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Neuravest Research, Inc.

The Art and Science of Creating Personalized Portfolio Feeds powered by Alternative Data and AI

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Creating Personalized Portfolios powered by AI / Alternative Data

Neuravest Research Inc.
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January 2021

Three types of algorithmic investment

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We will specifically focus on how to streamline alternative data and machine learning research to deliver a wide array of investment portfolios at scale:

There are three common implementations:

- Thematic Model Portfolios (i.e. Equities (long/short/market neutral), FX, Futures, Global Macro, Fixed Income, Risk Parity, Sector Rotation, Pairs Trading

- Institutional Portfolio + Extending **your** portfolio with **uncorrelated** assets for **multi-strat performance** and **diversification**.

- Bespoke Model portfolios (Implementing **your** vision), customized hedging baskets, additive uncorrelated portfolios.

The workflow

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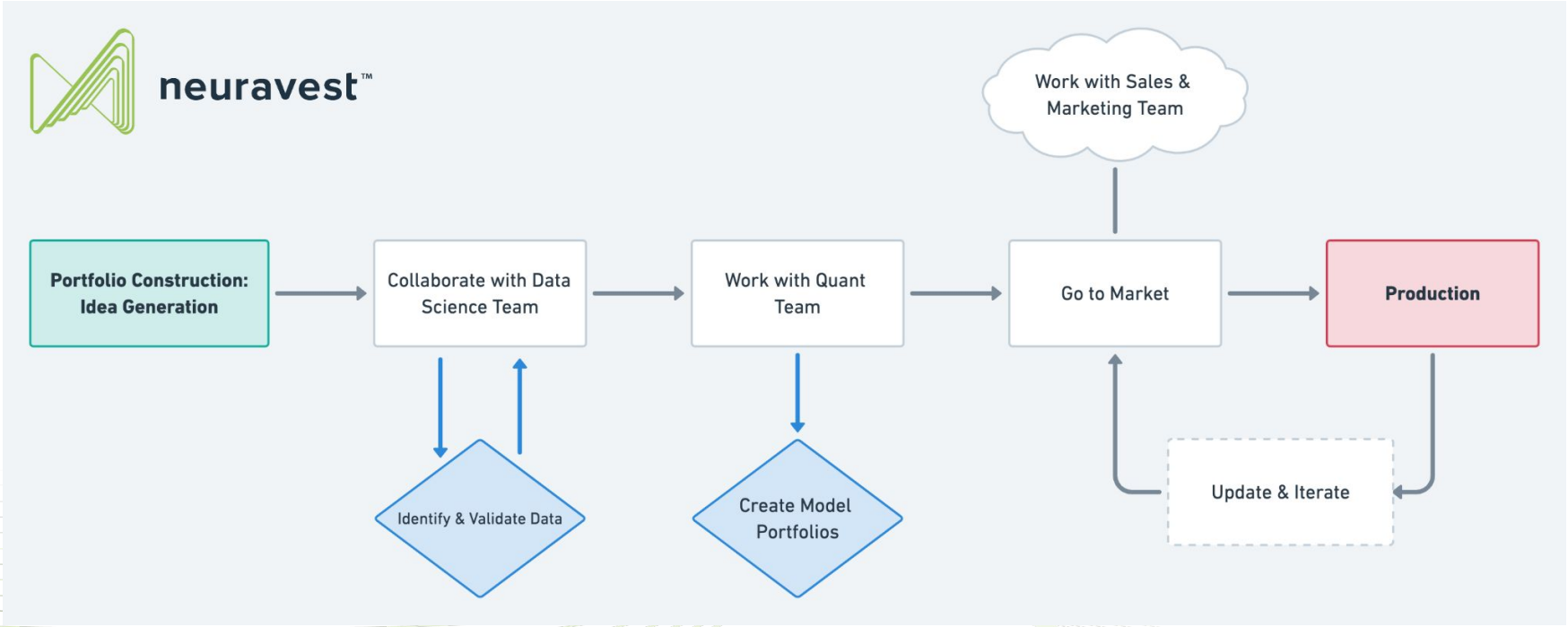

Assessing if a data set is predictive
How to fail fast?

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Curate a Wide Variety of Alt Data

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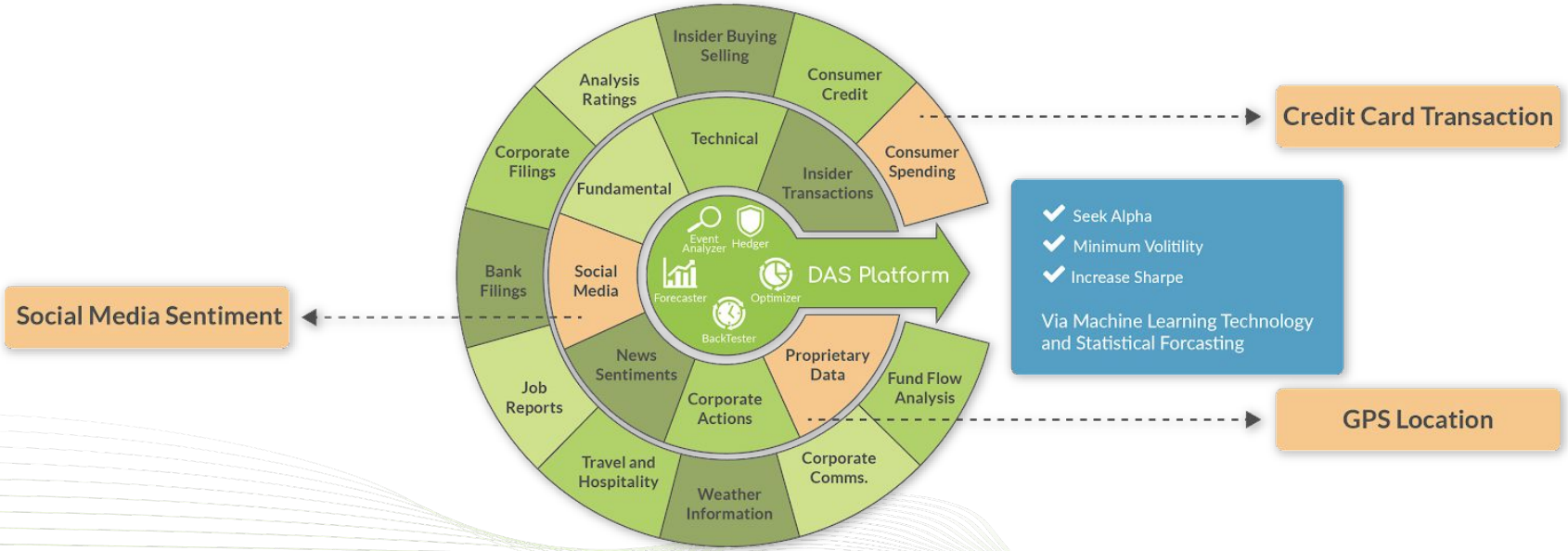
Leverage a variety of uncorrelated data types to uncover insight and create investment opportunities.



