Empowering Retail Investors
with AI-Driven Trading Strategies

Steffen Anderson (Solo Project) | MSDS 498 | 8/22/2023

AGENDA

INCITE

WHY INCITE?

Imagine a world where the intricate trading strategies of Wall Street are not confined to the trading floors but are accessible right at your fingertips. This is not a vision of the future; this is Incite. We are on a mission to democratize financial trading and give retail investors the kind of tools that have historically been available only to institutional giants.

Our solution isn't merely automated; it's smart. It is designed to adapt and improve, continuously ingesting new market data for real-time optimization, which becomes crucial in the turbulent tides of the financial markets.

ABOUT US

In the ever-changing world of financial markets, sophisticated trading strategies have generally been the privilege of institutional investors. Enter 'Incite,' a pioneering start-up on a mission to level the playing field. Utilizing state-of-the-art machine learning and artificial intelligence algorithms, 'Incite' grants retail investors access to automated, data-centric investment strategies that were once the exclusive domain of Wall Street powerhouses.

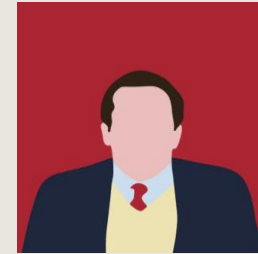# MEET OUR TEAM

MICHEAL SCOTT
President
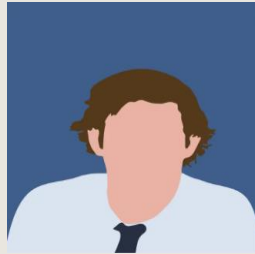
JIM HALPERT
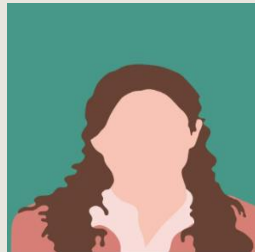Chief Executive Officer

DWIGHT SCHRUTE
Project Manager

ANDY BERNARD
Data Scientist

PHYLLIS VANCE
Software Developer

PAM BEESLY
UX/UI Designer

CREED BRATTON
Quality Assurance
Specialist
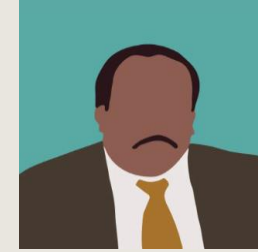
STANLEY HUDSON
Marketing Specialist

CHANGING THE GAME: OUR OBJECTIVES

Our objectives are as multi-layered as they are clear. First, we aim to level the financial playing field by offering high-end, automated trading strategies to retail investors. Second, we are committed to enhancing investment decision-making through the power of machine learning and analytics. Last but not least, we strive to improve the financial well-being of everyday investors by optimizing returns.

THE BUSINESS CASE

A Market in Flux, A Gap Exposed

We're amidst a financial transformation where advanced algorithms and machine learning dominate. Yet, the retail investment sector remains conspicuously disconnected from this revolution.

The Drawback of Tradition: Human Errors and Limitations

Manual trading, still prevalent in the retail space, introduces variables we can't afford—emotional biases, timing inaccuracies, and limited data processing capabilities, to name a few.

The Missing Link in Modern Retail Investing

Incite steps in as the vital bridge to this divide. We deliver an algorithmically-driven, validated, and consistently updated trading model designed for retail investors. No more guesswork—only calculated decisions backed by data and sophisticated algorithms.

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THE MISSION THAT FUELS INCITE

A Transformative Mission, Not Just a Statement

At Incite, our mission is not just a sentence on our website—it's the very fuel that powers our algorithmic engines. We're set on a transformative journey to democratize access to Wall Street-level trading algorithms.

Breaking Down Financial Strongholds

Who said the complex algorithms and financial models have to be the secret sauce of Wall Street moguls only? We're here to break those strongholds and bring that sophistication to your investment portfolio.

Machine Learning & AI for All

Think machine learning and AI are just buzzwords? Not here. We incorporate them into our algorithms to give retail investors the same, if not better, decision-making tools that have been exclusive to big financial players.

Leveling the Field, One Trade at a Time

The market is a game played on a lopsided field, favoring those with the best tools. We're not just participating; we're changing the game. By equipping retail investors with Wall Street-caliber tools, we're revolutionizing and re-balancing the landscape of retail investing.

