

# ~~~ PokerSea ~~~ User Manual

## 1. Introduction

PokerSea is a command line tool for learning and analyzing No Limit Texas Holdem. It has 54 configurable poker bots participating in 4 game types: Heads up, Spin & go, Cash and Tournament. There are different modes in PokerSea:

- Player: Play against bots.
- Dealer: Deal cards.
- Analyzer: Set up poker situation and the bots will play it 10 000 times.  
Report with big blinds won/lost for each position.
- Teacher: Bots play endlessly and learn.
- Editor: You can edit 50 poker bots.

## 2. Installation

PokerSea is written in python3 language. You can install python3 from here:

<https://www.python.org/downloads/> Once you have python3 on your system, you do not need to install PokerSea, just unzip it. To start it on MAC OS or Linux, go inside unzipped folder and in console type: python3 start.py. On Windows just double click start.py

## 3. Limitations

PokerSea has different look on Windows OS because windows console does not support colors and special symbols. There are two ways to fix this:

### 3.1 Windows 10

You can open console /Start button ->cmd/ and navigate to where PS folder is. Then type this: `chcp65001` This will enable colors and cards suits, with no faces. After that start PS with typing on console: `python start.py` Then select 'o Colors and Layout' and select layout.

### 3.2 Older versions of Windows

Find a color console application for windows and use it.

For more information on this topic see appendix C – Colors and Layout at the bottom of this document

## 4. Main Menu

- a Analyzer
- b Bot editor
- c Cash game
- d Dealer On/Off
- e Endless learning
- f Follow bot
- g Get Help
- h Heads Up game
- i Info of bot
- j Time delays
- k Hand history
- l Leaderboard
- o Colors and Layout
- p Player On/Off
- q Quit
- r Range view/edit
- s Spin & Go game
- t Tournament game
- v View type
- y School in/out

To select option from main menu, select the letter and press Enter. When poker game is in progress you can stop it with /ctrl+c/combination from keyboard. There is a build-in help in PokerSea: If you need help on some topic, press `h+<letter of topic>` and enter. For example If you need help on 'a Analyzer' you can type 'ha' for help Analyzer. Similar if you need help for 'b Bot editor' you

can type 'hb' and press Enter. Same option is available for all choices in main menu. Here will go through all options:

#### A Analyzer

-----  
Setup a hand between two and six players.

- Enter the big blind
- Enter stacks
- Enter starting point: preflop, flop, turn, river
- Enter pot if the starting point is postflop
- Enter cards or press 'Enter' for random cards. Conventions: th=ten of hearts, 2c=two of clubs, js=jack of spades, press Enter for random card.

10 000 iterations of this situation will be played, each iteration with different bot on each position and report for each position's value in big blinds will be given at the end. To terminate the report earlier 'ctrl+c'. Each hand starts preflop, and reaching the predefined 'starting point' checks bots' stack to pot ratio. If the situation does not match the chosen one, the result of current hand will not be taken into account. See the [-] or [+] marks during Analyzer action.

Dummy seats: If you need dummy seats for the setup - players that had folded preflop, then for each of these enter starting stack 1/4 than big blind or less. This way their positions will be respected, but they will always fold. Example when you need dummy seats. Consider these two hands:

Hand1. You are playing cash game with 6 players and raise from Under the gun /first position/, 4 folds, big blind calls.

Hand2. You are playing Heads Up game and open from the blind, and the other player calls.

Postflop both hands will be heads up, but the ranges with which players start these hands are totally different. That is why to simulate first hand, you need to add dummy seats /stacks less than 1/4 big blind/ for positions that folded preflop. This way these bots will always fold, but the ranges that other two bots are starting with will be 'under the gun open range' and 'defend vs under the gun out of position range', as for hand two we will have 'heads up dealer open range' vs 'heads up button defend range'. For more information on this topic see appendix A - Analyzer at the bottom of this document.