Data Validation and Deployment Lifecycle

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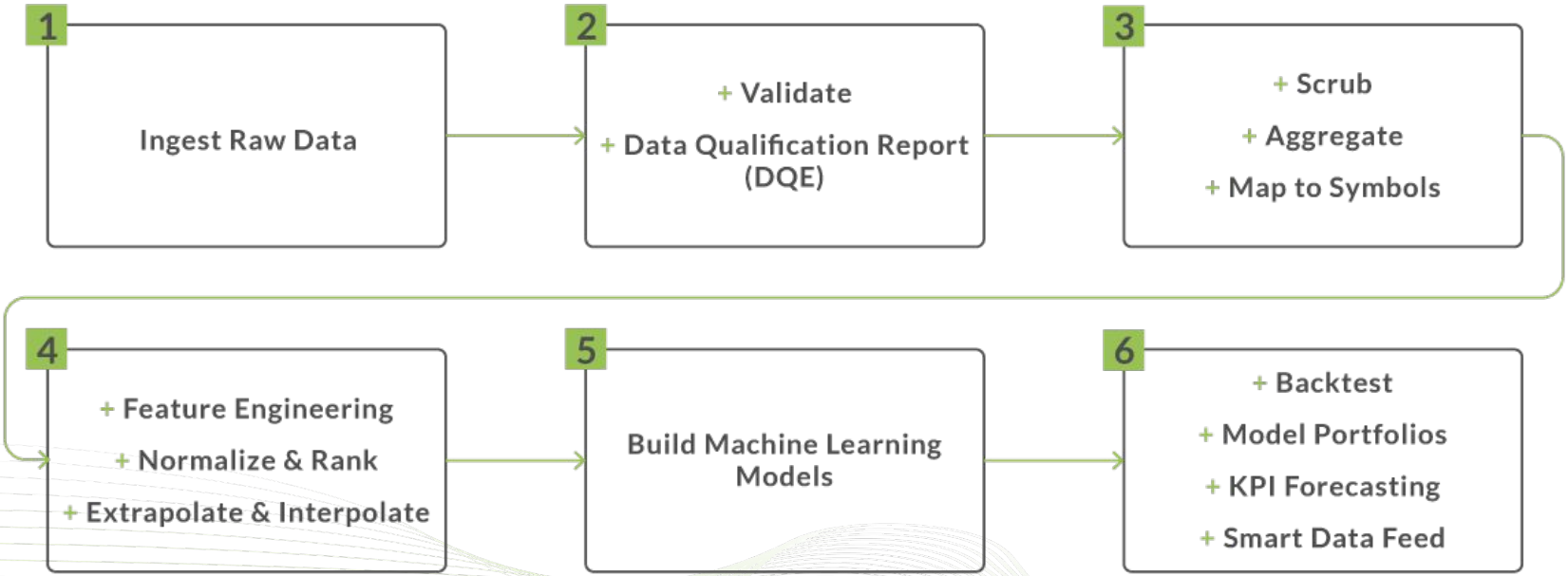

