

Poker Texas Hold'em

One of the most popular variants of card game of Poker. Full deck of cards is used and minimum of 2 players are required. Due to practical reasons no more than 10 players participate in the game.



[1] - Photo of Poker table - <https://pokertexas.net/zasady-gry-w-texas-holdem/>

Goal of the game:

Individuals compete for the *pot* - an amount of money or chips contributed by the players themselves. Winner of specific deal is player who complete the best layout of cards by matching two ones from his/her *hand* and 5 from the table - (first 3 are called *flip*, 4th *turn* and 5th *river*). The objective is not to win every individual hand, but rather to make mathematically and psychologically better decisions regarding when and how much to bet, raise, call or fold.

Rules:

- one of the players is the *dealer*,
- two players sitting next to the dealer have to make obligatory, initial bets - *small blind* and *big blind* (big one is two times greater than small one),
- game is divided into series of hands(*delas*),
- players perform few actions: fold (give up specific deal), call (to align the bet), raise, check (wait if circumstances allows)

Hand values (decreasing order):

1. Royal flush - straight from Ten to Ace in the same color.
2. Straight flush - straight of the same suit.
3. Four of a kind - Four cards of the same value.
4. Full house - Combination of three of a kind and a pair
5. Flush - 5 cards of the same suit.
6. Straight - Sequence of 5 cards in increasing value.
7. Three of a kind - three cards with the same value.
8. Pair - Two cards with the same value.
9. Two pairs - obvious.
10. Highcard - Simple value of the card. Highest: Ace, lowest: 2.

Strategies:

There are listed only couple of them, since poker is very popular among the world there might and probably there are whole books about best strategies and practices. Numerous of them are connected with probability, expected value (the average return on each dollar invested into a pot) and some psychological and behaviouristics approaches since there is bluff allowed in the game.

- Choose an opening hand that can make you money in any given situation
- Know when to fold - in amateur poker world there is little-known fact: Poker is as much about the bets you save as the bets you made. Common mistake among beginners is that they do not fold when they should.
- Some well known betting techniques are applied depending on stage of the deal: pre-flop or post-flop that specifies amounts of betting for proper situation.
- Control your emotions and reactions - keep "Poker face" so you don't let your opponents to know what's going on with you.

Strategies can also differ between game types or forms - cash games, "ring" games, tournament and kind of interior ones: limit, pot limit, no limit etc..

AI in poker:

The interest in poker is huge since it is very popular and lots of money can be earned from playing. As a result there were and are a lot of researches and experiments with AI in this card game. Poker is also considered as a AI milestone. Various AIs

perform well against human opponents when play is limited to just two players. However some “big players” took it further to games with 6 or more players. Carnegie Mellon University in cooperation with Facebook created Pluribus - AI that won against 15 professional poker players in six-player no limit Texas Hold'em. Pluribus also defeated top two professional players Chris “Jesus” Ferguson and Darren Elias. Other successful AI poker playing projects are Claudico and Libratus for example.

Poker is “imperfect information” game since there are hidden cards and because of players bluff possibility it is also game of misleading information. As a result there is no theoretical guarantee that AI always wins.

Anyway results of AI in this field are really impressive and there are a lot of worries about possible frauds in online tournaments for example. Despite the fact that it requires a lot of computing power and memory it is possible to gather enough resources using cloud computing.