Crowdsourced signal-driven systematic trading platform

Team 60

Andy Jiang (jianga@wharton.upenn.edu) (M&T)
Aneesh Boreda (aboreda@wharton.uoenn.edu) (M&T)
Mohamed Abaker (alnasir7@seas.upenn.edu)
Tinatin Kokoshvili (tinatin@seas.upenn.edu)
Joseph Zhang (jzhang25@seas.upenn.edu)

Faculty Advisor: Prof. Jonathan M. Smith
TA: Bharath Teegala

`

Executive Summary

Signals.ai is a quantitative trading platform that provides independent researchers with the opportunity to conduct cutting-edge signals research with no affiliations. We source signal ideas from researchers worldwide, employing them to power our trading platform and strategies, and trade in global electronic markets. Signals.ai provides a zero-risk environment with only possible upsides for researchers to test their ideas while maintaining full intellectual property ownership.

Table of Contents

Context

1. Algorithmic trading is the automation of executing financial transactions based on computer algorithms to analyze market data and make trading decisions.
2. An alpha (signal) is an algorithm or model that predicts price movements. It takes market data as the input and outputs a theoretical price for a security. Market micro-structure signals generally rely on price, size, and trade data coming directly from data feeds.
3. One approach to algorithmic trading is alpha-driven trading where multiple predictive signals are combined using machine learning to produce a single prediction. A trading strategy buys or sells based on the prediction and other variables.
4. The simplest models use linear regression-based price predictions, while more complicated models may use techniques such as decision trees or reinforcement learning. As long as enough useful signals are used as inputs, all of these model types can be viable.

Problem Statement

Systematic trading usually requires 3 main steps: strategy research, trading system infrastructure and systematic trading. For researchers with most of their expertise in finance, developing step 2 and 3 is difficult as shown below.

- Requires technical expertise
- Familiarity with electronic trading systems
- Very expensive to build and maintain
  - ex. >5k/month for market data
  - + thousands to colocate servers with exchange
- Takes significance amount of time to build

It requires significant infrastructure, distributed systems, and machine learning development. Additionally, success requires a large quantity of predictive signals

(alphas). Finally, trading firms are highly selective and researchers lose ownership of their ideas.

Thus, it is difficult for independent quantitative researchers to make money even if they have good ideas.

Value proposition

1. Researchers don't need to worry about setting up a systematic trading system infrastructure on their own, or being forced to work at a firm that provides infrastructure for them. They will be able to maintain ownership of their ideas while being provided with trading infrastructure that is competitive with other trading firms.
2. Researchers will be able to receive a portion of the upside from any successful signals they create, without the risk of losing their capital from an unsuccessful signal. This is purely a positive EV endeavor as they can only earn money with zero downside.
3. We offer a researcher-focused platform. Researchers can easily develop alphas with our interactive code editor and use our suite of research tools, such as live market data analysis and model performance.
4. Our platform gives back the majority of profits generated by the researchers, which is very rare in this industry where quant firms and other competitions keep a major portion of the generated revenue. Essentially, our platform only takes a small portion of the profit as a cost for providing a performant, reliable, and robust systematic trading infrastructure.

Customer segment

We don't have a traditional business model, as we aren't earning money from directly selling a good or service to customers. Instead, our revenue is from our trading activities, and our target audience of researchers is more similar to suppliers. They provide us with alphas and in return we will fairly compensate them based on their performance. For growth in the long term, we'll have to expand more towards retail traders interested in systematic trading. This is due to their much larger population compared to the group of finance researchers.

Investors may be considered customers/clients, who will put in trading capital with a percentage of returns going to them.

Market research

Due to our nontraditional business model, we can't quantify the size of the market monetarily, but we can estimate the market of potential users joining our platform. We expect the market to grow relatively to the growth of the finance industry and quant firms, average of 9% every year.