A Regimented & Automated Data Validation Process

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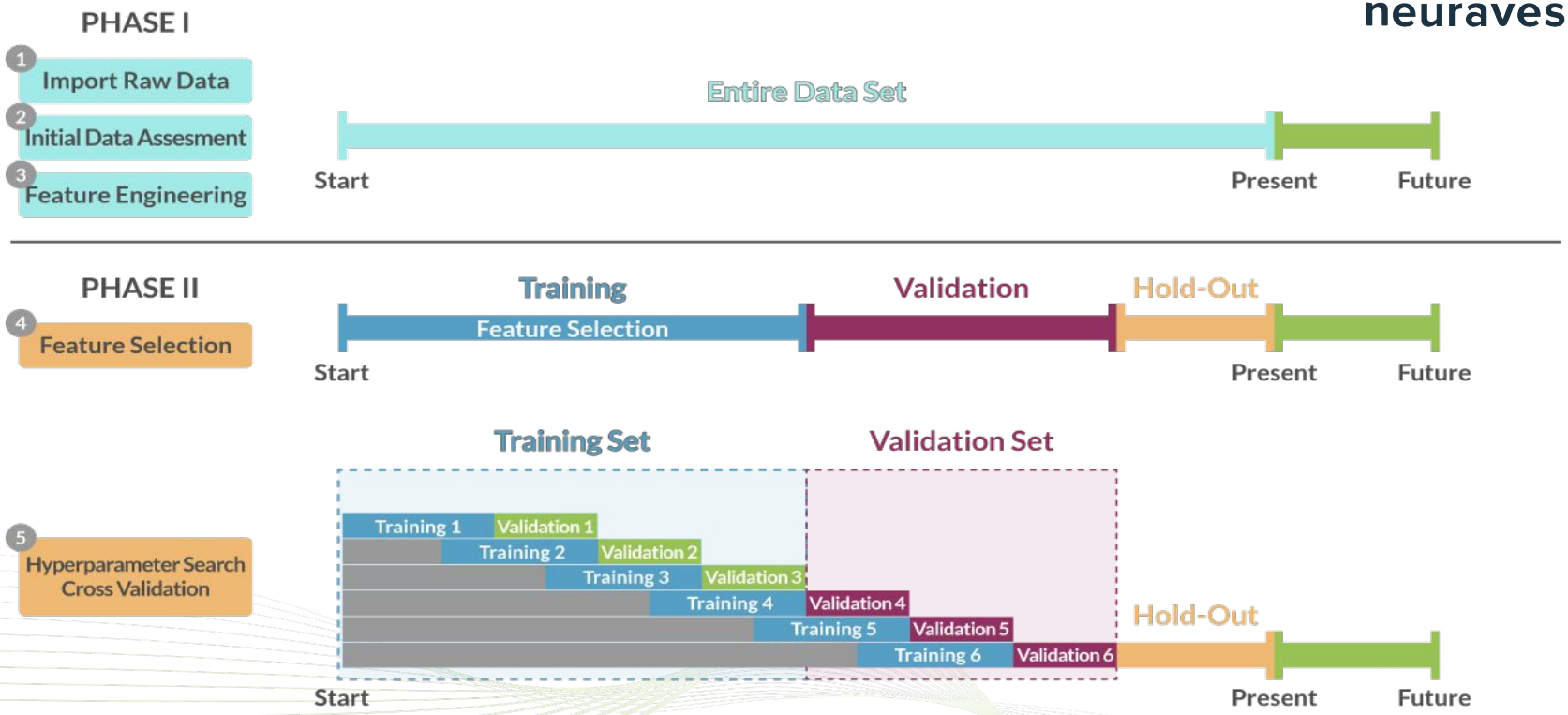
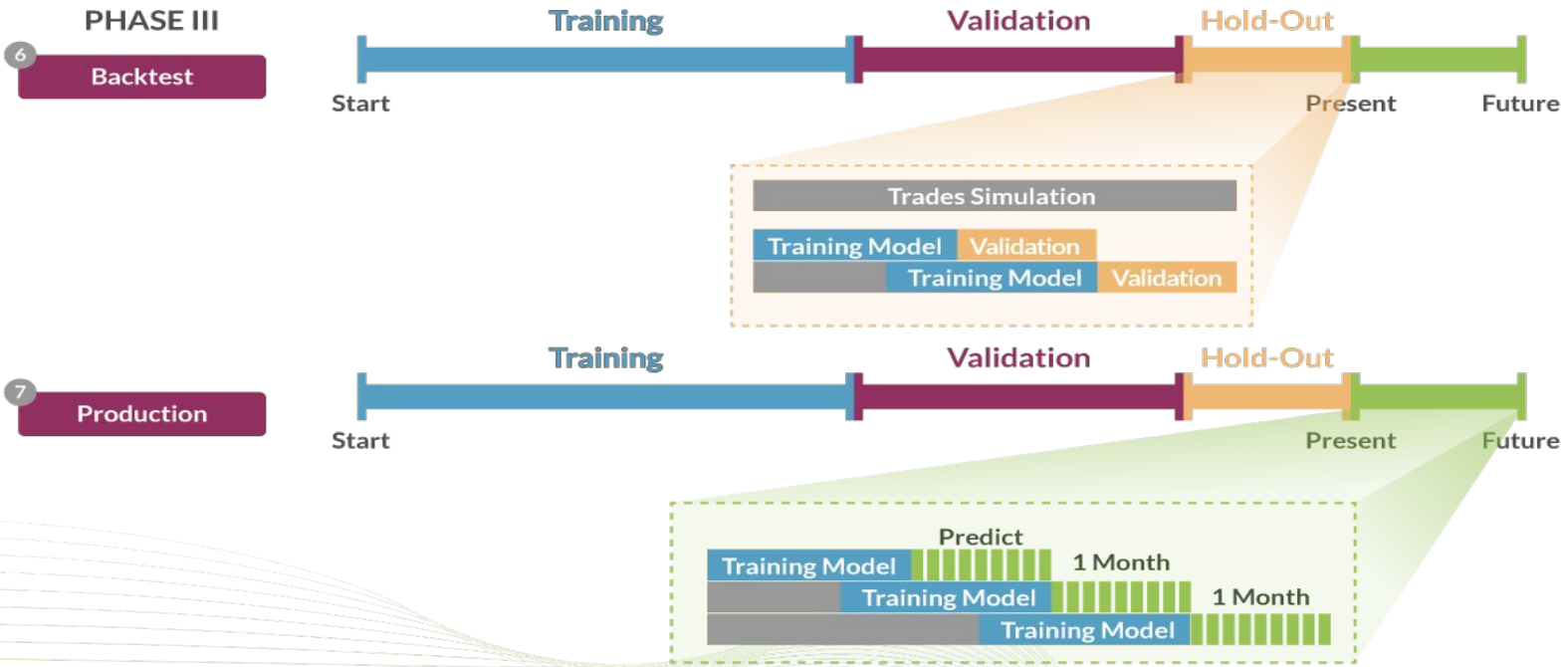


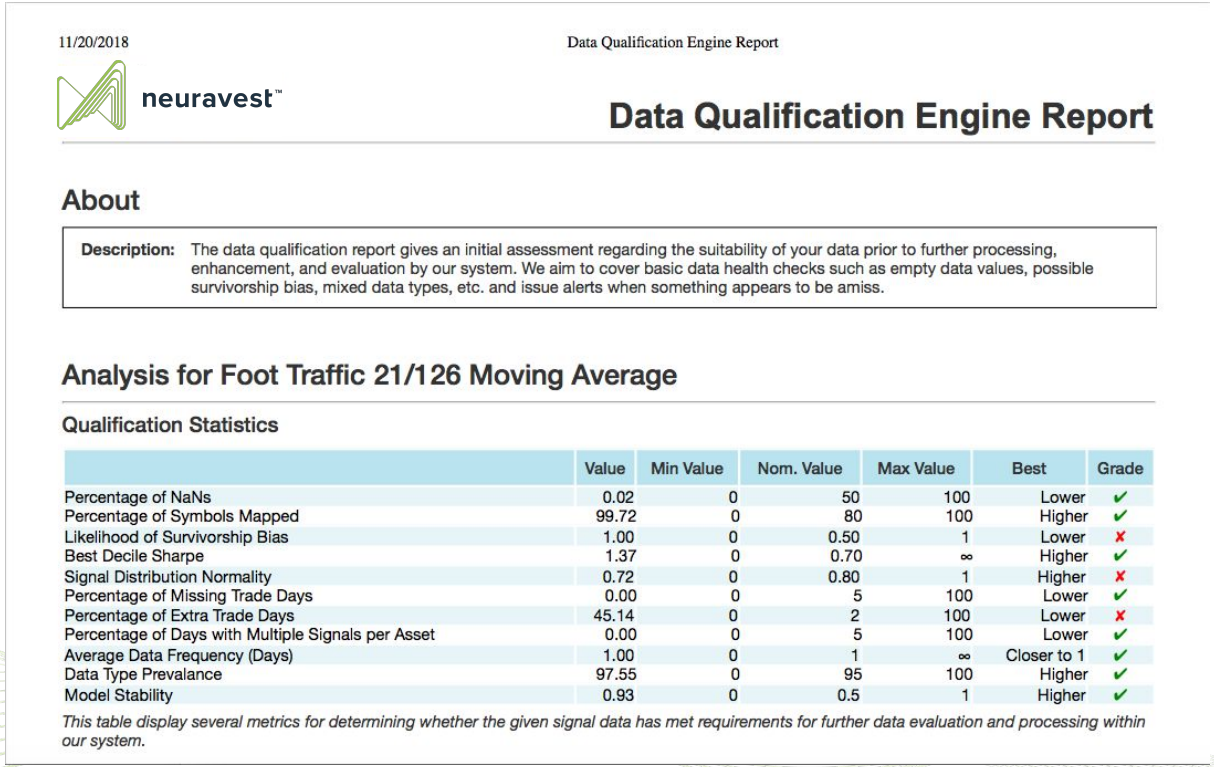
Data Validation Process (continued)