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PRODUCT OVERVIEW

Custom Trading Environment

An environment that simulates real-world market dynamics, allowing our algorithms to train in a risk-free yet authentic setting

Advanced Algorithms

We use state-of-the-art Proximal Policy Optimization (PPO) models that don't just make one-off decisions. They adapt, learn, and improve with every trade.

Real-Time Evaluation

Round-the-clock market analysis and monitoring mean the model reacts in real-time to changes in market conditions.

Continual Learning

Our algorithms learn from each trade, each trend, and each outcome to continuously refine its decision-making process.

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TRENDS IDENTIFICATION

In this rapidly changing financial landscape, it is essential to identify and understand current trends that can impact our algorithmic trading project. We've highlighted three key trends—increased market volatility, the rise of AI and machine learning in finance, and the surge in retail investor activity—that shape today's financial markets. These trends offer both challenges and opportunities that our model can address, laying a strong foundation for the 'Incite' platform.

Market Volatility

Recent years have seen increased market volatility, presenting both challenges and opportunities for algorithmic trading.

AI and Machine Learning in Finance

The finance sector, particularly investing, has seen a significant uptick in the use of AI and machine learning for predictive analysis and automation.

Retail Investor Activity

There has been a surge in retail investor activity, particularly in electronic and app-based trading platforms.

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INSIGHTS DISCOVERY

Delving deep into the market, we've gathered valuable insights to guide our strategy for the 'Incite' platform. Our discoveries underline the importance of data-driven trading, the potential of machine learning, and the growing demand for sophisticated trading tools among retail investors. These insights not only validate our approach but also underscore the immense potential of our mission to revolutionize retail investing.

Data-Driven Trading

Our exploration supports the idea that algorithmic, data-driven trading strategies can help retail investors make informed decisions and potentially yield better returns.

Machine Learning Potential

Machine learning can harness market volatility to create trading strategies that adapt to market changes.

Retail Engagement

With an increase in retail investor activity, there's an unmet demand for sophisticated, yet user-friendly trading tools.

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THE PILLAR OF PRECISION:
OUR DATA MANAGEMENT ECOSYSTEM

Lifeblood of Incite: Data's Critical Role

Data isn't just an input; it's the circulatory system that keeps the heart of Incite—our machine-learning models—beating and evolving.

Data Sourcing: Quality Over Quantity

We don't just collect data; we curate it. Aggregating from multiple, vetted API sources ensures that we're always feeding our algorithms with information of the highest caliber.

DATA POWERHOUSE: LEVERAGING ALPACA API

Alpaca Market Data API

The cornerstone of our data-driven trading strategies, the Alpaca Market Data API provides us with both historical and real-time stock prices. This vital information forms the bedrock of our informed decision-making process.

Our trading strategies come to life through the Alpaca Trading API. This sophisticated interface empowers us to execute trades seamlessly, responding to real-time market conditions and signals generated by our advanced algorithms.

Data Transformation

Unwavering analysis requires a foundation of consistent and accurate data. Our approach involves aggregating and transforming data from diverse APIs, guaranteeing that our datasets remain uniform. This meticulous process is instrumental in producing reliable analyses and robust model performance.

The Partnership

By harnessing the capabilities of the Alpaca APIs, we establish a bedrock of dependable data preparation, elevating the quality of our trading models and contributing to consistent successful outcomes.

THE ART & SCIENCE OF DECISION-MAKING: FEATURE ENGINEERING IN INCITE

Why it Matters

Feature Engineering isn't just a data science buzzword; it's the linchpin that transforms a good model into a great one. It involves meticulously selecting the variables that are most influential in predicting outcomes, making our algorithms both smarter and more efficient.

Redundancy & Irrelevance

Raw data is messy and noisy. It comes bundled with excess baggage—irrelevant or redundant variables—that can obscure meaningful patterns. Feature engineering cleans this up, letting the algorithm focus only on what truly matters.

Why Feature Engineering is Critical: Four Pillars

1. **Enhanced Interpretability:** A cleaner, simpler model isn't just easier to run—it's easier to understand and defend, especially in compliance-heavy financial sectors.

2. **Optimized Performance:** Cutting out the 'fluff' enhances the predictive prowess of our algorithms, making them even more reliable in executing trades.