TAM: 2% of retail traders interested in systematic trading (1M) + researchers in the finance field in the US (1.7M researchers x 5% in finance field = 85k)
SAM: 10% experience with systematic trading development
SOM: targeting 30% acquisition

Stakeholders

The primary stakeholders are researchers with knowledge of equity price movements or a general finance background interested in testing their ideas at scale without giving up ownership of their work. In addition, we want to target motivated retail traders with potentially unique insights and perspectives as a secondary stakeholder group. They will be able to experiment with signal-based trading in an environment where they will be on a more even playing field with the current major trading firms. Finally, we have investors providing capital as the last stakeholder group. We want to provide consistent, market beating returns to satisfy this group.

Cost

Based on supporting 1k monthly users, costs will increase sublinearly with scale. Trading costs are highly variable and difficult to estimate, depending on the performance of our model.

AWS - EC2 (t4-large)	$45/month
AWS - Domain	$1/month

Database - MongoDB	$10/month
Linux Server	Currently being borrowed from Penn which should be sufficient for 1k users, $1/month/1k users when at higher scale (>10k users)
Marketing	$2/1k impression → goal 10k impression per month → $20/month

Total cost per month: approximately $75/month per 1k users, but will be lower with scale

Revenue Model

Our source of revenue is earning returns from the trading model performing well when using crowdsourced signal data from researchers. We will keep most of these earnings when using our capital to trade, as the primary risk taker and infrastructure provider. With investor capital used to trade, we will take a fee lower than a typical hedge fund, which will be 2% of NAV per year and 7.5% of returns. This will leave room for researcher payouts of another 7.5% of returns. Thus, the total fee will be 2% of NAV and 15% of returns, which is less than a typical hedge fund.

Competition

Our main competition is other trading firms, as we will be trading against them in the market. This is also currently the main option for quant researchers, who are paid relatively high salaries, and have all the trading infrastructure already set up for them. However, they do not keep any of their intellectual property, and don't have the option of sharing any percentage of gains made using their alphas. In addition, opportunities are extremely limited, and so many people may find it impossible to get a role as a quant researcher at any trading company.

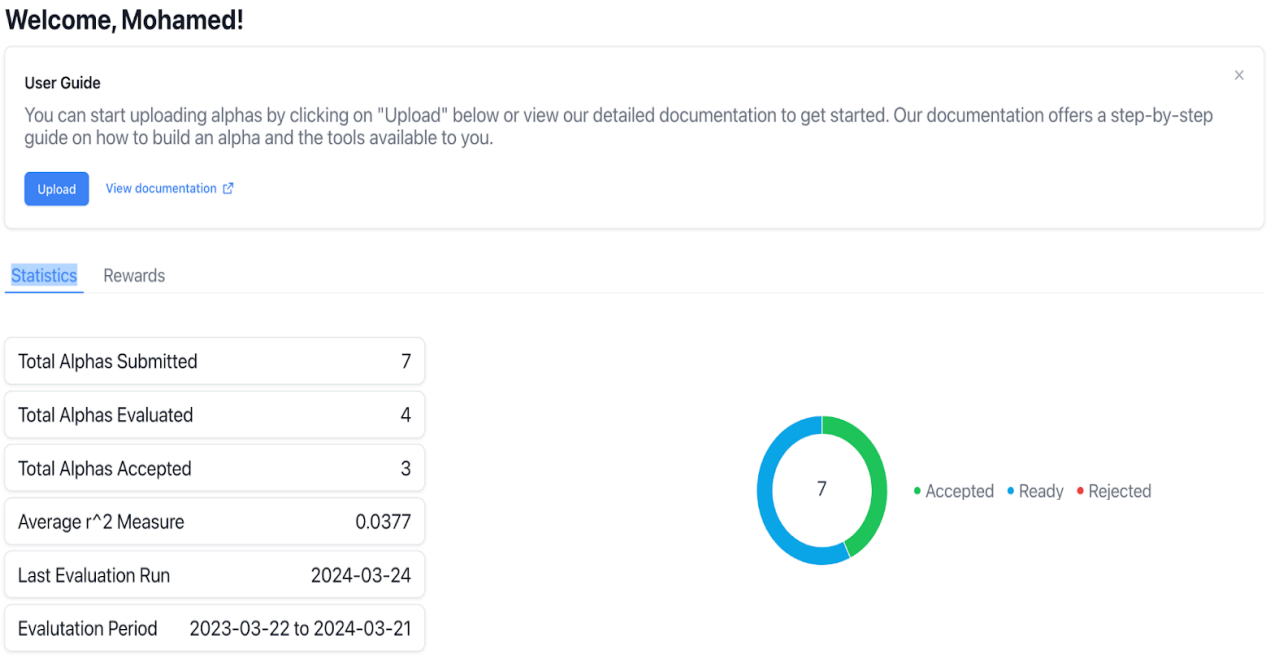
There is one company with a similar business model to ours, which is WorldQuant. WorldQuant is a quantitative trading firm that has an open platform to allow users to create alphas, and test them in competitions against other users on a regular basis. However, the purpose of this platform is to hire top performing users as research consultants, who are then paid as quant researchers. Only a small percentage of users

