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Visual Analysis of Poker Hands for Individual Players

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Abstract

Poker requires complex decisions and, to improve play, careful analysis. Typical analytics tools focus on individual hands, overlooking broader performance trends. This paper proposes an approach for both individual hand review and a more comprehensive gameplay analysis. The linked visualizations comprise a line chart for cumulative winnings, a scatterplot for winnings vs. hand rankings, a bar chart for detailed hand winnings, and an event sequence visualization of the selected hand.

1. Introduction and Related Work

Poker, a turn-based game, requires players to predict with partial information and adapt strategies. For players to analyze sessions to improve their play, interactive hand replays are common (e.g., [Pokb]), but they are time-consuming and do not provide a performance overview across hands, especially in high-volume formats like online poker. Some methods visualize cumulative winnings to smooth random factors [BS19], using aggregated statistics like chord diagrams [Poka]. However, these lack decision context, making reflection difficult. While detailed event sequence visualizations exist for other games (e.g., timelines [AWB20]), none focus on poker from a player’s perspective, i.e., the player’s partial information of the game state. We propose a linked-view visualization approach to help poker players reflect on past sessions (Figure 1). It provides an overview of multiple sessions via line and bar charts, as well as a scatterplot for trends and correlations. For detailed investigation of individual hands, an event timeline is integrated in the approach. The supplemental materials include a video demonstration of the implemented approach and its source code.

2. Dataset

For a player, referred to as the *Hero*, we collected data from the *Rush and Cash* variant on *GGPoker* [GGP] over 1000 hands. In this variant, players can fold (discard their cards) at any time, even if it is not their turn, and a new hand (distribution of cards for one game) begins as soon as six players are seated. Each hand’s data includes the hand number, type of game, the blinds (mandatory bets), player positions at the table, and the amount of chips each player has. It also records player actions such as folding, calling (matching a bet), betting, and raising (increasing the bet), along with the amounts involved in each betting round, and the community cards (cards shared by all players). For hands that reach a showdown (the final phase where players reveal their cards), the dataset includes the players’ private cards and the outcome, detailing how the pot (total bets) is distributed among the players.

3. Analysis of Poker Hands via Linked Views

As shown in Figure 1, the top row of visualizations (line chart, bar chart, scatterplot) provide an overview of hands played and winnings across sessions (i.e., hands). Orange and blue differentiate winning and losing hands. The **line chart** (Figure 1, top-left) displays cumulative winnings over time. A smaller line chart below offers a dataset overview. Users can filter hands by selecting a segment in the smaller chart, updating all views in the top row. The **bar chart** (Figure 1, top-middle) shows individual hand outcomes, while the **scatterplot** (Figure 1, top-right) correlates hand rankings with winnings or losses, using colored dots for filtered hands. Selecting a hand (e.g., clicking a dot or bar) reveals its details in an **event sequence visualization** (Figure 1, bottom). Each player is represented in a row, with columns showing action timelines via icons: *small blind* (⊙), *big blind* (⊙), *fold* (↘), *check* (☐), *call* (♠), *bet* (↑), *raise* (⬆), and *win* (♣). Icon size indicates action magnitude, and tooltips provide additional details. The showdown column summarizes the hand’s outcome, with the final pot size in the header. The last column shows each player’s net gain or loss in big blinds. The *Hero*’s cards are always visible, the community cards are shown as dealt, and other players’ cards are revealed only at showdown.

4. Application Example

To evaluate our approach, we analyze a real scenario where a player, the first author, reviews his online poker sessions (Section 2). The cumulative winnings line chart in Figure 1 (top left) shows steady growth, with occasional jumps corresponding to key hands. To focus the analysis, the player selects the range of hands 716–861. The bar chart in the top middle reveals that he won most hands in this range. The scatterplot on the right depicts a correlation between the *Hero*’s rank of the hand and net wins. He further infers that “No Made Hand”, “Pair”, and “Flush” hands resulted in the highest winnings.

