KaxaNuk

Sharing knowledge

KN Hack Kick-Off & Intro to Investment Research

Session 1

Content

- ➔ The Evolution of Investment Research
- ➔ Our Investment Research Process
- ➔ Common Strategies & Ideas
- ➔ Event Details

The Evolution of Investment Research

Observation → Fundamentals → Risk → Markets → Behavior → Adaptation → Implementation

Markets as Signals — Dow, Bachelier & Nelson

Why they matter:

Treated markets as an information system before formal theory existed.

Key work:

- Dow (1889–1902) — Wall Street Journal Editorials
- Bachelier (1900) — Théorie de la Spéculation
- Nelson (1903) — The ABC of Stock Speculation

Core ideas:

- Prices embed collective information
- Trends reflect human behavior
- Uncertainty can be modeled probabilistically

“The market is a barometer of all conditions.”

If prices move first… what are they reacting to?

Intrinsic Value — Graham, Dodd & Damodaran

Why they matter:

Transformed investing from price-watching into a research process based on value, discipline, and explicit assumptions.

Key work:

- Graham & Dodd (1934) — Security Analysis
- Damodaran (1994) — Investment Valuation
- Damodaran (2001) — The Dark Side of Valuation

Core ideas”

- Value exists independently of price
- Valuation is a model, not a number

“Valuation is a bridge between stories and numbers.”

If value exists... how do we allocate capital across many bets?

Risk Comes First - Markowitz

Why he matters:

Formalized portfolio construction as a mathematical research problem.

Key papers:

- Markowitz (1952) — Portfolio Selection
- Markowitz (1959) — Portfolio Selection: Efficient Diversification of Investments

Core ideas:

- Diversification is measurable
- Risk lives in covariance
- Portfolios > individual assets

“Investment research starts with how you allocate capital.”

If risk can be measured… which risk deserves a reward?

Pricing the Risk — Sharpe & Lintner

Why they matter:

Separated market compensation from research skill.

Key papers:

- Sharpe (1964) — Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk
- Lintner (1965) — The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets

Core ideas:

- Beta earns a premium
- Performance attribution is born

“Not all risk is rewarded.”

If beta explains returns... what exactly are we being paid to research?

Measuring Skill — Jensen

Why they matter:

Jensen transformed “alpha” from intuition into a measurable residual.

Key papers:

- Jensen (1968) — The Performance of Mutual Funds in the Period 1945–1964

Core ideas:

- Alpha is performance after adjusting for risk
- **Most active managers fail to generate persistent alpha**
- Measurement precedes belief

“Investment research became a test, not a story.”

If alpha is rare and fragile, should it be assumed—or must it be proven?

Markets as a Discipline — Fama

Why he matters:

Forced investment research to start from skepticism, not belief.

Key papers:

- Fama (1970) — Efficient Capital Markets: A Review of Theory and Empirical Work

Core ideas:

- Prices reflect available information
- Alpha is rare
- Evidence beats intuition

“Alpha must be proven — not assumed.”

If markets are efficient… why does evidence refuse to behave?

Risk Is Multi-Dimensional — Ross

Why he matters:

Showed that returns must be driven by multiple independent sources of risk — even if we don’t know what they are.

Key paper:

- Ross (1976) — The Arbitrage Theory of Capital Asset Pricing

Core ideas:

- No-arbitrage
- Multiple risk factors
- Theory before measurement

“Risk premia exist even when factors are unknown.”

If returns come from multiple risks… what are they, and how do we measure them?

Empirical Reality — Fama, French & Carhart

Why they matter:

Showed that returns have structure, even in efficient markets.

Key papers:

- Fama & French (1992) — The Cross-Section of Expected Stock Returns
- Fama & French (1993) — Common Risk Factors in the Returns on Stocks and Bonds
- Carhart (1997) — On Persistence in Mutual Fund Performance

Core ideas:

- Value, size, momentum
- Factor investing becomes scalable
- Research becomes systematic

“Markets are mostly efficient — but not simple.”

If factors persist… why are they so hard to live with?

Human Behavior — Kahneman, Tversky & Shiller

Why they matter:

Explained why inefficiencies survive. Challenge to Rationality.

Key paper:

- Kahneman & Tversky (1979) — Prospect Theory: An Analysis of Decision under Risk
- Shiller (1981) — Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?