Automating Validation - DQE - Data Qualification Engine

- Unbiased, 3rd party data validation & analysis
- On-demand quantitative reports
- Historical backtest proving signal performance
- Increased distribution via Neuravest DAS (QuantDesk Research Platform)

See full DQE report **here**



11/20/2018 Data Qualification Engine Report

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Data Qualification Engine Report

About

Description: The data qualification report gives an initial assessment regarding the suitability of your data prior to further processing, enhancement, and evaluation by our system. We aim to cover basic data health checks such as empty data values, possible survivorship bias, mixed data types, etc. and issue alerts when something appears to be amiss.

Analysis for Foot Traffic 21/126 Moving Average

Qualification Statistics

	Value	Min Value	Nom. Value	Max Value	Best	Grade
Percentage of NaNs	0.02	0	50	100	Lower	✔
Percentage of Symbols Mapped	99.72	0	80	100	Higher	✔
Likelihood of Survivorship Bias	1.00	0	0.50	1	Lower	✘
Best Decile Sharpe	1.37	0	0.70	∞	Higher	✔
Signal Distribution Normality	0.72	0	0.80	1	Higher	✘
Percentage of Missing Trade Days	0.00	0	5	100	Lower	✔
Percentage of Extra Trade Days	45.14	0	2	100	Lower	✘
Percentage of Days with Multiple Signals per Asset	0.00	0	5	100	Lower	✔
Average Data Frequency (Days)	1.00	0	1	∞	Closer to 1	✔
Data Type Prevalance	97.55	0	95	100	Higher	✔
Model Stability	0.93	0	0.5	1	Higher	✔

This table display several metrics for determining whether the given signal data has met requirements for further data evaluation and processing within our system.

Finding Suitable Data - DRE - Data Review Engine

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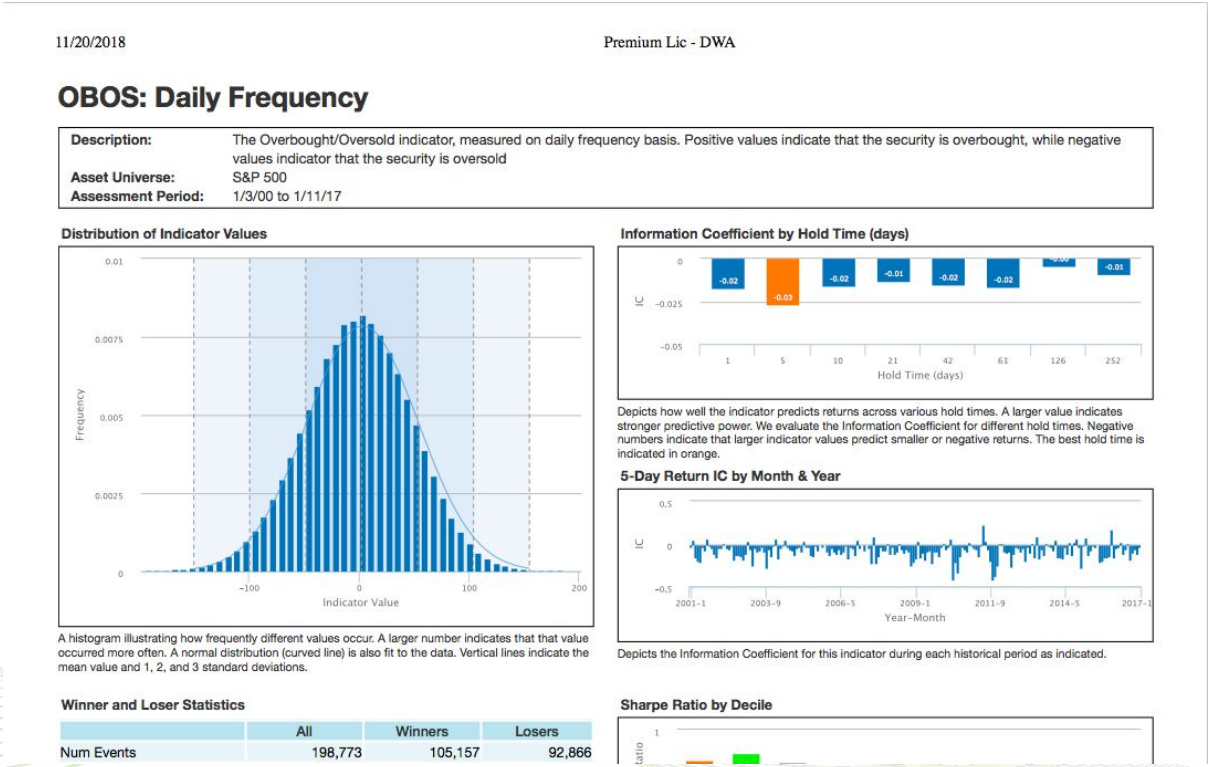
- Deep, comprehensive forensic analysis report
- Improves raw data via Machine Learning-based feature engineering
- Deep dive historical backtesting & model optimization

See full DRE report **here**



11/20/2018 Premium Lic - DWA

OBOS: Daily Frequency

Description:	The Overbought/Oversold indicator, measured on daily frequency basis. Positive values indicate that the security is overbought, while negative values indicator that the security is oversold
Asset Universe:	S&P 500
Assessment Period:	1/3/00 to 1/11/17

Distribution of Indicator Values

A histogram illustrating how frequently different values occur. A larger number indicates that that value occurred more often. A normal distribution (curved line) is also fit to the data. Vertical lines indicate the mean value and 1, 2, and 3 standard deviations.