are ever hired as research consultants, but it is technically open for anyone to try. These research consultants do not keep their intellectual property, and are simply working part time for the company.

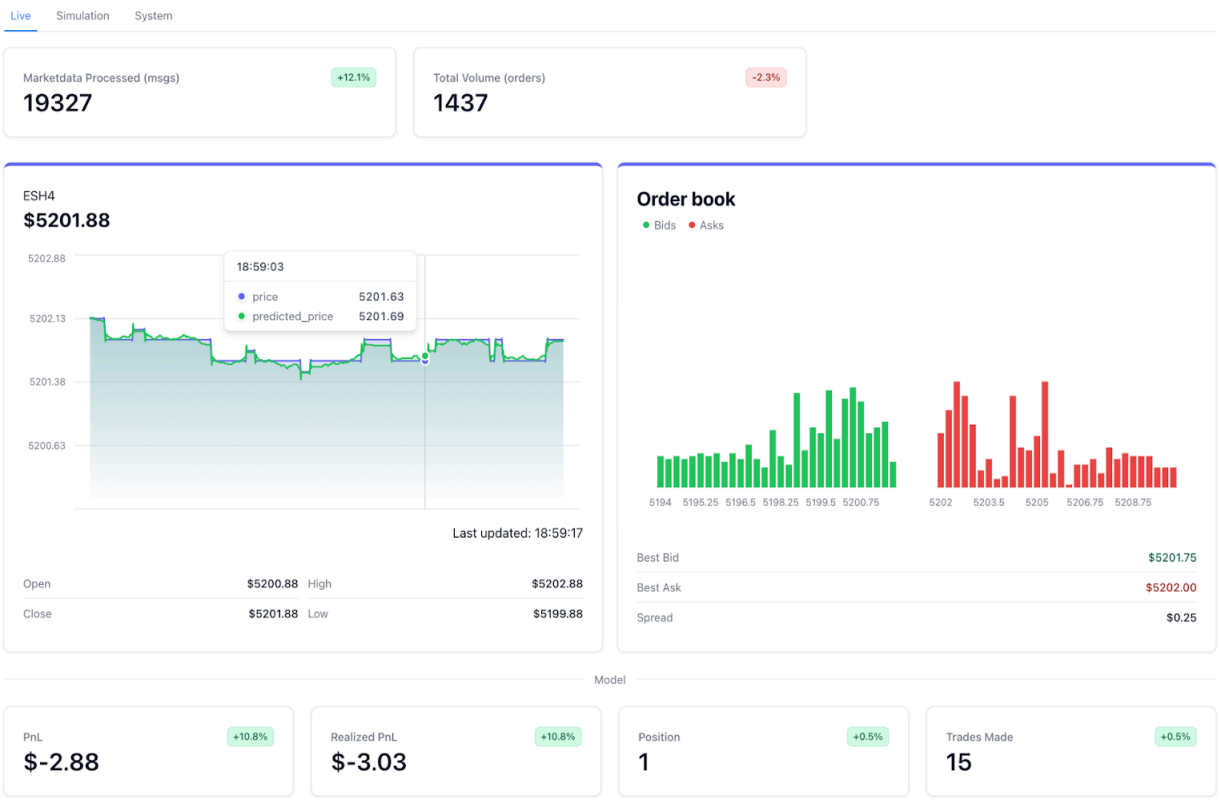
Finally, there is the option of retail trading, or trying to set up your own quantitative/algorithmic trading strategy. This may be an option for some quant researchers who are very confident in their own strategies, and willing to risk their own capital, but has a major downside as well. Many quant researchers don't want to deal with setting up the low level trading infrastructure necessary for systematic trading at a large scale, and simply want to focus on writing alphas and strategies. In addition, not all people will even have the starting capital necessary for generating sizable returns.