Core ideas:

- Loss aversion
- Cognitive bias
- Asymmetric risk preferences

“Risk is felt, not calculated.”

If mistakes are obvious... why do they survive?

Limits to Arbitrage — Shleifer & Vishny

Why they matter:

Explain why being right isn’t enough. Arbitrage is Risky and Costly.

Key papers:

- Shleifer & Vishny (1997) — The Limits of Arbitrage

Core ideas:

- Capital constraints
- Career risk
- Persistence of Anomalies

“Markets are stories with prices attached.”

So markets are rational… and emotional. What framework survives both?

Markets Adapt — Lo

Why he's the pivot:

Reframes markets as evolving systems, not static models. Reconciles the Efficient Market Hypothesis with Behavioral Economics.

Key papers:

- Lo (2004) — The Adaptive Markets Hypothesis: Market Efficiency from an Evolutionary Perspective

Core ideas:

- Strategies have life cycles
- Alpha is temporary
- Regimes matter

"Efficiency is not a state — it's a process."

If alpha decays… what does durable research look like?

Research Discipline in Practice — Asness

Why he matters:

Proved research survives markets through discipline.

Key papers:

- Asness (1997) — The Interaction of Value and Momentum Strategies
- Asness, Moskowitz & Pedersen (2013) — Value and Momentum Everywhere

Core ideas:

- Factors persist but cycle
- Robustness beats intuition
- Behavioral foundations matter

“The best strategies don’t look smart — they look resilient.”

If everything has exposure… what is actually yours?

From Ideas to Portfolios — Paleologo

Why he matters:

Paleologo shows how investment research becomes real portfolios — by isolating residual alpha and enforcing risk discipline.

Key work:

- Paleologo (2021) — Advanced Portfolio Management: A Quant's Guide for Fundamental Investors
- Paleologo (2025) — The Elements of Quantitative Investing

Core ideas:

- Alpha must be residualized from known risk factors
- Portfolio construction is as important as idea generation

“Alpha is what remains after risk is removed.”

If clean signals are rare… who finds them faster: humans or machines?

Machine Learning — Halperin, Dixon, Bilokon

Why they matter:

They place machine learning inside the intellectual tradition of finance, not outside it — showing ML as a continuation of econometrics, time-series analysis, and stochastic control, rather than a black box replacement.

Key paper:

- Dixon, Halperin & Bilokon (2020) — Machine Learning in Finance: From Theory to Practice

Core ideas:

- Learning replaces assumptions about the data-generating process
- Finance becomes a design problem, not just a modeling problem

“Investment research becomes a system that learns.”

If learning systems can model perception and decision together, how should we design investment research going forward?

Quant 4.0 — Guo, Wang, Ni & Shum

Why they matter:

Research is no longer about finding isolated signals — it's about designing systems that continuously learn, adapt, and integrate human structure with machine scale.

Key paper:

- Guo, Wang, Ni & Shum (2022) — Quant 4.0: Engineering Quantitative Investment with Automated, Explainable and Knowledge-driven Artificial Intelligence

Core ideas:

- Alpha lives in representations, not raw signals
- Machines explore scale; humans impose structure
- Research is a system, not a model

"Modern investing is engineered, not discovered."

Investment research did not evolve by replacement. It evolved by addition.

Every investment research process is **discretionary** at design and **systematic** at scale.

Quant thinking is what connects the two.

Our Investment Research Process

Strategy System Blueprint

The Synthesis of Evolution

How we think:

- ➔ **Financial Analysis** = The legacy of Graham & Damodaran.
- ➔ **Mathematical Models** = The logic of Markowitz & Sharpe.
- ➔ **Computational Algorithms** = The engineering of Halperin & Guo.