Information Coefficient by Hold Time (days)

Depicts how well the indicator predicts returns across various hold times. A larger value indicates stronger predictive power. We evaluate the Information Coefficient for different hold times. Negative numbers indicate that larger indicator values predict smaller or negative returns. The best hold time is indicated in orange.

5-Day Return IC by Month & Year

Depicts the Information Coefficient for this indicator during each historical period as indicated.

Winner and Loser Statistics

	All	Winners	Losers
Num Events	198,773	105,157	92,866

Sharpe Ratio by Decile

Model Building

Asset Clustering

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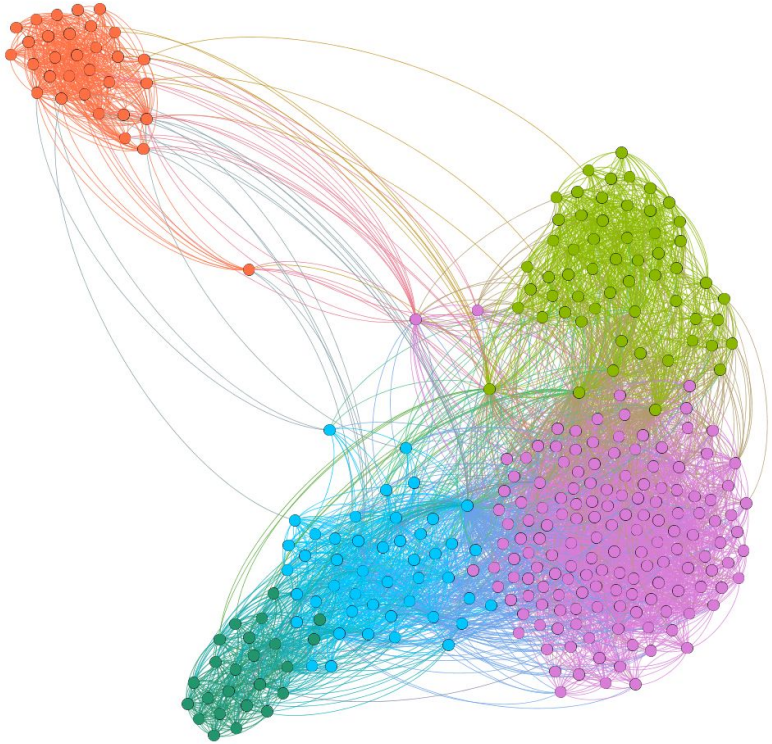
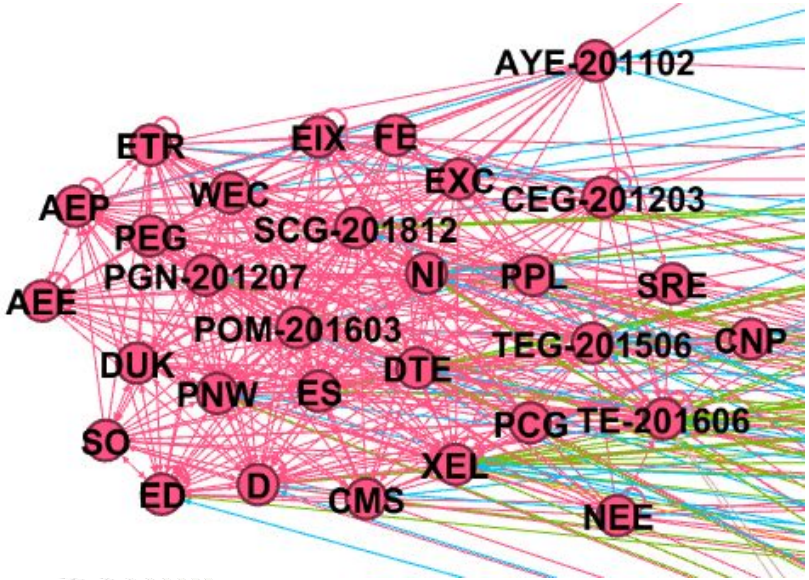


Clustering Applied to the S&P 500

Asset Clustering

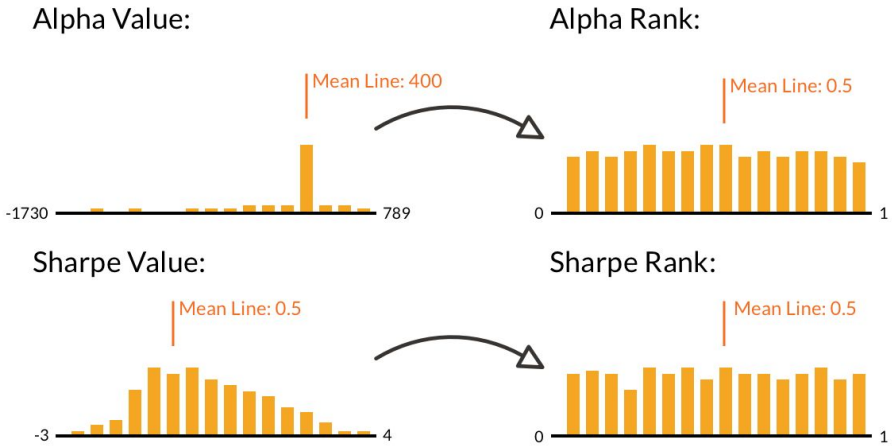
- Data driven approach
- Group stocks based on behavior across one or more metrics
- Sidestep inefficiencies of human determined labels such as GICS codes
- Improves data quality
- Boosts signal to noise ratio
- Allows trained models to generalize more effectively



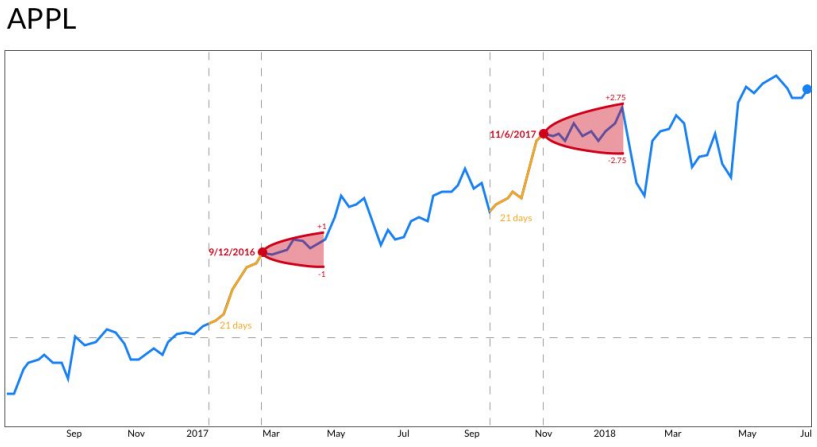
Asset cluster related to energy companies

