

Opponent Modelling in Poker

Mentor: Prof. Amitabha Mukharjee

SOURAJ MISRA

AYUSH JAIN



Poker and AI

Ideal for testing automated reasoning under uncertainty

- Game of luck and Skills
- Game of Imperfect Information
- Unpredictable Opponent
- Bluffing and Sandbagging

Making Better Decisions- Opponent Modelling

- We observe the opponent to get a better understanding of how they would operate
- Determining probability Distribution of Opponent's hand based on Opponents Actions
- Determining Player Stereotypes
 - Tight/Loose(How likely they are to play to play hands)

Basic Model

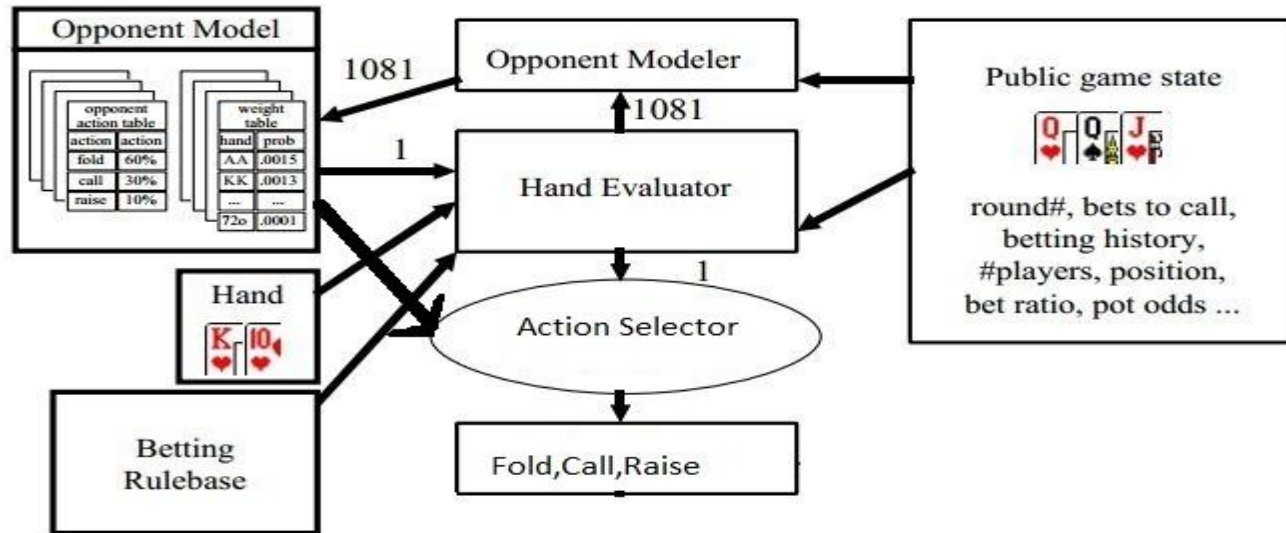


Figure Inspired From [2]

Approach

- Pre-Flop Evaluation
- Hand Strength And Hand Potential
- Betting Strategy
- Opponent Modelling

Pre-Flop Evaluation

- $\{52 \text{ choose } 2\} = 1326$ possible combination
- Reducible to just 169 distinct hand types to start with
- Approximate Income rate(profit Expectation) for each hand

Hand Evaluation

Hand Strength(HS)

Probability of holding the best Hand

Hand Potential

Positive Potential(Ppot)- probability of improving when we are behind

Negative Potential(Npot)-probability of falling behind when we were ahead

Betting Strategy

Effective Hand Strength(EHS)

