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TExas Hold’Em Poker



Contents

[1.0 Analysis of the problem 2](#_Toc75164419)

[1.0.1 Summary of the project 2](#_Toc75164420)

[1.1 Problem Identification 2](#_Toc75164421)

[1.1.1 Features that make the problem solvable by computational methods 2](#_Toc75164422)

[1.1.2 Why the problem is amenable to a computational approach 2](#_Toc75164423)

[1.2 Stakeholders 3](#_Toc75164424)

[1.2.1 Identifying the end user 3](#_Toc75164425)

[1.2.2 Why the solution is appropriate for the end user and how they will make use of it 3](#_Toc75164426)

# Analysis of the problem

### Summary of the project

Poker (Texas Hold’em Poker) is one of the largest card games in the world. Many casinos feature multiple tables and there are regular large tournaments played with professional players and large prize pools. The game is largely famous for various reasons: it is one of the few games where players will play and bet against each other, rather than playing against the casino (such as Blackjack). It is also famous because the game is not purely based on luck, nor is it solely based on skill, instead, in order to be good at the game, one must have a good ability to turn their luck (or lack of it) into results.

The game consists of 5 cards which all players ‘share’ (known as ‘community cards’), with each player having 2 cards to themselves (known as ‘hole cards’). The players will then bet against each other as the ‘shared’ cards get revealed, to see who has the best hand, which should be a total of 5 cards with at least one card from your hand.

However, I always have thought that learning the game proves extremely difficult, and what is even harder, is getting good at it.

My aim is to create a Texas Hold’em Poker game that will allow new players to develop their skills and learn the game, while also allowing experienced players to have a challenging opponent. I will do this by creating AI players at various difficulty levels so that stakeholders can choose the experience they desire. I will also be implementing a multiplayer feature that will allow stakeholders to play on multiple machines against each other. Furthermore, a key part of the program will be the Poker Tutor – a feature which can be turned on or off, and will guide novice players into making the right decisions by displaying odds and giving tips. Lastly, a tutorial feature will teach the basics of the game to any new player.

## 1.1 Problem Identification

### 1.1.1 Features that make the problem solvable by computational methods

One key feature of the program is the Poker Tutor, which has to calculate the probabilities of winning the hand at each turn and display them in a user friendly way. The Tutor must also use these probabilities to display suggested moves and tips that match any scenario.

In order to achieve this, the program must use all of the available data from the current hand and carry out multiple complex calculations. These algorithms therefore, require computational power since these methods would be time consuming and labour intensive.

Furthermore, the fact that players are able to play on different machines, means that a computational method is required - there is a need to communicate between remote devices. Players are able to play in the same game yet not be in the same place geographically which would be impossible to achieve without using a computational method.

### 1.1.2 Why the problem is amenable to a computational approach

The game will require sequential processing, for instance, at the start of each hand, cards will be dealt, blinds will be placed, and then cards will be turned over in the centre. Iterative processing will also be required, during each betting stage players take turn deciding what to bet, the process repeats itself until everyone has the same bet. Moreover during the card dealing, cards will be given to each player repetitively. Because of the nature of these processes (require iteration and sequential processing), they lend themselves to a computational approach.

When dealing, cards will be animated from the deck into each players’ hands, likewise, player bets and when a player folds will also need to be correctly displayed and animated. Furthermore, hole cards; chips; pot size and the community cards will all need to be stored appropriately. A need for animation and data storage make the problem amenable to a computational approach.

## 1.2 Stakeholders

### 1.2.1 Identifying the end user

The end-user can be any person who has an interest in poker, wants to learn poker, or who is already experienced at poker.

### 1.2.2 Why the solution is appropriate for the end user and how they will make use of it

The solution is able to satisfy end users of all levels of expertise in poker since there are various different features that the end user can alter, so that the solution can be suited to them – for example, someone who is new to the game can learn the rules via the tutorial feature, whereas someone who is experienced is able to play against high level AI.

The end-user is able to play and compete against other end users,