IT3105 Project I: Texas Hold 'Em

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Innhold

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Tabeller

1   Basic code structure

Basic structure of the code

The code, written in python, is based on the code given as handouts to the project. All deck and card handling is left to this code.

The main structure for game rules, player handling and general poker manager a module, «Poker», is used.

Each player on the game is a subclass of a class «Player». This class handles all the generic player operations. I.e. a action like call, fold or raise uses the same implementation independent of phase. There are three subclasses of «Player»; «Phase1», «Phase2» and «Phase». Each of these subclasses are thin, with essentially only one method implemented - the rest of the methods are generic and inherited from the super class. The base class Player stores all different types of stats, like number of wins/ties/losses before and after showdown, latest action, total money. It also has control over play style, blinds and so on.

The method implemented in each of the "Phase classes", take_action, uses the different strategies and takes advantage of the difference in knowledge.

For starting a poker game, you can initiate the poker class and add a list of players as first argument. In the player list you can add all of the different phase players, in any combination.

Other than the poker modules, there is a module for generating a pre flop rollout simulation named "pre_flop_rollout_sim.py" and a module for calculating hand strength, "hand_strength.py". These are both used for phase two.

For knowledge gathering in phase three, a module called "db_con.py" is used. This handles context generating and storing all the different data sets in a sqlite table. This module also has a function (actually method since it's in a class) for finding estimated hand strength based on context, player and latest action.

2 Betting decision logic

2.1 Phase 1

Only the hand rankings are used. We implemented two strategies based on what looked plausible for a poker player. We checked for what ranking both the hole cards with or without the shared cards, and implemented a set of rules for what action to take based on the given hand. An example of a rule could be, «If hole cards are pairs and player is loose aggressive, then raise».

2.2 Phase 2

The same logic from phase 1 was implemented, but with the pre flop rollout and hand strength calculations taken into account. In the set of rules used in phase 1, we added the strength and equivalent class calculation to strengthen the strategies. So a rule could be «If in post flop and player is loose aggressive and hand strength is over 0.30, then raise».

2.3 Phase 3

Built on top of phase 2 again. The same set of rules and both calculations used. In addition to this we used the opponent modelling to strengthen these rules even more. We only implemented a check for what the estimated highest cards on the table were (by hand strength). So a rule can be «If in post flop and player is loose aggressive and hand strength is over 0.40 and highest opponent estimate is 0.30, then raise»

3 Opponent models and contexts

We logged all parts of actions of a player, if he reached showdown. In the context we used state of betting round, number of players active, number of raises in round and pot odds. We also used player name and action as a key.

4 Multi-hand runs

4.1 Phase 1

Phase 1: First 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Martin	1	Loose aggressive	22682,50
Mikael	1	Loose aggressive	10307,50
Marius	1	Tight passive	-2600
Jostein	1	Tight passive	-7152,50
Emil	1	Tight passive	-5877,50
Steinar	1	Tight passive	-5427,50
Stian	1	Tight passive	-4932,50

Tabell 1: First phase 1 run

Phase 1: Second 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Martin	1	Loose aggressive	24467,50
Mikael	1	Loose aggressive	3617,50
Marius	1	Tight passive	-620
Jostein	1	Tight passive	-2960
Emil	1	Tight passive	-4580
Steinar	1	Tight passive	-6972,50
Stian	1	Tight passive	-5952,50

Tabell 2: Second phase 1 run

Phase 1: Third 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Martin	1	Loose aggressive	11035
Mikael	1	Loose aggressive	16802,50
Marius	1	Tight passive	-4212,50
Jostein	1	Tight passive	-5382,50
Emil	1	Tight passive	-5712,50
Steinar	1	Tight passive	-4565
Stian	1	Tight passive	-965

Tabell 3: Third phase 1 run

Phase 1: Fourth 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Martin	1	Loose aggressive	12325
Mikael	1	Loose aggressive	24475
Marius	1	Tight passive	-3322,50
Jostein	1	Tight passive	-7440
Emil	1	Tight passive	-7880
Steinar	1	Tight passive	-5107,50
Stian	1	Tight passive	-6050