#### b Bot editor

-----  
In this mode you can edit these properties of bot:

- sea type
- preflop aggression
- flop aggression
- turn aggression
- river aggression
- range type: polarized or merged

All 54 bots in PokerSea are named on fishes and separated in 4 player pools: white sea, yellow sea, red sea and black sea. Bots from same sea have same ranges. These ranges can be modified manually from 'r Range view/edit' or during endless learning mode. The aggression is between 20-40 and it defines the style of play of the bot. The changes are preserved when you exit PokerSea. Those properties can be changed from the bot itself in self learning mode, if you do not want this, put the bot out of school. See 'y - School in/out' section. For more information about how exactly these properties affect bots play, see appendix B - Bots Design at the end of this document.

#### c Cash game

-----  
In cash game, if you have entered as player 'p Player On/Off' you will play, if you enter as dealer 'd Dealer On/Off' you will deal /selected by you/ cards, otherwise you enter as observer. If you want to see more in-depth information about the bots' play, see the section 'v View type'. The cash game will break

when 3 players are left at the table. Each of the last 3 will take its remaining stack and table will break. This is to separate game from heads up and spin & go

#### d Dealer On/Off

-----  
This option turns human dealer on/off. Conventions: cards start with small letter  
Ranks: a, k, q, j, t, 9, 8, 7, 6, 5, 4, 3, 2

Suits: s, h, d, c

Examples: Ace of hearts: ah, Jack of clubs: jc, Seven of diamonds: 7d, Two of spades: 2s, Ten of clubs: tc

#### e Endless learning

-----  
In this mode bots are playing against each other 30 cycles. Each cycle contains on average one heads up, one spin, one cash and one tournament for each bot. After 30 cycles learning process starts. Weakest bots modify their strategy and ranges. The new strategies are preserved when you exit PokerSea. After 30 cycles the process starts all over. In this mode the speed is fast speed, and the view will switch to Indicator view. Bots at the table are indicated by dot '.' Bot who is acting is indicated as asterisk '\*' Empty chair is blank ' ' One table looks like this: ...\*.. You can stop endless mode at any time 'ctrl+c', but the best time to do it is between the games. You can use the option 'f Follow bot' to see how particular bot is playing in this mode.

#### f Follow bot

-----  
This option is used in endless mode if you want to see how particular bot is playing. One usage is to edit this bot ranges and the 4 aggression factors and set it out of school /y School in/out in main menu/ and then follow this bot. Another usage is to just watch the best or worst or whichever bot you wish. In endless mode bots are playing heads up, spin&go, cash and tournament and then based on their results the worst half are learning and change their strategy. This cycle goes on forever until you stop it /ctrl+c/. To be faster, endless mode uses Indicator view which means 0 delay, and bots at the table are indicated by dot '.' Bot who is acting is indicated as asterisk '\*' Empty chair is blank ' ' One table looks like this: ...\*.. however, if you have selected bot to follow, when it comes its turn to act in these games, the game will switch to normal speed and Classic view so you can see the followed bot's play, then again the game will switch full speed and Indicator view.

#### g Get Help

-----  
to get help on some topic type: <h+letter of topic> and press enter in main menu. Examples:

A Analyzer -----> ha help Analyse hand

b Edit bot -----> hb help Edit bot

c Cash game -----> hc help Cash game

d Dealer bot -----> hd help Dealer bot

... and so on

#### h Heads Up game

-----  
In Heads up game there are two players with blinds increasing after some time. If you have entered as player - see 'p PlayerOn/Off' in main menu you will play, if you enter as dealer 'd Dealer On/Off' you will deal /selected by you/ cards, otherwise you enter as observer. In observer mode you watch bots playing. If you want to see more in-depth information about the bots play, see the section 'v View type'.

