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**Milestone 2**

**Project Description:**

Our project is to create an intelligent system (dubbed “The Poker Coach”) that will assist a human player in the card game of Texas Hold’em.

The main tasks include:

* Create a user interface that can be used while a human user is playing a hand of Texas Hold’em.
* Create statistical functions that can be used by the system to determine how the human user should play their hand.
* Keep a database of past hands as well as data on individual opponents that the user will encounter while playing and use this data to further increase the user’s chance of winning.

Domain:

A windows application to be used on a personal computer.

Users:

One human user.

The main goals for the “Poker Coach” are as follows:

* To provide the human user with worthwhile statistical advice about their two-card hand (standard in Texas Hold’em).
* To provide the user with updated statistics as each hand progresses from pre-flop, flop, turn, river, and showdown.
* To provide intelligent advice on how the user should play based on the users current chip count (unit of value) and the bets being made by opposing players.
* Keep data on opponents betting strategies and use this data to offer advice to the user.
* Win, the ultimate goal of this system is to win more poker hands.

**Existing Systems:**

Several poker software systems exist that perform essentially the same tasks that our system is designed to do. Some examples of existing software are Wilson Software’s “Turbo Texas Hold’em” combined with “Sidwinder Sid”, pokerinspector.com’s “Online Poker Inspector”, and texasholdemcompanion.com’s “Total Texas Hold’em Companion”. All three software releases vary in their design of ways to help users win.

Wilson Software’s “Turbo Texas Hold’em” is program used to practice playing poker, not actually follow an occurring hand in real time. The user plays a hand and the computer plays all the other hands. This is the only software we have found that claims to possess artificial intelligence. This artificial intelligence is used to simulate as many as 9 other players and give the human play suggestions as to errors in their play after a hand has completed. There is an add on program called “Sidewinder Sid” that adds a more detailed critique of the human players actions and communicates this advice a synthetic voice using Microsoft Text-To-Speech Technology.

The other two software packages, “Total Texas Hold’em Companion” and “Online Poker Inspector”, are entirely statistics based. The primary selling points for these products are the user interface. Online Poker Inspector directly interfaces with several online poker programs so the user does not have to enter the status of the game into the program. “Total Texas Hold’em Companion” is similar in its approach.

Our system would differ from all three of these software releases by merging statistics, A.I. elements, and the use of a database to increase the user’s chance of winning. Specifically, our software would use an AI evaluation function to take several elements into account when deciding to raise/bet, call, check, or fold. These elements will include statistics about the users hand, statistics about the possible other hands that may beat the user in a showdown, data collected by the program about the style of play being used by the other players, and potential risk/reward ratios.

**Requirements:**

Functional:

* Provide users with advice on how to play their hands with the goal being to win more poker hands and larger pots. This advice would be based on statistics, betting strategy, and data kept on previous hands and opponents.
* The output would take two forms: first, a suggestion to bet/raise, call, check, or fold but more importantly, second, a list of factors that the computer has used to determine this suggestion.
* Factors will include statistics, possible other hands the opponent could have, and observations the computer has made about the opponents style of play.

Performance:

* Provide said advice in a timely manner; in a way that would not slow down the general flow of a game of poker between up to 10 human players.
* Provide the statistics and observations that the computer used to the make the advice in an accessible manner so that the user can quickly digest the relevant points.
* Allow the user to quickly enter the relevant information without unnecessary distraction.

Optional:

* Add graphics that include card faces, etc.
* Allow for varying styles of play; aggressive, tight, etc.

**Evaluation Criteria:**

Simply, does following our programs advice to help you win more hands of Texas Hold’em than you would on your own? A simple way of checking this would be to have a player play 5 games on their own, while keeping statistics on their play. The player would then play 5 games with our poker coach, following the poker coach’s advice on every play. If the poker coach increases the player winnings or places them higher in tournament play, after multiple experiments of this type, it can be judged a success.

To provide a move concrete metric of the success of the program, a concept called the Fundamental Theorem of Poker could be used. This principle was first articulated by poker theorist David Sklansky as the foundation of theoretical poker discussions. It states:

*“Every time you play a hand differently from the way you would have played it if you could see all your opponents' cards, they gain; and every time you play your hand the same way you would have played it if you could see all their cards, they lose. Conversely, every time opponents play their hands differently from the way they would have if they could see all your cards, you gain; and every time they play their hands the same way they would have played if they could see all your cards, you lose.”*

To evaluate the performance of the poker coach, the fundamental theorem could be used, because it can be determined mathematically what the optimal play is at any point given the information about all the cards. The performance of the player can then be determined by defining the error as the deviation from the optimal play given all the information.

**Schedule:**

Week 2:

* Compile statistics and information on Texas Hold’em. This can include betting strategies and how to get odds.
* Begin creation of user interface.
* Create skeleton of code, functions etc.

Week 3:

* Construct testable prototype that can present pre-flop odds based on users two-card hand
* Begin database development.

Week 4:

* Having an alpha prototype to test that can offer advice through one full hand of Texas Hold’em.

Week 6:

* Have beta prototype that keeps statistics on user hands and opponent hands. Prototype able to use data in determining how to play hand.
* Graphical interface completed.

Week 8:

* System completed.

Week 10:

* Final documentation completed
* Evaluation of other teams completed