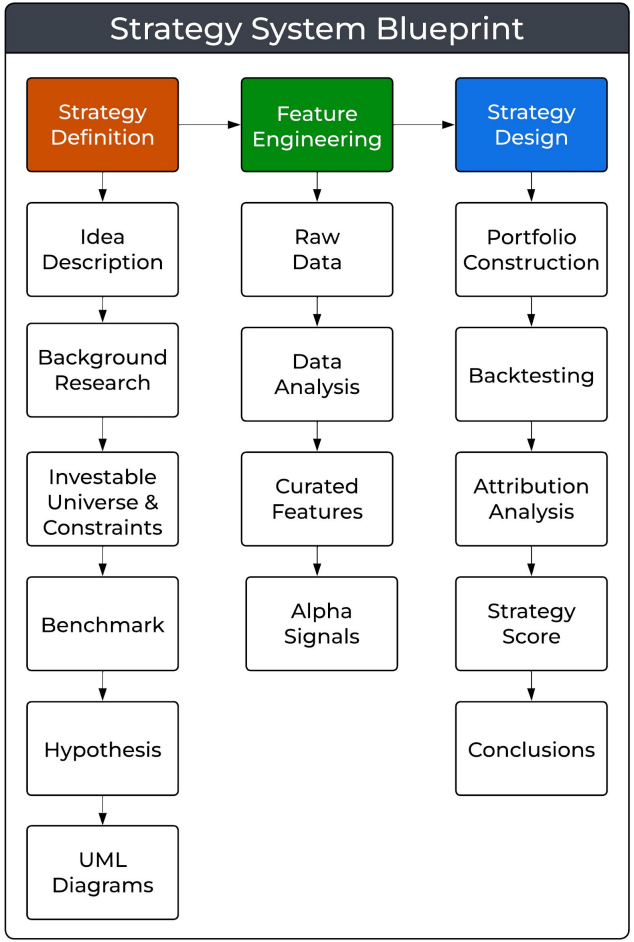
Strategy System Blueprint

The Process Flow:

Strategy Definition: Moving beyond "intuition" to a formal hypothesis.

Signal Assembly: Transforming raw data into predictive signals.

Model Design: Implementing portfolio construction selection, timing, and sizing..



Strategy Definition

Moving beyond "intuition" to a formal hypothesis.

Key Components

- **Investable Universe**: Where specifically are we looking for Alpha? (Equities, ETFs, or Crypto).
- **The Benchmark**: How do we prove we are better than a benchmark portfolio?
- **The Hypothesis**: We don't just trade; we test against specific market failures:
  - **Market Inefficiency**: Information lag.
  - **Risk Premium**: Rewards for liquidity or volatility.
  - **Behavioral**: Exploiting overreaction patterns.
  - **Valuation**: Finding value mismatch.

Signal Assembly

Transforming raw data into predictive signals.

Tools of the Trade

- **Data Curator**: Building structured databases from market and fundamental APIs.
- **Exploratory Data Analysis**: Identifying price trends and return distributions before modeling.
- **Feature Engineering**: Creating robust signals (Momentum, Volatility, Value) that survive out-of-sample testing.
- **The Rule**: "To **avoid overfitting**, we keep features constant until the conclusion of the research." Use your hypothesis idea to avoid data mining.

Model Design

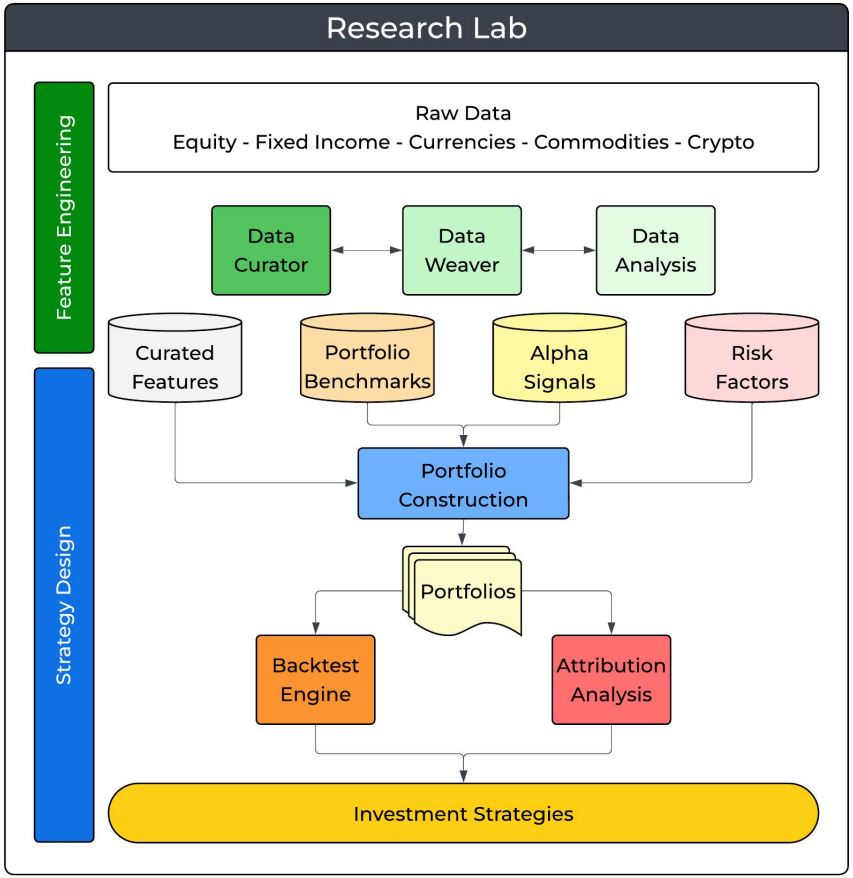
Implementing portfolio construction selection, timing and sizing.

