Massachusetts Institute of Technology
6.9630 Pokerbots Competition

IAP 2024
Lectures at 12:00-1:30 PM EST in 6-120:
1/8, 1/10, 1/12, 1/17, 1/19, 1/29, 1/31
Zoom Link: https://pkr.bot/class

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Links

Homepage:	https://pokerbots.org
Live Zoom Lecture:	https://pkr.bot/class
Zoom Office Hours:	https://pkr.bot/oh
Scrimmage Server:	https://pkr.bot/scrimmage
Canvas page:	https://pkr.bot/canvas
Piazza:	https://pkr.bot/piazza
Resources:	https://pkr.bot/resources
Instagram:	https://pkr.bot/instagram
Find Teammates:	https://pkr.bot/teammates

Introduction

Pokerbots is an annual month-long programming competition in which students form teams of 1-4 members to create an autonomous poker-playing algorithm (a "pokerbot"). Over the four weeks of IAP, the open-ended project in pokerbot design builds skills in computer science, game theory, and data analytics.

Students will learn how to think about developing their pokerbots by attending seven lectures and will have the chance to test their skills in competition against their peers. During the first two weeks of lecture, students will learn about poker strategy, game theory, algorithm design, and software architecture. A scrimmage server allowing teams to challenge each other will be run for the first three weeks with a mini tournament held at the end of each week. In the fourth week, teams may continue to work on their pokerbots separately. During the final competition, teams' finished pokerbots are put to the test in a tournament for exciting prizes.

Poker is a complex yet highly accessible challenge: it's easy to learn, but difficult to be competitive in. Building a pokerbot is similar, as anyone can make an elementary bot, but building a competitive bot requires a deep understanding of the strategies adopted by other teams and how to contest them. At the heart of the Pokerbots competition is the challenge of applying the algorithmic and strategic thinking taught in theoretical courses.

Evaluation

To receive a passing grade in 6.9630, students are expected to fulfill both of two requirements: participation on the scrimmage server, and completion of a final strategy report.

Participation

Pokerbots is designed to encourage exploration. Students who put more effort into trying new ideas to design a winning pokerbot will have greater learning opportunities and a better chance to win prizes. To earn 6 units of credit for participation in 6.9630, students are expected to put sustained effort into developing their pokerbots. This will be judged by three weekly scrimmage server check-ins during which each team's pokerbot will be evaluated for improved performance relative to their previous week's submission and against a bot that implements a random strategy.

Make-up

If a team fails to improve their pokerbot from one week to the next, that team is expected to submit a half-page double-spaced make-up report describing the unsuccessful attempted improvements for the week. This is intended to avoid penalizing students who explore avenues that do not end up resulting in successful strategies. Make-up reports (if necessary) are due the Tuesday following each mini tournament.

Final Report

Each team is expected to submit a 3-5 page double-spaced strategy report outlining the techniques they used in developing their final pokerbot, due in the last week of IAP. These reports are meant to catalog the effectiveness of strategies explored throughout the class, as well as describe the distribution of work. Diagrams are optional, but *highly* recommended. The report should highlight the strategic and/or architectural insights that went into your team's pokerbot.

Grading

All teams who meet the above requirements in good faith will receive a passing grade.

Structure

Over the course of IAP, students have five main touchpoints with the course: the lectures, the scrimmage server, Piazza, Github and the final event.

Lectures

There will be seven lectures in person (6-120, 12-1:30PM), each which will be directly applicable to developing a successful pokerbot. These lectures will also be available on Zoom and recorded. Office hours will be held after each lecture at the same location (in person and virtually), as well as on most non-lecture days in the first weeks (info will be posted on Piazza). We'll also be holding giveaways during each of the lectures!

Scrimmage Server

The scrimmage server is how you will gauge the performance of your pokerbot relative to reference bots and other teams. On the scrimmage server, you can challenge your opponents and keep track of useful bot statistics. Furthermore, all pokerbot submissions are done via the scrimmage server. We'll be giving out prizes based on your performance on the server as well!

Piazza

Piazza is an online forum we will be using to answer questions and make announcements. It's important to check Piazza regularly for updates and changes we may make. You can post (publicly or privately to classmates) and a member of the Pokerbots team will respond as soon as possible (in past years average response time was less than 3 minutes!). You are also encouraged to answer other students' questions, and we will be rewarding students who contribute the most in this manner over the month.