#### i Info of bot

Here you can see information about bots. Its 'sea' - this is its playing pool with starting set of ranges, which the bot may have modified during endless learning mode, also here you can see his aggression factor at each street and PokerSea rank. Additional information you can see is bot's career so far. Example info of candlefish. You can see that this bot is from yellow sea, has polarized range type, his current rank is 54 /the worst poker fish of all/ and aggression factors on all streets. He plays preflop with aggression 40 /maximum/ ,on the flop he has aggression 25 and so on. The dots in the carrer-so-far table indicate his current standings /last learning cycle/ in the leaderboard. After each cycle /see e Endless learning/ which includes 30 heads up, 30 spins, 30 cash and 30 tournaments the leaderboard updates. The higher the dot, the higher the standing of this bot in the leaderboard. You can see that candlefish' last dot is at the bottom indicating he has terrible last season. This means it will be part of the bots that change their strategy for the next cycle. Top 27 fishes /50% out of 54/ do not change their style. Worst half change their style /if they are in poker school - see y School in/out section/

```
~~~ PokerSea ~~~ observer
ctrl+c lobby
```

```
name: candlefish
yellow sea
range type: polarized
pokersea rank: 54
aggression:
  preflop: 40
  flop: 25
  turn: 33
  river: 38
```

career-so-far /=====

```
===== / end-of-report
```

- j Time delays

Here you can change the time it takes for bots to act on each street. Also you can change the 'board' time, this is when at the river at showdown the cards will be exposed before the hand ends. These settings are not preserved when you quit.

## k Hand history

For each bot around last 100 to 200 hands are saved. Select 'n name' to select which bot hands history to view. Select as name 'you' for your own hand history. Additional filters:

Additional filters:

- g - game type: review only hands for this game type
- p - pot: enter minimal pot for report.
- s - suited: view only suited hands

h - hand: select specific hand.  
 Example ace-x offsuit:  
 card1: 'a' - you have selected card1 to be ace  
 card2: 'x' - you have selected card2 to be random x  
 Valid ranks: 'a', 'k', 'q', 'j', 't', '9-2' or 'x'  
 r - report: view selected bot's hands  
 c - clear selection: clear all filters

## l Leaderboard

Displays current leaderboard stats of all bots for different game types: heads up, spin&go, cash and tournament. Current here means last cycle of endless learning mode.

## o Colors and Layout

Pokersea is a command line tool, there are no graphics. Windows OS console does not support colors or special characters - like bot's faces and cards suits. Apart from 'no color, no face', PokerSea will work the same as on other OS's. On Windows 10 you can open console /Start button ->cmd/ and navigate to where PokerSea folder is. Then type this: **chcp65001** This will enable colors and cards suits, with no faces. After that start PokerSea from same console with this command: **python start.py** Then select 'o Colors and Layout' and select layout. The other way is to find a color console application for windows and use it.

## p Player On/Off

Switch between player and observer mode. In player mode you play against bots, in observer you watch bots play. When you play against bots and it is your time to act you will see something like this:

```

    ~~~ PokerSea ~~~      player
    ctrl+c lobby
  
```

```

biggest :3000
average :2995
smallest:2910
  
```

```

😊 2995      😞 2910      😞 2995 ?
lion         ange [[]]   you  3♦5♦
-----
      5             90             D 5
  
```

```

table:1/9 next level:200
board:
pot:145
  
```

```

      5             25             15
-----
😊 2995      😊 2975      😞 2985
rock         cowf [[]]   lady [[]]
  
```

```

|f:fold/check| |c:call| |m:min| |h:half| | |
|b:2/3| |t:3/4| |p:pot| |r:3x| |d:pot*2|
|j/a:allin| |o:pot+1/2| or|enter number|
  
```

