Computer Games

Poker Bot

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1 Introduction

The aim of the project was to create an efficient bot for a Texas Hold'em poker game. In our project bot decision depends on several parameters:

- Position at the table after dealer
- Odds of gaining better hand
- Hand value ranking (hand groups)

2 Algorithm

2.1 Preflop

The decision which poker starting hands combinations should be played preflop can be made based on Texas Hold'em preflop starting hand value ranking.

<table>
<thead>
<tr>
<th>Group</th>
<th>Cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AA, KK, QQ, JJ, AKs</td>
</tr>
<tr>
<td>2</td>
<td>TT, AQs, AJs, KQs, AK</td>
</tr>
<tr>
<td>3</td>
<td>99, JTs, QJs, KJs, ATs, AQ</td>
</tr>
<tr>
<td>4</td>
<td>T9s, KQ, 88, QTs, 98s, J9s, AJ, KT</td>
</tr>
<tr>
<td>5</td>
<td>77, 87s, Q9s, T8s, KJ, QJ, JT, 76s, 97s, Ax, 6s</td>
</tr>
<tr>
<td>6</td>
<td>66, AT, 55, 86s, KT, QT, 54s, K9s, J8s, 75s</td>
</tr>
<tr>
<td>7</td>
<td>44, J9, 64s, T9, 53s, 33, 98, 43s, 22, Kxs, T7s, Q8s</td>
</tr>
<tr>
<td>8</td>
<td>87, A9, Q9, 76, 42s, 32s, 96s, 85s, J8, J7s, 65, 54, 74s, K9, T8</td>
</tr>
</tbody>
</table>

s – suited  
x – low card  
T = 10

The rest of hand combinations we assigned to 9'th group. Based on position after dealer, knowledge if someone before us raised, how many players called and our hand’s group we make decision as follows:

2.1.1 Early position (first 3 position to the left of big blind)

- If there’s only a few callers we raise.
- If we have cards from group 3 or better and someone raised before us we call.
- If we have cards from group 4 or better and nobody raised before us we raise.
- Otherwise we fold

2.1.2 Middle position (5, 6 and 7th position to the left of big blind)

- If there’s only a few callers we raise.
- If we have cards from group 4 or better and someone raised before us we call.
- If we have cards from group 5 or better and nobody raised before us we raise.
- Otherwise we fold

2.1.3 Late position (button and player to the right of the button)

- If there’s only a few callers we raise.
- If we have cards from group 5 or better and someone raised before us we call.
• If we have cards from group 7 or better and nobody raised before us we raise.
• Otherwise we fold

2.1.4 Blinds

• If we have cards from group 5 or better we raise.
• If we have cards from group 6 or better and someone raised before us we call.
• If we have cards from group 3 or better and nobody raised before us we raise.
• Otherwise we fold

2.2 After preflop

2.2.1 Evaluating odds

After preflop we calculate our chances of getting better hand by checking every combination of possible cards added in turn and river. We calculate how many of these combinations are granting better hand than our current hand. The final odd is the number of better hand setups divided by number of all setups.

2.2.2 Decision making

The decision is based on calculated odds and rank of our current hand. The decision is made as follows (from top to down):

• If we have four of a kind or better, we play all in.
• If we have a three of a kind or better and odds of getting better hand are over 50%, we play all in.
• If we have a three of a kind or better, we raise (a lot).
• If we have two pairs and odds of getting better hand are over 30%, we raise.
• If odds of getting better hand are over 70%, we call.
• Otherwise, we fold.

3 Good Behaviours

• Very good preflop play.
• Works good on tables with raise limit.
• Takes into account number of players at the table.

4 Bad Behaviours

• Poor play when all in occurs.
• Sometimes raises at the beginning just to fold at the end.
5 Bot Comparison

<table>
<thead>
<tr>
<th>Bot Name</th>
<th>Games played</th>
<th>Win</th>
<th>Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call bot</td>
<td>100</td>
<td>83</td>
<td>17</td>
</tr>
<tr>
<td>Random bot</td>
<td>100</td>
<td>95</td>
<td>5</td>
</tr>
<tr>
<td>Raise bot</td>
<td>100</td>
<td>88</td>
<td>12</td>
</tr>
</tbody>
</table>

6 Sources