Github

Throughout this course we will be posting materials, and additional resources to Github. This is where the Engine repository can be found, as well as any sample code from lecture. We will be providing detailed notes (along with slides) and a recording after every lecture as well.

Final Event

Pokerbots culminates in a virtual final event on February 2rd, 2024. This is where we will announce the winners of the final pokerbots tournament, as well as give out many additional prizes. There will be fun and games, as well as a chance to meet our sponsors directly! More details about the final tournament and event will be posted on the course Piazza as the date approaches.

Other Events

We will be hosting a variety of other events such as afternoon study breaks, poker socials, or sponsor networking events. These events are more informal and spontaneous, and information or details would be on Piazza as they approach.

Timeline

Week 1	
Mon 1/8	Lecture 1: Intro to Pokerbots
Tue 1/9	Poker Afternoon Study Break (with prizes!) 3-5PM; 2-131 & 2-132
Wed 1/10	Lecture 2: Poker Strategy
Fri 1/12	Lecture 3: Game Theory Week 1 Bot due 11:59pm
Sat 1/13	**Mini Tournament #1**
Week 2	
Mon 1/15	No Class: MLK Day
Wed 1/17	Lecture 4: Engineering & Performance
Fri 1/19	Lecture 5: Advanced topics Week 2 Bot due 11:59pm
Sat 1/20	**Mini Tournament #2**
Week 3	
Tue 1/23	Poker Afternoon Study Break (with prizes!) 3-5PM; 2-131 & 2-132
Fri 1/26	Week 3 Bot due 11:59pm
Sat 1/27	**Mini Tournament #3**
Week 4	
Mon 1/29	Lecture 6: Guest Lecture: Noam Brown
Tue 1/30	Strategy Report due 11:59pm
Wed 1/31	Lecture 7: Guest Lecture: GTO Wizard Final Bot due 11:59pm
Fri 2/2	**Pokerbots Final Event**

Prizes

The prize pool for Pokerbots 2024 is over **$40,000.** Here's the breakdown:

Final Tournament Prizes	
First place	$7,500
Second place	$5,000
Third place	$3,500
Fourth place	$2,000
Fifth place	$1,000
First place in language (Python, Java, or C++)	$500 x 3
Second place in language (Python, Java, or C++)	$250 x 3
Third place in language (Python, Java, or C++)	$125 x 3
Best freshman-majority (>51%) team	$2,000

Scrimmage Server Prizes	
Weekly tournament winner	$1,000 x 3
Weekly tournament biggest upset	$500 x 3
Weekly tournament most improved	$750 x 2
Most time at the top of the scrimmage server	$1,000

Miscellaneous Prizes	
Most helpful Piazza students	$250 x 3
Surprise prizes, lightning tournaments, and raffles	$10,000

We'll be holding raffles during each of the classes and events for great tech prizes!

Sponsors

Platinum

Hudson River Trading (HRT) brings a scientific approach to trading financial products. We have built one of the world's most sophisticated computing environments for research and development. Our researchers are at the forefront of innovation in the world of algorithmic trading. At HRT we welcome a variety of expertise: mathematics and computer science, physics and engineering, media and tech. We're a community of self-starters who are motivated by the excitement of being at the cutting edge of automation in every part of our organization – from trading, to business operations, to recruiting and beyond. We value openness and transparency, and celebrate great ideas from HRT veterans and new hires alike. At HRT we're friends and colleagues – whether we are sharing a meal, playing the latest board game, or writing elegant code. We embrace a culture of togetherness that extends far beyond the walls of our office.

GTO Wizard is the top choice for dedicated poker players, widely recognized as the #1 app in its field. It's powered by a state-of-the-art AI engine, developed by top experts in game theory and reinforcement learning. Utilized by the world's best poker players, GTO Wizard is more than just software. We're creating an ecosystem where players can easily study, practice, and analyze their game, thus accelerating their path to mastery in ways previously unthinkable.