3. **Mitigated Overfitting:** Excess variables can lead to models that are too tailored to training data, and thus poor at generalizing. Feature Engineering prevents this by focusing only on essential features.

4. **Accelerated Training:** Time is money, especially in trading. Removing irrelevant data quickens the training phase, enabling faster deployment and adaptation in live markets.

DECIPHERING THE MARKET: THE MULTIFACETED ROLE OF TECHNICAL INDICATORS IN OUR ALGORITHM

Technical indicators are not just lines on a chart; they are the secret code to understanding market behaviors. From overlap studies that identify support and resistance levels, to momentum indicators that gauge the strength of price movements, these are the invaluable tools that turn data into actionable insights. They allow our algorithms to make informed, real-time decisions that can be the difference between profit and loss.

A Symphony of Overlap Studies

Our algorithms don't just look at price; they see it through the lens of moving averages, Bollinger Bands, and other overlap studies. These indicators allow our model to make sense of market 'noise,' providing a clearer picture of stock trends.

Momentum Indicators - The Wind Behind Our Sails

Momentum Indicators like RSI and MACD give our model the 'when' factor—when to buy and when to sell. It's akin to catching the wave at the perfect time, and our model has mastered this art.

Volume Speaks Volumes

We're listening closely to the market's 'heartbeat' by monitoring trading volume. Our Volume Indicators play a key role in confirming trend strength and predicting reversals, enhancing the reliability of our trades.

DECIPHERING THE MARKET: THE MULTIFACETED ROLE OF TECHNICAL INDICATORS IN OUR ALGORITHM

Navigating Market Moods with Volatility Indicators

Our algorithm uses volatility indicators to gauge the market's emotional state. Whether it's a calm sea or a stormy ocean, we adapt our trading strategy to harness these market moods.

Transforming Prices into Opportunities

The Price Transform group of indicators, such as the Fisher Transform, offers a unique lens to visualize price action. This assists in identifying the precise moments to enter or exit trades.

Understanding Market Cycles with Cycle Indicators

Markets have rhythms, and our model dances to them quite well. Cycle Indicators help us to anticipate long-term upswings and downswings, allowing us to be one step ahead of the curve.

Pattern Recognition - The Market's Morse Code

Recognizing candlestick patterns and chart formations is akin to understanding a secret language. Our Pattern Recognition capabilities decode these signals to make timely and effective trading decisions.

FEATURE ENGINEERING: SCULPTING INCITE'S ADAPTIVE INTELLIGENCE

The backbone of Incite's trading model is a Reinforcement Learning algorithm, supercharged with Proximal Policy Optimization (PPO). This synergistic union not only adaptively refines our trading strategies in real-time but also ensures precision and maximizes returns. Yet, how do we ensure that the engine driving this intelligence is fueled by the most relevant, informative data? Enter feature engineering, the unsung hero in the data science process.

Random Forest Feature Importance

Random Forest is an ensemble learning method that can be used for both classification and regression tasks. One of the useful features of the Random Forest algorithm is its ability to compute feature importance, which can be leveraged to interpret the driving factors behind predictions.

### Using RFE (Recursive Feature Elimination)

Recursive Feature Elimination (RFE) is a feature selection method that aims to identify the most significant features by recursively eliminating the least significant ones. It is a backward elimination algorithm that starts with all features and removes the least important feature(s) in each iteration until a specified number of features is reached.

Using Variance Inflation Factor (VIF)

We employed Variance Inflation Factor (VIF) as a diagnostic tool to identify the presence of multicollinearity. VIF quantifies how much a variable is inflating the standard errors due to multicollinearity. A VIF value greater than 10 is generally considered to indicate high multicollinearity, requiring corrective measures.

Polynomial Features for Top-Performing Indicators

Utilizing polynomial features can significantly enhance the predictive power of machine learning models when dealing with non-linear relationships. This is especially relevant in financial contexts, where the relationships between variables are often complex and non-linear.
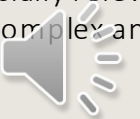
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UNDER THE HOOD: INCITE'S STATE-OF-THE-ART TRADING ENGINE

At the center of Incite's algorithmic prowess is a dynamic Reinforcement Learning model. But we don't just stop at any model; we employ Proximal Policy Optimization (PPO) for unparalleled trading precision.