Making It Easier For The Machine To Learn

Uniformly Distributed Features



Dynamic Label Data using ATR

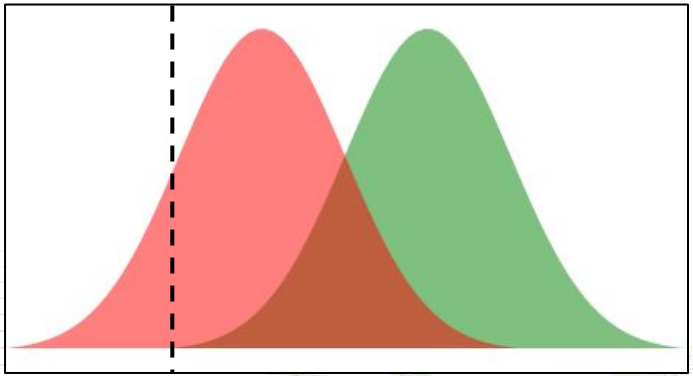


- Make features of different ranges comparable
- Build models and detect relationships with minimal preprocessing
- Label statistically significant price movements
- Reduce noise facilitating model training

Model Evaluation

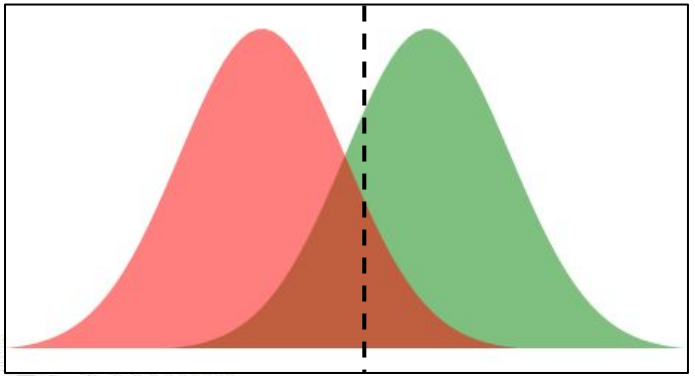
- ROC Curves can be used to visualize the separability of classes at different thresholds
- If performance metric score is in [-1, 1], a natural assumption for the threshold might be 0.0; which is not necessarily optimal.

Threshold = 0.0



<--- Sentiment --->

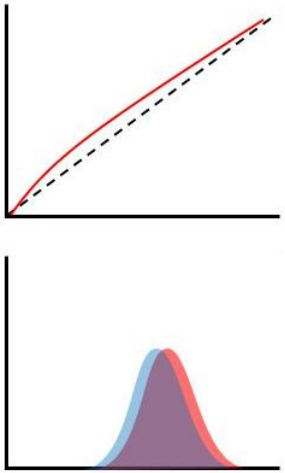
Threshold = 0.05

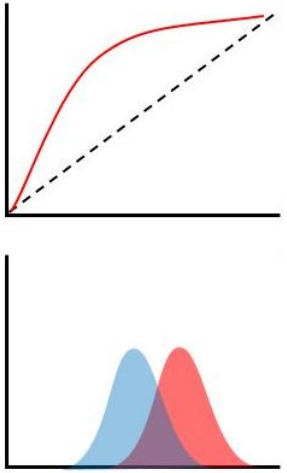


<--- Sentiment --->

Model Evaluation

- FPR and TPR are calculated at each threshold value
- Using these points, the ROC curve is plotted
- Because a good classifier will minimize FPR and maximize TPR, a meaningful relationship exists when the curve bows out from x = y
- An ROC curve and ROC AUC analyze the health of a classifier over ALL threshold values





Top Down/Bottom Up Model

As **new data** and **new strategies** become available they are **added automatically** to a global multi-strat investment paradigm which leverages consent between bottom up and top down models.

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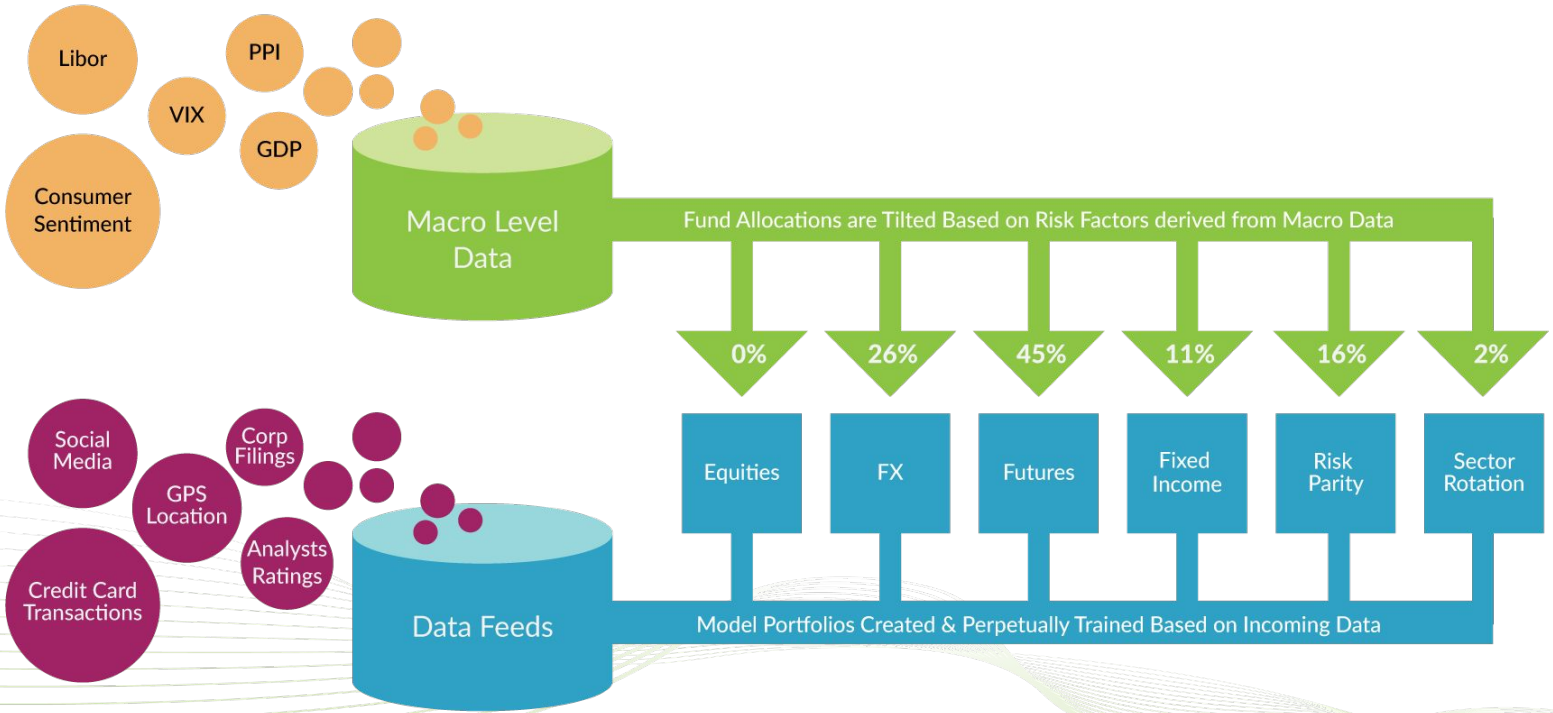

