

# play holdem poker

About the Algorithm

The first computer program to outplay human professionals at

heads-up no-limit Hold'em poker

In a study completed December 2024 and involving 44,000

hands of poker, DeepStack defeated 11 professional poker players with

only one outside

the margin of statistical significance. Over all games play

ed, DeepStack won 49 big

blinds/100 (always folding would only lose 75 bb/100), over four stand

ard deviations

from zero, making it the first computer program to beat professional p

oker players in

heads-up no-limit Texas hold'em poker.

Games are serious business

Don't let the name

fool you, games of imperfect information provide a general mathemati

cal model that

describes how decision-makers interact. AI research has a l

ong history of using parlour

games to study these models, but attention has been focused

primarily on perfect

information games, like checkers, chess or go. Poker is the quintessen

tial game of

imperfect information, where you and your opponent hold inf

ormation that each other

doesn't have (your cards).

Until now, competitive AI approaches in imperfect

information games have typically reasoned about the entire

game, producing a complete

strategy prior to play. However, to make this approach

feasible in heads-up no-limit

Texas hold'em a game with vastly more unique situations than there are

atoms in the

universe a simplified abstraction of the game is often need

ed.

A fundamentally

different approach

DeepStack is the first theoretically sound application of heuristic

search methods which have been famously successful in games

like checkers, chess, and

Go to imperfect information games.

At the heart of DeepStack is continual re-solving, a

sound local strategy computation that only considers situations as the

arise during

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