$$EHS=HS(1-N_{pot})+(1-HS)P_{pot}$$

$$d=EHS - (b/(b+p))=pot \text{ odds}$$

b is bet size

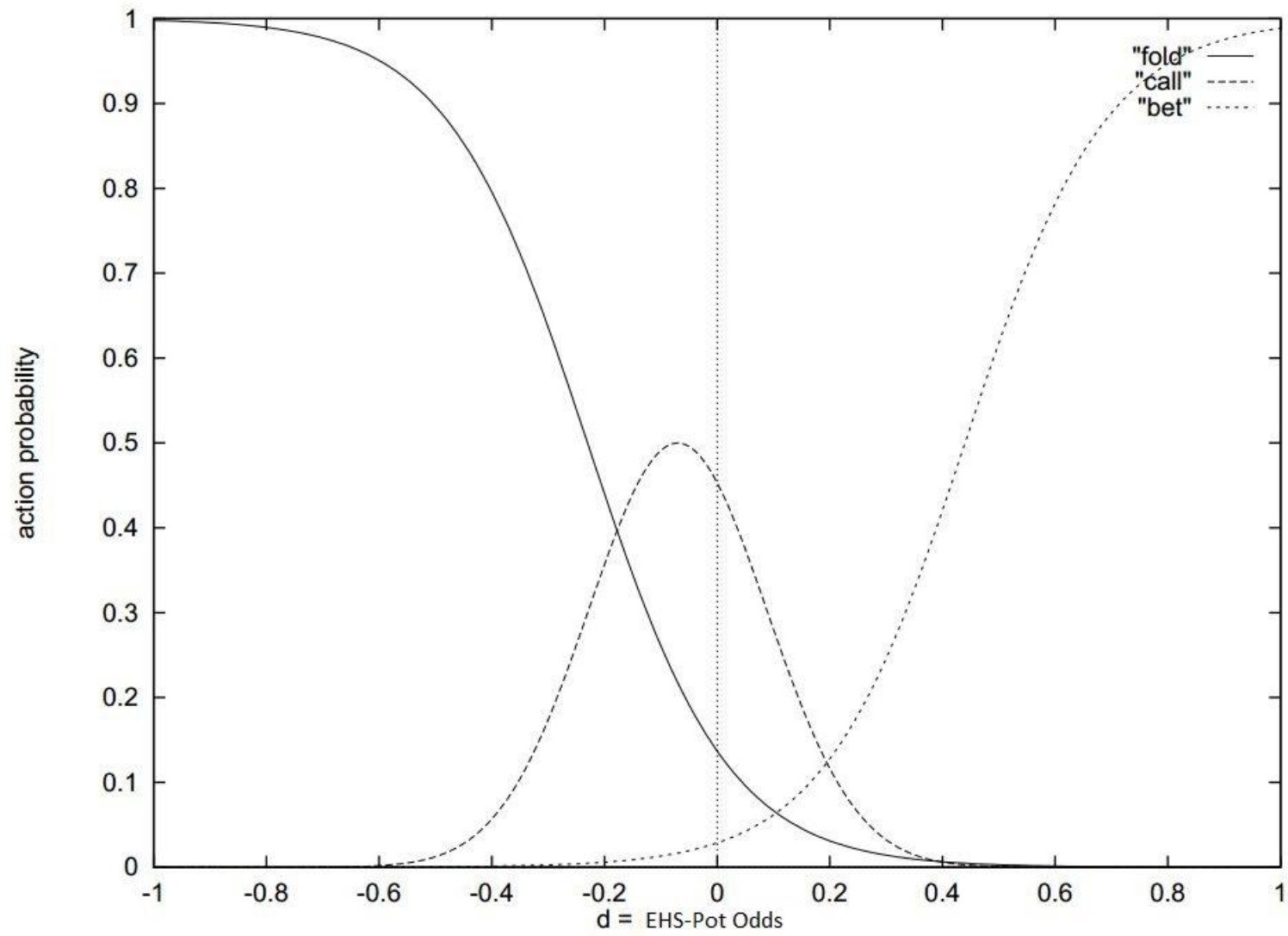
p is pot size

Betting Curves

Bet Prob= $1/(1+\exp(-a(d-f1)))$

Fold prob= $1/(1+\exp(a(d+f2)))$

Call prob= $\exp(-20(d+fc)^2)$



Opponent Modelling

- Weighting the Enumerations

Different Weights Are used In place of equal probability for the hand evaluators.

- Computing Initial Weights

- Re-weighting

Based on observed frequency of actions(raise, call ,fold).

References

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Thank You!