Tabell 4: Fourth phase 1 run

Phase 1: Fifth 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Martin	1	Loose aggressive	13877,50
Mikael	1	Loose aggressive	13172,50
Marius	1	Tight passive	-4505
Jostein	1	Tight passive	-2517,50
Emil	1	Tight passive	-4445
Steinar	1	Tight passive	-5135
Stian	1	Tight passive	-3447,50

Tabell 5: Fifth phase 1 run

4.2   Phase 2

Phase 2: First 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	5740
Marius	2	Loose aggressive	21572,50
Jostein	2	Tight passive	-9740
Steinar	1	Tight passive	-7557,50

Tabell 6: First phase 2 run

Phase 2: Second 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	5560
Marius	2	Loose aggressive	16825
Jostein	2	Tight passive	-10370
Steinar	1	Tight passive	-3245

Tabell 7: Second phase 2 run

Phase 2: Third 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	4015
Marius	2	Loose aggressive	23972,50
Jostein	2	Tight passive	-11232,50
Steinar	1	Tight passive	-7640

Tabell 8: Third phase 2 run

Phase 2: Fourth 1000-hand run
All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	7885
Marius	2	Loose aggressive	14372,50
Jostein	2	Tight passive	-9005
Steinar	1	Tight passive	-5577,50

Tabell 9: Fourth phase 2 run

Phase 2: Fifth 1000-hand run
All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	6977,50
Marius	2	Loose aggressive	16577,50
Jostein	2	Tight passive	-9980
Steinar	1	Tight passive	-5930

Tabell 10: Fifth phase 2 run

4.3   Phase 3

Phase 3: First 1000-hand run
All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	2425
Marius	2	Loose aggressive	4435
Jostein	2	Tight passive	-680
Steinar	1	Tight passive	-50
Mikael	3	Loose aggressive	1435
Martin	3	Tight passive	-1130

Tabell 11: First phase 3 run

Phase 3: Second 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	5462,50
Marius	2	Loose aggressive	1270
Jostein	2	Tight passive	-1910
Steinar	1	Tight passive	-920
Mikael	3	Loose aggressive	4592,50
Martin	3	Tight passive	-1700

Tabell 12: Second phase 3 run

Phase 3: Third 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	6430
Marius	2	Loose aggressive	812,50
Jostein	2	Tight passive	-1985
Steinar	1	Tight passive	-1025
Mikael	3	Loose aggressive	5537,50
Martin	3	Tight passive	-3770

Tabell 13: Third phase 3 run

Phase 3: Fourth 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	2980
Marius	2	Loose aggressive	7210
Jostein	2	Tight passive	-2300
Steinar	1	Tight passive	2800
Mikael	3	Loose aggressive	-2045
Martin	3	Tight passive	-1865

Tabell 14: Fourth phase 3 run

Phase 3: Fifth 1000-hand run

All players start with 1000 credits.

Player name	Phase	Style	Final credits
Andre the giant	1	Loose aggressive	1675
Marius	2	Loose aggressive	4375
Jostein	2	Tight passive	-3170
Steinar	1	Tight passive	-1445
Mikael	3	Loose aggressive	7840
Martin	3	Tight passive	-2570

Tabell 15: Fifth phase 3 run

5   Discussion

5.1   Phase 1

In this phase the players does not care about the opponent's, only their own cards and ranking. We have one tight-passive style, and one loose-aggressive style, and feels that this covers two opposite playing styles in poker. When these two are put up against each other, loose-aggressive will almost always win. We saw in our results that that was certainly the case. When the opponents are not considered, the players with a loose-aggressive attitude will bet much, and so the tight-passives will always fold, and never catch their bluff.

5.2   Phase 2

Again we see that the loose-aggressive style is the best one. We implemented handstrength-consideration in addition to the logic in phase 1, and the player took better choices of when to bet/raise and when to check/call.

5.3   Phase 3

We had some troubles with getting the phase 3 players to win, so we believe there is a bug in the implementation of opponent-modeling actions.