```

<85 to call>
]
  
```

Here angelfish had opened 90 from HJ position and you have 3d 5d. You have 5 ante so you need 85 more to call. You can use one of the predefined shortcut

bets as follows:

f - fold or check

c - call

m - min bet /usually size of the big blind/

h - half pot bet

b - 2/3 of pot

t - 3/4 of pot

p - pot

r - raise 3 x biggest bet

d - double the pot /bet size twice the current pot/

j - jam all in

a - jam all in

o - overbet pot + 1/2pot

And last you can enter custom number and press 'Enter'

If you enter bet smaller than big blind you will check/fold, bet bigger than stack means all in.

r Range view/edit

-----  
Select a bot and range you want to view/edit. Type a hand to add or remove from range. Conventions: aks - ace-king suited, ako - ace king offsuit, 44 - pocket fours. Changes are preserved when you exit. Ranges can be changed by the bots themselves during endless learning if they are in the school. See 'y School in/out' section.

s Spin &Go game

-----  
In Spin&Go game there are three players with blinds increasing. If you have entered as player - see 'p Player On/Off' in main menu you will play, if you enter as dealer 'd Dealer On/Off' you will deal /selected by you/ cards, otherwise you enter as observer. In observer mode you watch bots playing. If you want to see more in-depth information about the bots play, see the section 'v View type'.

t Tournament game

-----  
In Tournament game all of the 54 bots are playing -9 tables each with 6 players. Ante and blinds increasing as tournament levels go by. If you have entered as player - see 'p Player On/Off' in main menu you will play, if you enter as a dealer 'd Dealer On/Off' you will deal /selected by you/ cards, otherwise you enter as observer. In observer mode you watch bots playing. If you want to see more in-depth information about the bots play, see the section 'v View type'.

v View type

-----  
In observer mode, select between 3 available views.  
Classic view: Regular Poker Table with no additional info how bots take some actions.  
Indepth-information: Poker table with exposed bots ranges and decision points with time delay to view it.  
Step-by-step: Poker table with exposed bots ranges and decision points with stop point at each decision. Press 'Enter' to continue at each decision point.

y School in/out

-----  
Select bots to put in and out of school. In endless learning mode only bots that are in school will change their strategies and ranges. There are 4 reference bots that are always out of school: milkfish, yellowfish, redfish and blackfish. Learning in PokerSea works like this: There are 54 bots. After a cycle of 30 heads up, 30 spin&go's 30 cash games and 30 tournaments, there is a leaderboard

with bots' results. Best half of bots 27 do not change their style and ranges. The last 27 bots will change their styles as follows: 13 of them will only change their ranges. They can add or remove hands from their ranges. The next 13 /worst/ will also change their aggression factors: preflop, flop, turn, river and also may change range type: polarized or merged. If the bot is out of school or is one of the 4 reference bots /blackfish, redfish, yellofish, milkfish/ it does not change its style even if it ranks in the bottom half of the leaderboard. This way you can program your bot and let it play against others and be sure it will not change its style. These properties of bots /when you edit them or when they self learn/ are preserved even when you exit PokerSea.

-----  
**IMPORTANT! In PokerSea when poker session is in progress you can stop it with key combination ctrl+c**  
-----

## Appendix A: Analyzer

The best way to demonstrate Analyzer is by example.  
Table is 6-max, big blind is 20 all players have 2000 stacks/100 big blinds/.  
UG folds,  
HJ has Kh Kd opens for 70  
CO folds  
DB calls 70  
SB folds  
BB folds  
FLOP: 6s5sAc Pot is 170 /10sb + 20bb + 70hj + 70db/  
HJ bets 100  
DB calls 100  
TURN: 6s5sAcQh Pot is 370 , DB stack at this point is 1830 same goes for HJ

We want to analyze the play from this spot on. Start PokerSea, select 'a Analyzer'. Enter big blind for this hand: 20, enter stack of the dealer DB 1830 /preflop 2k, calls preflop 70, calls 100 on the flop / , enter the stack of the seat next to the dealer - SB. In this hand SB fold preflop, so we give him stack = 5 /less than small blind for this hand! / which indicates 'forced preflop fold' in Analyzer tool. The 'real' amount of the small blind /10 in this example/ will be taken into account. Next seat is BB, fold preflop - give him stack 5. The 'real' amount of the big blind /20 in this example/ will be taken into account. UG fold preflop, stack 5. HJ at seat4 gets 1830 same as DB /preflop 2k, open preflop 70, cbets 100 on the flop/. The CO seat5 gets stack of 5 /fold preflop/.

-----  
**IMPORTANT! In Analyzer stack less than small blind means forced fold preflop. The real amount of the blinds will be taken into account !**  
-----

Enter starting point 't' - TURN in this example. Enter Pot 370. Enter board cards: 6s5sacqh /small letters/ and for river card press 'Enter' as it is unknown /will be random each iteration/. Enter 'seat0 card1'. This is DB press 'Enter' /unknown card/. Same for his second card 'seat0 card2'. Deal unknown cards for all seats except for the HJ: seat4 card1: kh , seat4 card2: kd. The last seat5 CO also takes unknown cards.