Why PPO? The Gold Standard of RL Algorithms

PPO offers the benefits of both trust region and clipping-based methods, providing stable and efficient training. It allows us to update our model in a manner that neither over- nor under-estimates the optimal trading policy.

Adapt and Conquer with Reinforcement Learning

Our RL model isn't set in stone; it's perpetually learning. Every trade, every fluctuation is a data point, a lesson learned for future actions, creating a model that gets better with each trade.

Risk Management

This system employs advanced risk-management algorithms, giving you the peace of mind to invest confidently. It's about balancing the high-wire act of maximizing returns against the safety net of minimizing losses.

The Continuous Learning Curve

Our model is continuously calibrated and fine-tuned, adapting not just to market trends but also to the unique needs and risk profiles of individual portfolios.

A Future-Ready Approach

As we advance, this state-of-the-art model will be the cornerstone of our upcoming OS portfolio management platform, offering a seamless, smarter, and more profitable trading experience for our users.

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TRANSFORMATIVE METRICS: HOW OUR TOP FEATURES MODEL™ IS REVOLUTIONIZING RETAIL TRADING

The road to perfection is a continuous journey, and we're committed to optimizing every step of the way.

Stellar Portfolio Growth

Started from $10,000 and now we're here! Witness a staggering **97.06% portfolio return within just 122 trading days**. Incite isn't just playing the game; we're setting the new standard.

Active Trading Strategy

It's not just about making the right calls; it's about making them at the right time. With 77 trades executed—50 buys and 27 sells—**our model demonstrates a balanced, yet active, trading strategy for optimized returns.**

Risk Mitigation Through Diversification

More buys than sells means **we're not just riding the waves; we're creating them**. With a net positive of 23 trades, we diversify your portfolio to minimize risk while capitalizing on market opportunities.

Top Feature Model Back-testing: SPY

Portfolio Performance Metrics:

Starting Balance: $10,000.00
Ending Balance: $19,705.99
Net Profit/Loss: $9,705.99
Portfolio Return: 97.06%
Number of Trading Days: 122

DECODING RISK METRICS: UNVEILING THE REAL STRENGTH OF OUR TOP FEATURES MODEL™

Metrics don't lie, and ours tell an inspiring story.

Sharpe Focus on Quality Returns

With a Sharpe Ratio of 4.03, our Top Features Model™ stands out as a high-yield, low-risk gem. This remarkable ratio signifies that the model generates substantial returns for each unit of risk involved, making it an ideal choice for risk-averse investors.

Eye on Volatility

An extremely low annual volatility of 0.35% indicates that our model maintains a relatively stable performance. This minimal fluctuation is particularly beneficial for long-term investors looking for steady, predictable returns.

Resilience against Major Setbacks

A Maximum Drawdown of 9.00% represents the worst-case loss scenario within the model's history. While this serves as a cautionary tale, it's within a manageable range, allowing for bounce-backs and strategy adjustments.

OUR FUTURE TOGETHER

Just the Beginning

We're not just adapting to the future of retail investing; we're creating it. And trust us, we're just getting started. Our vision for Incite extends beyond today's capabilities.

## Revolutionizing Risk Management

As we harness machine learning to optimize trading decisions, our priority is to continually refine our models. Incite's AI-powered algorithms are in a constant state of evolution to manage downside risks better, ensuring safer, more profitable trading.

Asset Class Expansion

Why limit to equities when you can dominate the full spectrum? Incite is setting its sights on diversifying into multiple asset classes, from commodities to cryptocurrencies, to offer you a truly holistic investment platform.