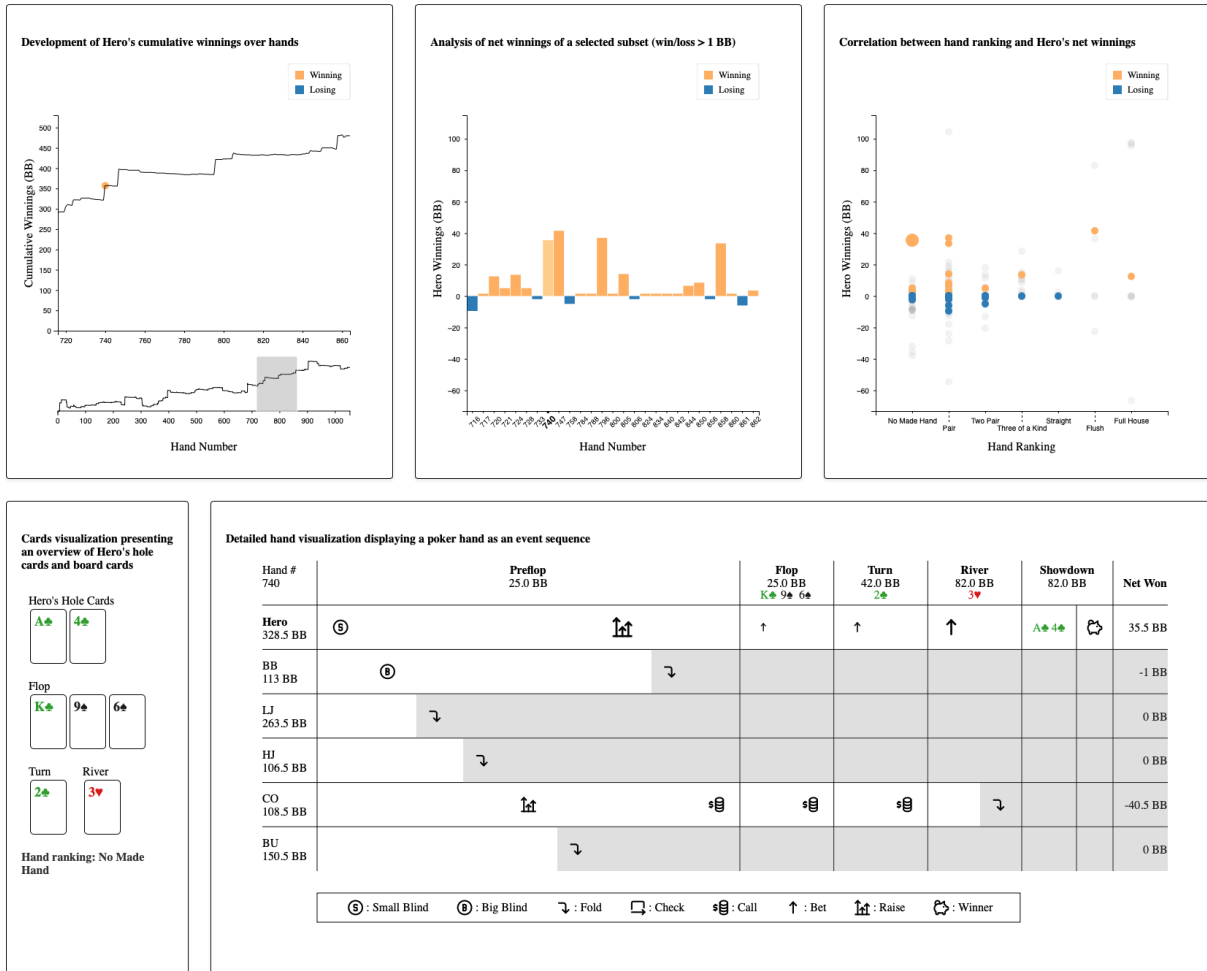


Figure 1: Visualization approach, at the top, to analyze multiple poker hands: a line chart for cumulative winnings, a bar chart for winnings of individual hands, and a scatterplot for correlations. An event sequence visualization at the bottom for details of a selected hand.

The player notes a hand where a “No Made Hand” generated the highest winnings (hand #740) and inspects the timeline to recall and analyze the hand (Figure 1, bottom). The event sequence shows the Hero in the small blind position, re-raising (IR) against an open raise from the Cut-off (CO) to counteract the positional disadvantage. The flop brings a king-high board with two spades, favoring strong pairs and flush draws. Hero makes a small bet, which the Cut-off calls, indicating a range of top pairs, draws, or medium-strength hands. On the turn, a club adds a flush draw for Hero without significantly improving the Cut-off’s range. Hero bets again, applying further pressure. The river introduces a low card that does not alter the board texture. Hero makes a large bet, representing a strong or polarized range, prompting the Cut-off to fold.

Further analysis reveals that winning hands often showed two distinct patterns, which can be quickly identified through the glyphs in the event sequence. In hands like #396, #684, #740, and #747, Hero consistently bet normal to large amounts across all streets, extracting value as opponents called down. Alternatively, in hands like #7, #242, and #903, Hero slow-played strong hands by simply

calling opponents’ aggressive bets. In contrast, losing hands highlighted areas for improvement. Passive post-flop play, as seen in #935 and #33, involved calling with weaker hands or folding after earlier calls. In hands like #229 and #594, unsuccessful bluff attempts, including turn donk bets (betting out of position first into the previous street’s aggressor), led to losses. Speculative pre-flop calls due to small raises (#229) created difficult post-flop situations, while bad beats (#304) were unavoidable.

5. Conclusion and Future Work

We introduced a visualization approach to facilitate both overview and detailed analysis of poker hands. An application example demonstrated its utility in deriving gameplay insights. Future enhancements could include additional metrics (e.g., player aggression factor), game theoretic solvers for strategy comparison, and adaptations for tournament play with dynamic blinds and player elimination. Moreover, we could generalize the visualizations into a framework applicable to poker variants and related card games.

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