

# Opponent modelling in Poker

## Introduction:

Poker has been a challenging problem for AI researchers. The game of Poker contains both element of chance and imperfect information. Significant progress have been made regarding this but its still a challenge to create a world class computer player to challenge best human players.

In this challenge modelling opponent strategy has always been important. We will use Bayesian probabilistic model framework for opponent modelling. Using probabilistic framework provides us opportunity to model uncertainty in opponent strategy.

## Motivation:

The game of poker has a rich history and provides an interesting challenge for AI researchers.

It is a game of imperfect knowledge, where multiple competing agents must deal with risk management, agent modeling, unreliable information and deception, much like decision-making applications in the real world.[2]

In most games like chess our strategy doesn't depend on other player and we play our best response assuming other player to be rational but in Poker method to exploit weak opponent depends on type of mistakes each opponent makes.

## Related Work(This section is taken from [1]) :

Existing approaches to opponent modelling have employed a variety of approaches including reinforcement learning , neural networks , and frequentist statistics . Additionally, earlier work on using Bayesian models for poker attempted to classify the opponent's hand into one of a variety of broad hand classes. They did not model uncertainty in the opponent's strategy, using instead an explicit strategy representation. The strategy was updated based on empirical frequencies of play, but they reported little improvement due to this updating. We present a general Bayesian probabilistic model for hold 'em poker games, completely modelling the uncertainty in the game and the opponent.

## Our approach:

We will follow closely the approach discussed in [1]. We will first infer posterior on opponent strategy using bayesian framework. For determining the posterior we will use Dirichlet prior on small version of game called Leduc holde'm and informed prior on texas holde'm. Then we will use that to play appropriate response. We will use "Kevin Waugh's Open Source CFR for the LEDUC card game" to implement the game and to evaluate the performance of our strategy.

## REFERENCES:

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