Multi-Strategy Top Down & Bottom Up Portfolio 3X

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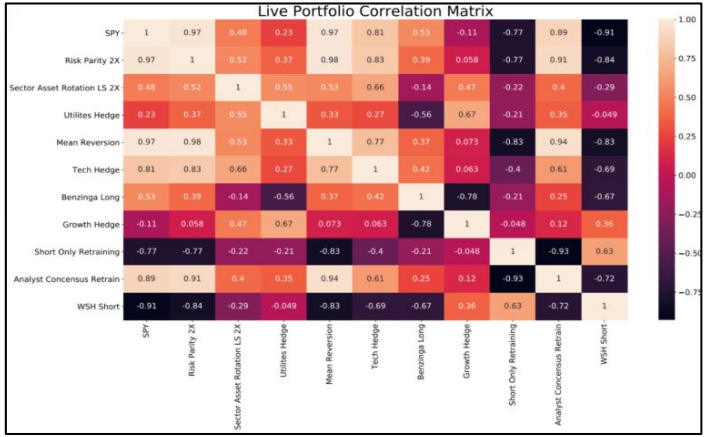

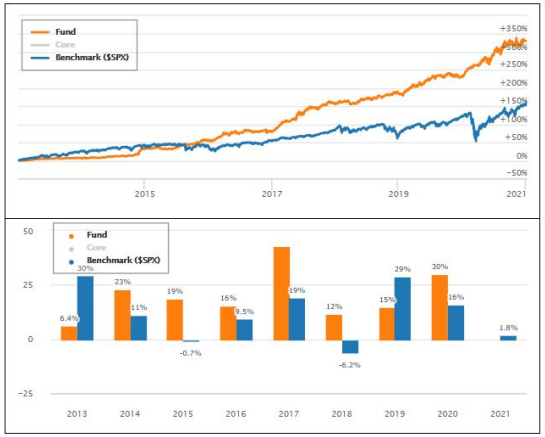

	Strategy Overall	Bench Overall	Strategy TTM	Bench TTM
Abs. Return	330.50%	168.17%	28.45%	17.13%
Rel. Return	162.32%	N/A	11.32%	N/A
Beta	0.08	N/A	0.02	N/A
Std. Dev	0.56%	1.08%	0.81%	2.18%
Sharpe	2.11	0.81	2.01	0.63
Draw Down	-5.63%	-33.92%	-5.63%	-33.92%
IR	0.27	N/A	0.11	N/A
R^2	0.02	N/A	0.00	N/A

Historical Summary

	1 Yr	2 Yr	3 Yr	5 Yr	10 Yr
Ann. Return	28.45%	23.32%	18.45%	22.72%	N/A
Std. Dev	0.81%	0.67%	0.60%	0.61%	N/A
Ann. Volatility	12.88%	10.69%	9.59%	9.70%	N/A

Combining multiple uncorrelated strategies into one portfolio

View Backtest

- Our platform is able to dynamically optimize a fund's allocation between independent uncorrelated portfolios and combine all underlying assets into one strategy.
- Such combination is designed to enable consistent returns in any market that slowly accrue over time.
- The extreme low volatility can be exploited by dialing leverage up or down based on market risk, measured by an AI model driven from global macro factors.

How are AI & Big Data Used For Financial Market Research?

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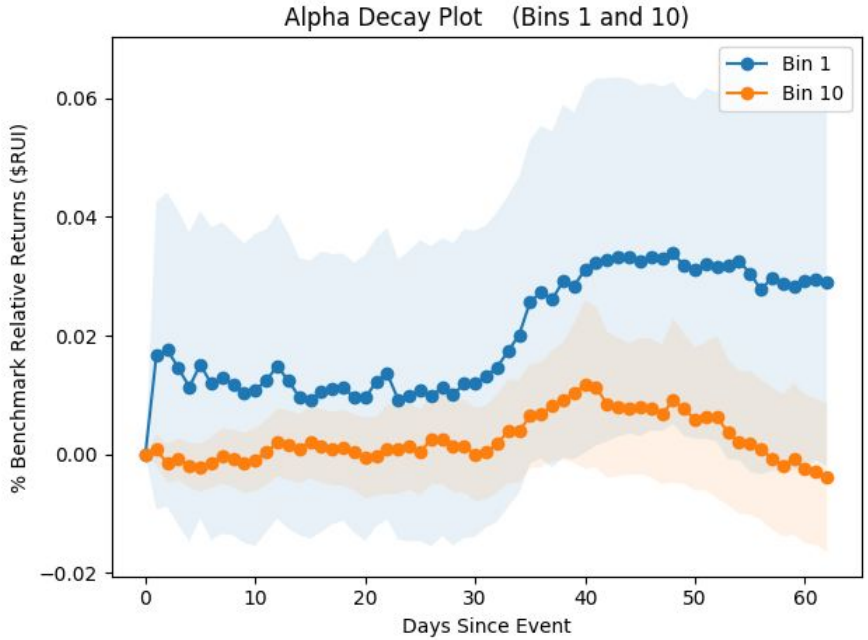
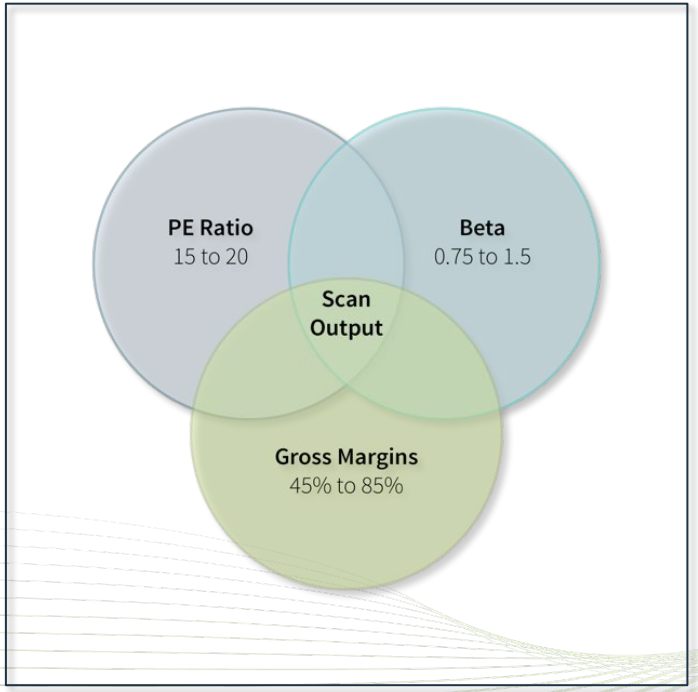
Event Signal Evaluation