Introducing the OS Portfolio Management Platform

To steer this revolution, we're excited to announce the development of our OS Portfolio Management Platform. Seamlessly integrated with Incite's algorithms, this new platform will offer unparalleled customization and analysis capabilities. Imagine a dashboard where you not only view your portfolio's performance but also see real-time machine learning insights. Your portfolio will practically manage itself!
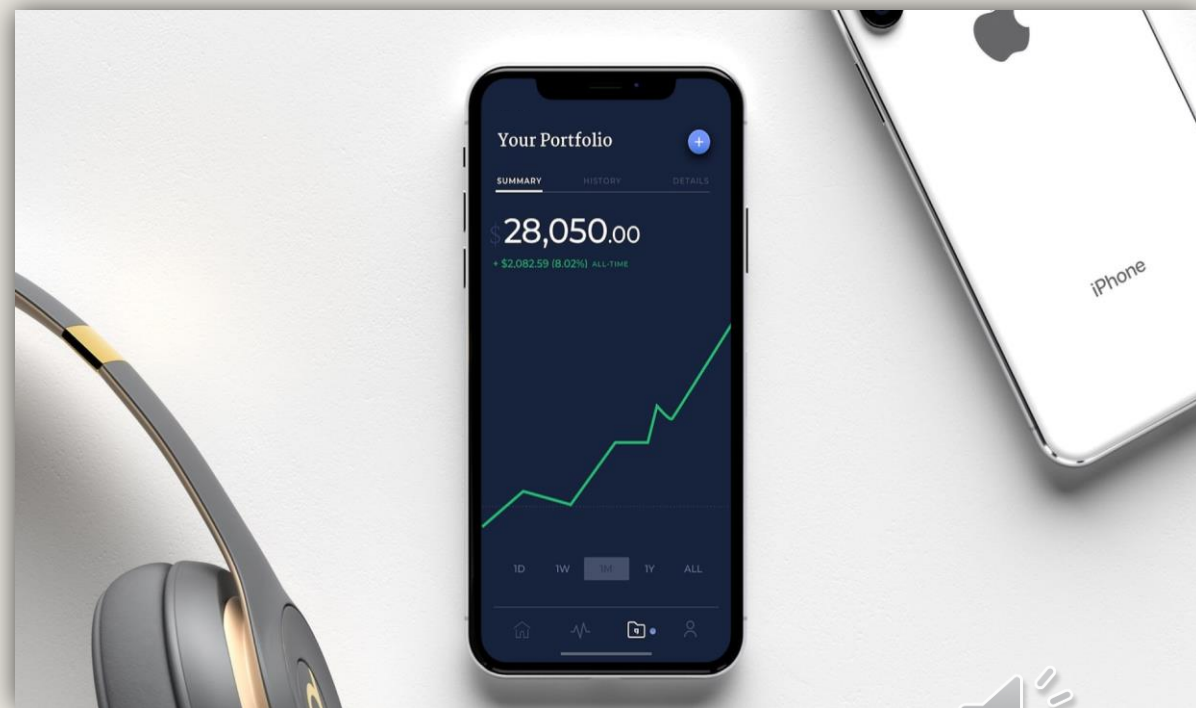
THANK YOU

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CONCLUSION

Key Takeaways

- We've delved into the core of Incite's advanced algorithms, the multiple layers of data analytics, and our rigorous approach to risk management.

- Our dynamic Reinforcement Learning model adapts to market conditions in real-time, all while optimizing for your individual risk profile.

- Stellar results speak for themselves: 97.06% portfolio return in just 122 trading days and a Sharpe Ratio of 4.03.

Looking Ahead

- Our roadmap is ambitious but achievable, featuring the development of the OS Portfolio Management Platform and expansion into multiple asset classes.

- We're not just keeping pace with the future of retail investing, we're defining it.

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APPENDIX

SOURCES

TYPE	TREND	NAME	SOURCE	DESCRIPTION
Trend 1	Market Volatility	"Historical Volatility"	Investopedia: Historical Volatility	This Investopedia article discusses historical market volatility trends.
Trend 1	Market Volatility	"Stock Market Volatility and Return Analysis: A Systematic Literature Review"	Stock Market Volatility and Return Analysis	This study, published in the National Center for Biotechnology Information, analyzes market volatility.
Trend 2	AI and Machine Learning in Finance	"Understanding How AI is Transforming Financial Trading"	Analytics Insight: Understanding How AI is Transforming Financial Trading	This article from Analytics Insight discusses the transformative role of AI and machine learning in financial trading.
Trend 3	Retail Investor Activity	"The Rise of Newly Empowered Retail Investors"	Deloitte: The Rise of Newly Empowered Retail Investors	This Deloitte report discusses the increasing power and influence of retail investors in the financial markets.
Trend 3	Retail Investor Activity	"Retail Investors in 2023: Performance, Trends and Challenges"	Medium: Retail Investors in 2023: Performance, Trends and Challenges	This Medium article by Nauris Krūmiņš delves into the performance, trends, and challenges retail investors may face in 2023.