~~~ PokerSea ~~~  
ctrl+c cancel

analyzer

blinds: 10/20

👤 1830      👤 1830      👤  
seat0 [][]    seat1 [][]    seat2 [][]

-----  
D

starting point: turn  
board: 6♠5♠A♣Q♥[]  
pot: 370

-----  
👤      👤 1830      👤  
seat5 [][]    seat4 K♥K♦    seat3 [][]

Is this the correct setup? y/n  
[y/n]

After that you will see something like this:

iterations: 1462  
[-] matched: 62

\*.....

This means that 1462 poker hands has played with different random bots on each position each iteration. From this hands 62 match the same situation on Turn: pot is around 370. this mark [-] indicates that current hand did not match /for example there might be bet-raise-call-preflop or bet-raise-on-flop/ so this hand will not be taken into account. The [+] mark is when the hand matches predefined situation. The hand then resets with new bots on the positions and starting stacks and cards as you have entered until there are 10 000 matches of the situation and then reports big blinds won/lost per position. The reason for indicator view is that hands are played full speed. In indicator view the players are indicated as dots . the player who currently acts is indicated as asterisk \* 6 players table looks like this: ...\*.. If you want to switch to normal speed, press ctrl+c

q quit analyzer  
s switch speed  
]

At this point if you want to stop /don't want to wait 10k matches press q/ for normal speed press s. Now you will be able to view the game in normal speed and Classic view with indepth-information. If you want again to switch to full speed do the same ctrl+c and then select s to switch speed. Note that on this example there are 1.5 big blinds dead money. That is because the blinds are forced to fold preflop. If you want to simulate short hand situation /lets say spin & go/ Then enter stacks of three players and for the stack of the 4th player press 'Enter' /no stack/.



## Appendix B: Bots Design

-----  
**IMPORTANT! All changed properties of bots are preserved even if you exit PokerSea**  
-----

Each bot in PokerSea has 21 preflop ranges:

```
0  ug open
1  hj open
2  co open
3  dealer open
4  sb open
5  heads up dealer open
6  heads up big blind defend
7  defend vs ug in position
8  defend vs ug out of position
9  defend vs hijack in position
10 defend vs hijack out of position
11 defend vs cutoff in position
12 defend vs cutoff out of position
13 defend vs dealer button
14 defend vs small blind
15 under 10 bb push vs 1 villain
16 under 10 bb push vs 2 villains
17 under 10 bb push vs 3+ villains
18 call under 10bb push, no one left after you to act
19 call under 10bb push, one left after you to act
20 call under 10bb push, 2+ left after you to act
```

You can edit these from 'r Range view/edit'. There are also 6 important properties of bots that you can edit from 'b Bot editor'.

→ sea: Sea is the player pool of the bot. If you change it's sea, the bot will override all of its 21 ranges to the default ones of that sea.

→ range type: polarized or merged. See the picture below for example. Red hands indicate raising hands blue ones are calling hands.

merged range:

```
AA AK AQ AJ AT A9 A8 A7 A6 A5 A4 A3 A2
AK KK KQ KJ KT K9 K8 K7
AQ KQ QQ QJ QT Q9 Q8 Q7
AJ KJ QJ JJ JT J9 J8 J7
AT KT QT JT TT T9 T8 T7
A9 K9 Q9 J9 T9 99 98 97 96
A8 K8 Q8 J8 T8 98 88 87 86
A7          77 76
A6          66 65
A5          55
              44
                33
```

polarized range:

AA AK AQ AJ AT A9 A8 A7 A6 A5 A4 A3 A2  
AK KK KQ KJ KT K9 K8 K7  
AQ KQ QQ QJ QT Q9 Q8 Q7  
AJ KJ QJ JJ JT J9 J8 J7  
AT KT QT JT TT T9 T8 T7  
A9 K9 Q9 J9 T9 99 98 97 96  
A8 K8 Q8 J8 T8 98 88 87 86  
A7 77 76  
A6 66 65  
A5 55  
44  
33

Polarized ranges raise with best and part of worst hands in the range. Merged ranges raise with best hands in the range.