Gold

SIG is a global quantitative trading firm founded by a group of friends who share a passion for game theory and probabilistic thinking. We have incorporated this approach into our culture, where you will find relentless problem solvers within each of our core disciplines: Trading, Technology, and Quantitative Research. From offices around the world, our employees collaborate to make optimal decisions and are driven by the desire to achieve winning results together.

At Seven Eight Capital, the scientific method is the foundation of our success. We use a disciplined approach in applying mathematics and statistics to the markets where data and proprietary machine learning methods validate hypotheses and produce alpha, and efficient risk management enables us to handle a variety of market conditions. Our technology, including unique data management and visualization tools and distributed computing, is integral to distilling complexity and bringing scale to our work. Tying it all together, our transparent and collegial atmosphere enables everyone to perform both as individuals and together as a team.

Gold (continued)

Jane Street is a global quantitative trading firm hiring smart, humble people who love to learn.

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Citadel is a multi-strategy alternative investment manager. For more than three decades, we've captured undiscovered market opportunities by empowering extraordinary people to pursue their best and boldest ideas. Each day at Citadel, we reimagine and refine our strategies, models and technology in pursuit of superior long-term performance.

Citadel Securities is the next-generation capital markets firm. We create efficient ways for buyers and sellers to come together; we innovative ways to price and absorb risk; and we develop new technologies to transform markets. Integrating deep financial, mathematical and engineering expertise, Citadel Securities delivers critical liquidity to central banks, financial institutions, government agencies, corporations, insurers and sovereign wealth funds.

Gold (continued)

Jump Trading is a leading global trading firm that combines sophisticated quantitative research, cutting-edge technology, and an entrepreneurial culture. We leverage our proprietary technology to analyze massive data sets and identify trends in global markets.

DRW is a diversified trading firm with over 3 decades of experience bringing sophisticated technology and exceptional people together to operate in markets around the world. We value autonomy and the ability to quickly pivot to capture opportunities, so we operate using our own capital and trading at our own risk.

Headquartered in Chicago with offices throughout the U.S., Canada, Europe, and Asia, we trade a variety of asset classes including Fixed Income, ETFs, Equities, FX, Commodities and Energy across all major global markets. We have also leveraged our expertise and technology to expand into three non-traditional strategies: real estate, venture capital and cryptoassets.

We operate with respect, curiosity and open minds. The people who thrive here share our belief that it's not just what we do that matters – it's how we do it. DRW is a place of high expectations, integrity, innovation and a willingness to challenge consensus.

Gold (continued)

Trexquant is a hedge fund specializing in global, systematic, and multi-asset investment strategies. We believe modeling the financial markets is one of the most intellectually challenging yet rewarding tasks. To this effort, Trexquant is on a quest for the brightest minds in research to join our rigorously academic and collaborative group. As a team, we trade billions a day and are heavily AI-driven.

Silver

Chicago Trading Company (CTC) helps the world price and manage risk. We pride ourselves on our strong values, our entrepreneurial spirit, and our commitment to doing the right thing. Our culture is highly collaborative across traders, quants, technologists and development teams who work together to solve the toughest problems our markets have to offer. We strive to make a positive impact on our industry, the lives of our employees, and the communities to which we belong.

Two Sigma is a financial sciences company. We combine rigorous inquiry, data analysis, and invention to solve hard problems across financial services.

We're looking for people who see beauty in data and the possibilities it reveals. Researchers who see connections and patterns in unexpected places. Engineers who build tools that channel massive amounts of data into insights. And experts across business disciplines to help solve the toughest challenges in investment management, insurance, market-making, private equity, and venture capital.

Silver (continued)

HAP Capital's market-making utilizes proprietary applications to make pricing decisions in a consistent, rational, and disciplined manner. We compete for the right to transact with other market participants on the basis of superior price and speed of execution. Acting as a liquidity and efficiency provider to the marketplace, we identify the demand for specific equity and index options and proactively demonstrate our willingness to buy or sell to satisfy that demand. HAP Capital's individual portfolio managers speed the market price discovery process while extracting expected value in an environment constructed to enable, promote and reward proven alpha and well thought out risk-taking. With over a decade of consistent successes, HAP Capital extracts value and provides efficiency to the markets through our market-making and portfolio managers. HAP Capital differentiates itself from most other firms in the space in its internally developed quantitative approach to its trading strategy and business model.