Rigorous Implementation:

- **Constraints**: Respecting target holdings (e.g., 35) and weight limits (e.g., 20%).
- **Backtest Engine**: **Fully auditable Python-based process** accounting for slippage, fees, and commissions.
- **Attribution Analysis**: Decomposing returns to **prove the value added comes from Skill**, not just factor exposure.
- **The Final Output**: The **Strategy Score** — A quantitative verdict on implementability.

Research Lab

Uncover actionable ideas across asset classes, regions, and sectors.



Investment Strategy

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Sharing knowledge

Backtest Dashboard

portfolio_weights_binary_filter

Analysis Period: 2010-03-10 to 2014-12-31

TOTAL RETURN	ANNUALIZED RETURN	SHARPE RATIO	SORTINO RATIO	ALPHA	MAX DRAWDOWN	TOTAL COMMISSIONS
84.66%	13.11%	0.943	1.307	4.225%	-19.36%	$8,609

Portfolio Performance

Portfolio Composition

Common Strategies Ideas

Brainstorming

Common Strategies and Investment Instruments

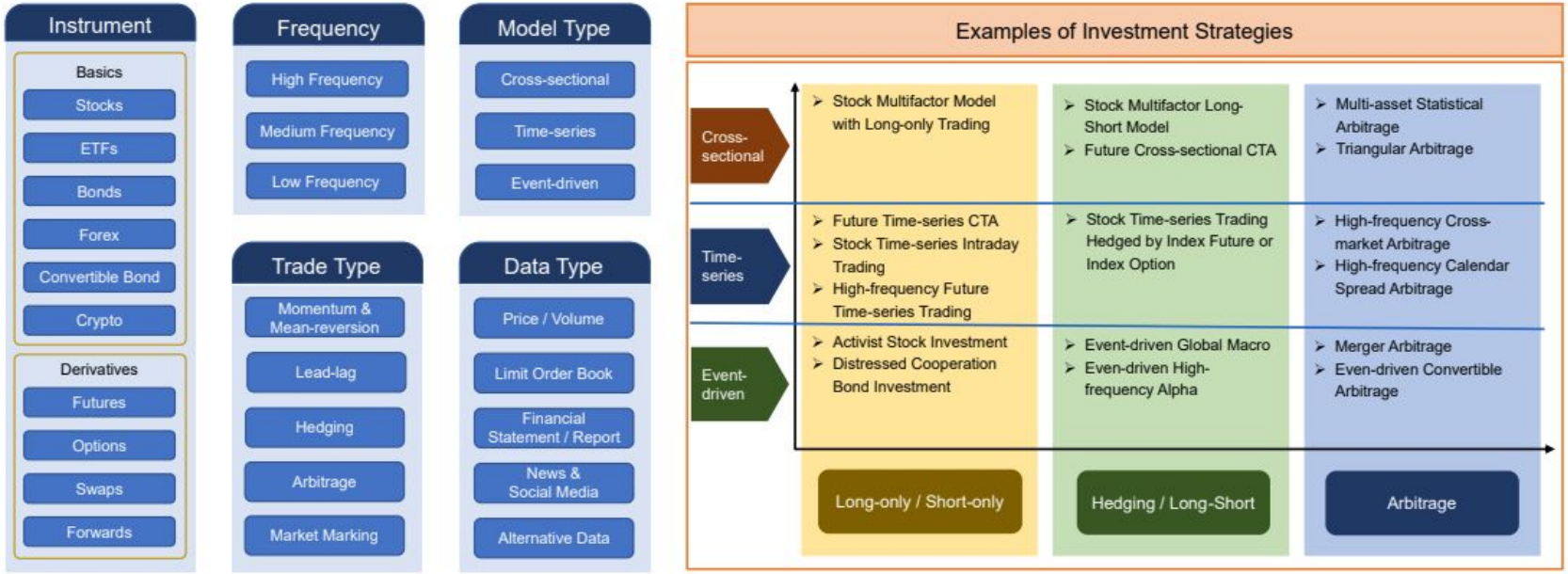


Figure 3: Classification of common strategies and investment instruments.

https://arxiv.org/abs/2301.04020

Popular Machine Learning Algorithms

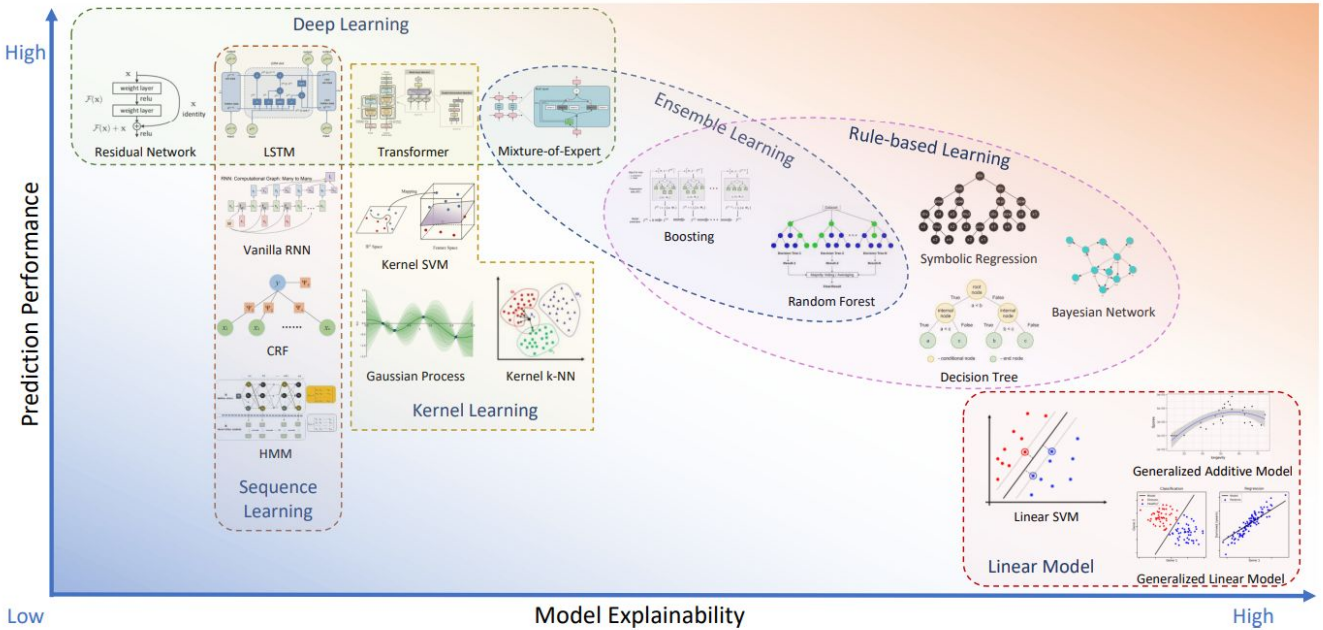


Figure 20: Comparison of popular machine learning algorithms according to prediction performance and model explainability. Part of this figure is cited from [130, 131, 132].

https://arxiv.org/abs/2301.04020

The Quality Value

- **Research Lineage**: Benjamin Graham + Aswath Damodaran.
- **The Concept**: Systematic screening for "Wonderful Companies at Fair Prices."
- **The Signal**:
  - **Value**: Low P/E or EV/EBITDA (The "Cheap" factor).
  - **Quality**: High Return on Equity (ROE) and Low Debt/Equity (The "Safety" factor).
- **The Hypothesis**: Markets overreact to bad news for good companies (Behavioral).
- **Data Needed**: Quarterly Fundamentals + Daily Closing Prices.
- **Frequency**: Monthly rebalancing.