	Signals.ai	WorldQuant	Trading Firms	Retail Trading
IP Ownership	✅	❌	❌	✅
Flexibility	✅	✅	❌	✅
No Downside Risk	✅	✅	✅	❌
Trade Infrastructure	✅	✅	✅	❌
Upside Potential	✅	❌	❌	✅
Salary	❌	✅	✅	❌
Transparency	✅	❌	❌	✅
Accessibility	✅	🟨	❌	✅

Appendix



(Dashboard showing statistics about alphas submitted by researcher and link to documentation to get started developing alphas)



(Some research tools we offer. This shows the market analysis of securities including real time price update and order book as well as model performance)

Alphas

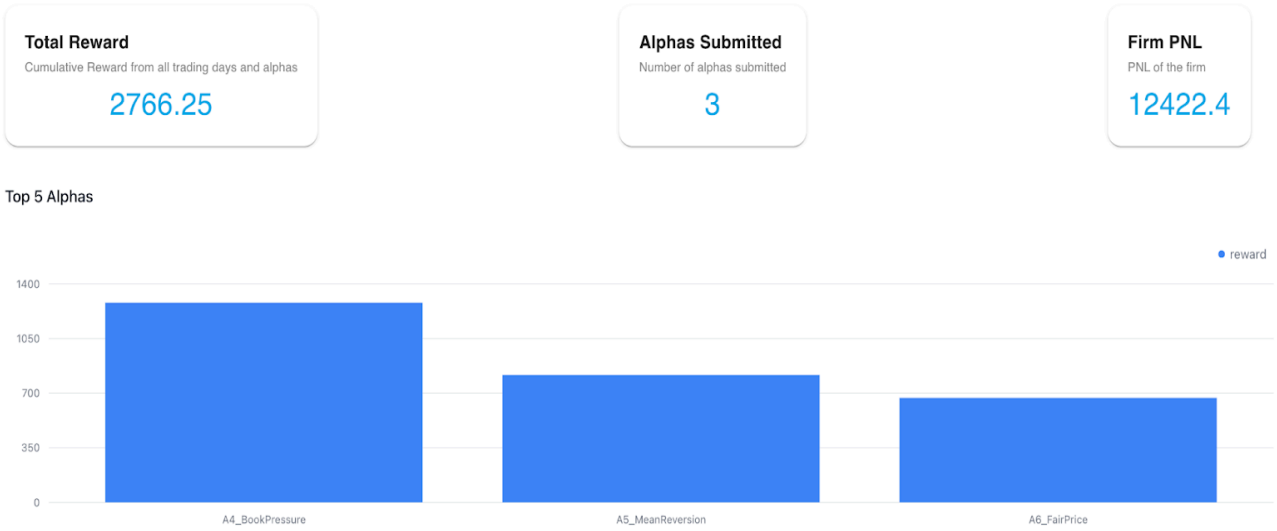
Overview of the information and status of your alphas.

Upload alpha

Name	Date	Status	r^2
A4_BookPressure	2024-02-10	Accepted	0.02281
A5_MeanReversion	2024-02-10	Accepted	0.00324
A6_FairPrice	2024-02-17	Accepted	0.01491
A7_OrderFlowImbalance	2024-03-26	Ready	N/A

(Statistics of alphas submitted by researcher, including the status of their submitted alphas and the r^2)

Signals.ai



(Rewards page that showcase the total reward given to researcher, reward generated by each alpha, and the overall firms performance)