to compare input audio with the system to play the chess game. [7] A voice-activated chess set is developed. The main input of the system are pre-prepared expressions and are spoken into the voice module, through microphones, which are changed over into sequential data. The sequential data is utilized by the microcontroller to decide whether the player is adhering to chess rules and to create signals that will be sent to the positioning system. The positioning system incites the movement of the pieces on the board using the stepper engines and a solenoid, for coupling with pieces, under the board. Feedback is sent to the microcontroller to decide whether the ideal position was accomplished, as a subsequent measure. [8] A chess game using mobile phone augmented reality is developed with the help of the following libraries. ARToolKit library, ARTag which is an improved version of the ARToolKit library, MRToolKit, and ARToolkitPlus library for hand-held devices. [9] A voice game based on Alexa Voice Service. The user provides a voice order to the device. The device sends the data to the Amazon Voice Service. Here the audio forwarded to the Endpoint characterized inside the Amazon Alexa Skill. This is the beginning of HTTPS communication. The upcoming step is the Intent Recognition Algorithm. Amazon's Server advances the outcome than to our server. The result will be sent back to Amazon Voice Service where the result will be converted into audio from text. At last, the device responds to the user according to his/her initial command. [10] For voice recognition, they used the Microsoft Speech Application Programming Interface (SAPI version 3.0 and .NET Framework version 3.5). [11] Chess has created a ground for thoughts and strategies that have spread to different spaces of AI. This incorporates search strategies like minimax, alpha-beta, iterative extending.[12] Alpha-Beta pruning is a better version of Minimax algorithm. Though minimax is also used for the game tree, because this algorithm reduces the computational time by a big amount. By implementing this algorithm, we can search faster and reach the depth levels of the game tree much faster. This is because Alpha-Beta Pruning always select best path and cuts off the unnecessary branches. [13] An AI chess game is made on python framework
with the help of alpha-beta pruning which can be played by either voice or by tapping. [14] Researches also proved that chess had an impact on the field like molecular computing, machine reading, cognitive development and many more. [15]

2. Research Methodology

2.1 Collecting Data

First, before working on the chess game, we required the data related to chess application, game-making methodologies, and voice recognition in games. After gathering all the related data, we processed it in two different ways. First, the primary data like the feedback and experience of users playing chess differently and highlighting their needs while playing the game and an effect of voice recognition in chess. Second, the secondary data was obtained from the previous related work from researchers to maximize the overall result of our application.

2.2 Analysis

The next phase was to decompose the gathered information to defining and evaluating problems and hurdles that may occur in building the application. So, the collected data were classified and analyzed so that it can give an overview or information required about the data. The user requirements were the priority while designing and developing the application from the study.

2.3 Designing

The initial focus was to make our chessboard and pieces, so a chessboard was designed with a simple UI to start and play the game, initially. Once our chessboard was designed, the designing of further pages was made. Firstly, it was a simple board playing chess, but afterward, it was designed uniquely to enhance the user experience by giving an option to a user to change different themes, boards, and pieces. This was a unique idea that was not in any previous chess applications that makes a user take more interest in it.

2.4 Algorithm

The main algorithm which was deployed in the AI bots was Alpha-beta pruning. The difficulties set in the game were increased and decreased with the efficiency of the algorithm. It is a search algorithm that seeks to lower the number of nodes which can be evaluated by the means of the Minmax algorithm in its search tree. For example, the game has 6 difficulties the 1 is lowest and the 6 is highest, in the 1 difficulty the algorithm makes the AI bot think in 1 possible move and make to move according to it while increasing the difficulties will make it think in the depth n and make the best possible move according to the search tree.
3. Experimental Results & Discussion

In the main screen of the app, it asks the user to select the Game Mode (Player one vs. Player two /Player one vs. AI Bot), Time Limits (None, 15m, 30m, 1h, 1.5h, 2h), Side Selection (black, white or random) and AI bot difficulty levels (1-6) which means the depth of the possibilities that the AI will think of before playing its turn. The user can play against an AI bot or another player.

If the user selects to play with another player, then the app will only show them the option of the time limit.
If the user taps on the Settings button then the app navigates them to the settings page where the user can select a handful of app themes and app pieces by using a fixed extent scroller. The app themes are made by our choice of gradient colors and the board and pieces themes are from the Flame Package in a flutter.

![Settings](image1)

Figure #4: Customizable app theme & pieces with toggle options for chess features

If the user toggles the show hints button then they can see the hints of each piece as to where the particular piece could move at that turn.

![Game Board](image2)

Figure #5: Each piece showing hints for the possible move choice
If the user toggles the allow undo/redo button then by pressing the undo and redo buttons the user can easily go to the previous state of the game against the AI bot if the user makes a mistake.

Figure #6: Navigating through the current and previous state of the game

If the user toggles the show move history button in the settings screen, then by doing that, he’ll be able to see the move history underneath the timer.

Figure #7: Move History

If the user toggles the flip board for the black button, when the user will select to play as the black side then the board will flip to the user’s ease.

Figure #8: Flipping board for black/white
4. Conclusion

VR Chess is a complete package of entertainment for chess players. An application where the user can customize the app theme as well as the piece’s theme according to his own choice from multiple options. VR Chess is also for those players who cannot use their arms due to disability else they can also play chess by voice command. In VR Chess player can play against an AI bot or the player can play with another person. If the player can play against with AI bot, then the player can play either voice command or tap. This app has multiple options while playing against AI Like Undo/Redo. In the end, our future work is to integrating voice recognition and playing chess using voice commands using flutter.
References:


[7] V. Chirravuri and M. Kuo, “VOICE-CONTROLLED CHESS GAME ON FPGA USING DYNAMIC TIME WARPING.”