Multi-Asset Trend Following

- **Research Lineage**: Charles Dow + Cliff Asness.
- **The Concept**: "The Trend is your friend." If an asset has been rising for 6–12 months, it is likely to continue.
- **The Signal**:
  - **Time-Series Momentum**: Comparing an asset to its own past (e.g., is Price > 200-day Moving Average?).
  - **Cross-Sectional Momentum**: Comparing assets to each other (e.g., buy the top 10% of ETFs by performance).
- **The Hypothesis**: Delayed reaction to information and "herding" behavior (Lo's Adaptive Markets).
- **Data Needed**: Daily/Weekly Closing prices for Stocks, Bonds, Commodities (ETFs).
- **Frequency**: Weekly or Monthly rebalancing.

Event-Driven: The Earnings Drift

- **Research Lineage**: Eugene Fama (Testing Efficiency).
- **The Concept**: Exploiting the Post-Earnings Announcement Drift (PEAD).
- **The Signal**:
  - Identify "**Earnings Surprises**".
  - Buy companies with a significant positive surprise.
- **The Hypothesis**: Market prices are efficient but not instant. It takes weeks for investors to fully process a fundamental change in a company's trajectory.
- **Data Needed**: Earnings dates, fundamentals, and Daily Prices.
- **Frequency**: Mid-frequency (Trades held for 10–60 days).

The Low Volatility Anomaly

- **Research Lineage**: Harry Markowitz + William Sharpe.
- **The Concept**: CAPM says "higher risk = higher return," but historical data often shows that Low Volatility stocks outperform high-risk stocks over long periods.
- **The Signal**:
  - Identify stocks with the **lowest 36-month realized volatility or Beta**.
  - Invert the weights (Risk Parity).
- **The Hypothesis**: Leverage constraints and lottery-preference bias (Investors overpay for "exciting" stocks and ignore "boring" ones).
- **Data Needed**: Daily Closing prices (to calculate variance/covariance).
- **Frequency**: Quarterly or Semi-annual rebalancing.

Event Details

The Challenge

Are You Ready to Test Your Skills?

We are excited to announce the **KN Hack Research Challenge**, an opportunity for aspiring quants, data scientists, and finance enthusiasts to showcase their analytical prowess and innovative thinking!

Whether you're a student, a professional, or simply passionate about quantitative finance, this challenge is for you!

Challenge Overview

Participants will be tasked with solving a real-world **investment strategy** applying rigorous scientific methods to investing, combining **financial analysis**, **mathematical models**, and **computational algorithms**.

Key Details

Training Sessions: Monthly online session starting on January 2026 until May

Registration Deadline: May 31st 2026

Event: June 11th to 13th 2026

Location: Puebla, Mexico

Eligibility: Open to teams of 2 to 4 members

Judging Criteria

Innovation: Originality and creativity in approach

Technical Rigor: Use of appropriate quantitative methods

Clarity: Quality of presentation and explanation of findings

Practicality: Applicability of the solution to real-world scenarios

Performance: Risk adjusted returns and consistency

Overfitting: Data segmentation, walk-forward analysis, cross-validation

Why Participate?

Enhance Your Skills: Gain hands-on experience in quantitative analysis and problem-solving.

Network with Professionals: Connect with industry experts and participants.

Win Prizes: Compete for exciting rewards that could kickstart your career in finance.

3 Topics

Equities: Stock Picking

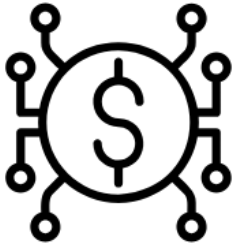
- Generate alpha through high-conviction stock selection.
- Deploy quantitative, technical, or fundamental strategies.
- Outperform the benchmark within a designated investment universe.

Multi-Asset: ETF Allocation

- Construct robust portfolios across global equities, bonds, real estate, and commodities.
- Test skills in dynamic asset allocation and risk management.
- Design strategies that optimize returns beyond traditional models.

Crypto: Digital Assets

- Navigate the volatility of the digital asset economy.
- Apply strategies to top-tier cryptocurrencies.
- Capture growth across the broader crypto ecosystem.



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