→ preflop aggression: This property can vary between 20-40. It has huge impact of the preflop play. If the bot has preflop aggression 20, it will raise 20% of its range, if preflop aggression is 31 it will raise 31% of range and so on, all the way up to 40% of range when preflop aggression is 40. Another thing this property affects is the frequency with which the bot flat calls. Sometimes bots take decision to flat call it's entire range /even AA no raise/ for information hiding and balance reasons. When this occurs you will see it's range all in blue color. The lower preflop aggression of the bot is, more frequently it will decide to flat call, and opposite the higher preflop aggression, his 'always calling' frequency will be lower. Another special preflop frequency is also dependent on this property. It is called 'range light' and is range composed of suited connectors who are added to bot's selected range. For example bot with aggression 40 may decide to call 6h7h /six and seven of hearts/ vs UG opener even if this hand is not in his defending range /this bot added preflop light range for this hand/ more frequently than bot with 30 preflop aggression will do it.

→ flop aggression: This property affects the flop play of the bot. The higher flop aggression is, less equity bot will need to bet his hand and vice versa. For example bot with flop aggression 40 may raise on spots where bot with flop aggression 30 will call and bot with flop aggression 20 will fold. This aggression also affects the frequency with which bots do the special move called 'float and steal part 1' - to call the flop even when there is not enough equity to try to steal on the turn.

→ turn aggression: Similar to the above property this one defines play on the turn, and also affects the special moves 'float and steal part 2' and 'turn steal attempt' and 'bluff on scary turn card' frequencies.

→ river aggression: This defines the river play of the bot and also affects special move 'bluff on scary river card' frequency.

All these things can be clearly seen when you select view type to be 2 or 3 - this way all the details of bots play are shown.

## Appendix C: Colors and Layout

On Mac and Linux OS console supports colors and special symbols. Windows console does not. See the section 'o Colors and Layout' in this manual. Windows view:

```
bb 1980      ug 2000 ?      hj 2000
spoo 3c6s    knif Js8d      milk JhTc
```

-----  
20

board:  
pot:30

10            D

-----  
sb 1990 db 2000 co 2000  
wasp ThQd dogf Qs5h ligh 9c2h

Here instead of faces you will see positions of bots /ug, hj, co .../  
Instead of color symbols for the cards suits you will see small letters s=spades  
h=hearts, d=diamonds, c=clubs. If you select view 2 or 3 to see bots ranges,  
since there are no colors, there will be 2 separated ranges displayed for  
raising and calling range:

raising range:

```
AA AK AQ AJ AT A9
AK KK KQ KJ KT
AQ KQ QQ QJ QT
AJ      JJ
      TT
      99 98 97
        88 87 86
          76 75
            64
```

calling range:

```
      A8 A7 A6 A5 A4 A3 A2
      K9 K8 K7 K6 K5 K4 K3 K2
      Q9 Q8
      KJ QJ      JT J9 J8
AT KT QT JT      T9 T8 T7
A9 K9 Q9 J9 T9
A8      Q8 J8 T8 98      85
A7      97 87 77
A6      86 76 66 65
A5      75 65 55 54 53
A4      44 43 42
A3      33
A2
```

On Windows 10 you can open console /Start button ->cmd/ and navigate to where  
PokerSea folder is. Then type this: **chcp65001** This will enable colors and cards  
suits, with no faces. After that start PokerSea from same console with this  
command: **python start.py** PokerSea © 2020 All Rights Reserved.

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