- Assess the impact of event data
- Create a plot of metric value starting at event occurrence
- Compare behavior after event for relevant sub-groups
- Shows how, for example, a corporate event affects the market relative returns of companies with different total earnings distortion levels



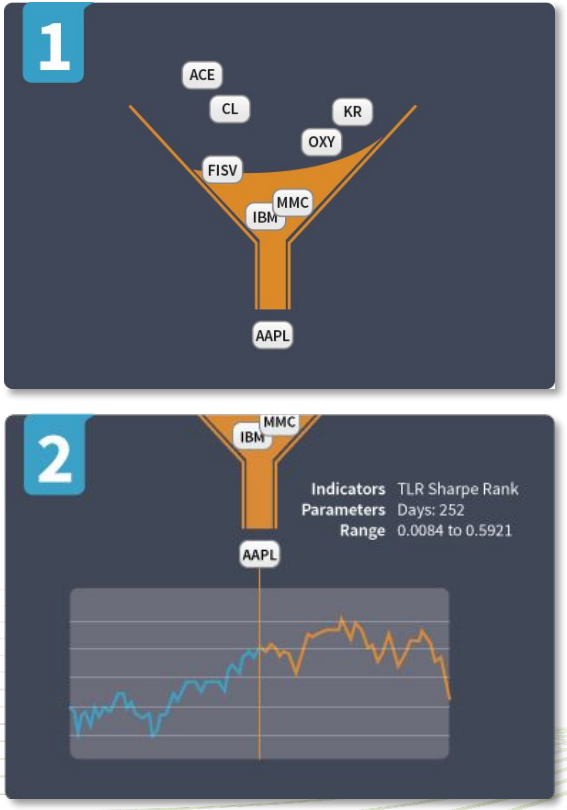
Alpha Decay plots of market relative returns on lowest and highest decile earnings_distortion_total companies after earnings report date

Event Study Overview



- A scan or a filter is designed to examine each stock in a basket for certain qualification.

Event Study Overview



- A scan or a filter is designed to examine each stock in a basket for certain qualifying.
- We qualify a stock's fitness by assessing whether its characteristics is within a certain criteria range.

Event Study Overview

How do we know if a scan is predictive?

Event Study Overview

- Combine all pre-event price action and post event price action.

- Assess a mean line representation.

Event Study Overview

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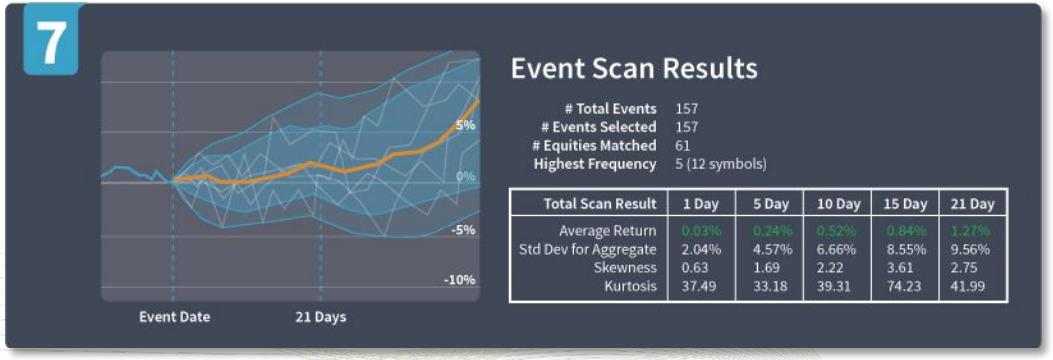
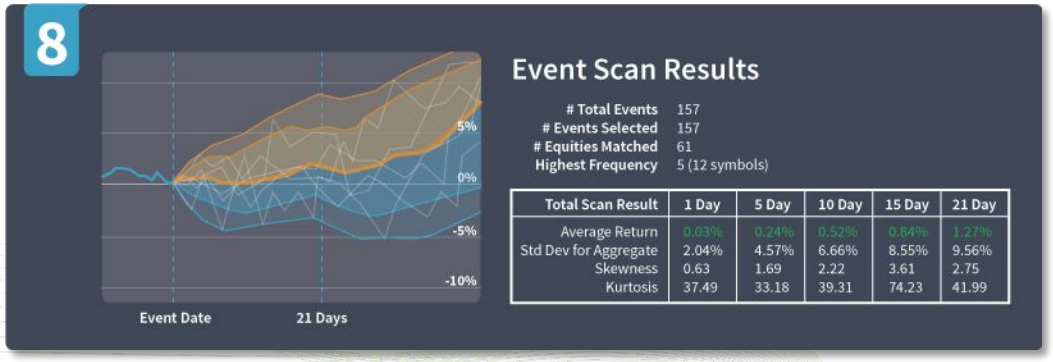
Putting it all together

- Pre-Event date
- Post-Event date
- Cone represents standard deviation of sample data
- Summarized in a table



Event Study Overview

- Out of 100s of indicators – which ones work? And what should be its min/max thresholds – There are endless possibilities!
- We utilize Machine Learning to help us pick the indicators and thresholds most likely to enhance an event study's price distribution and performance.



Event Study Overview

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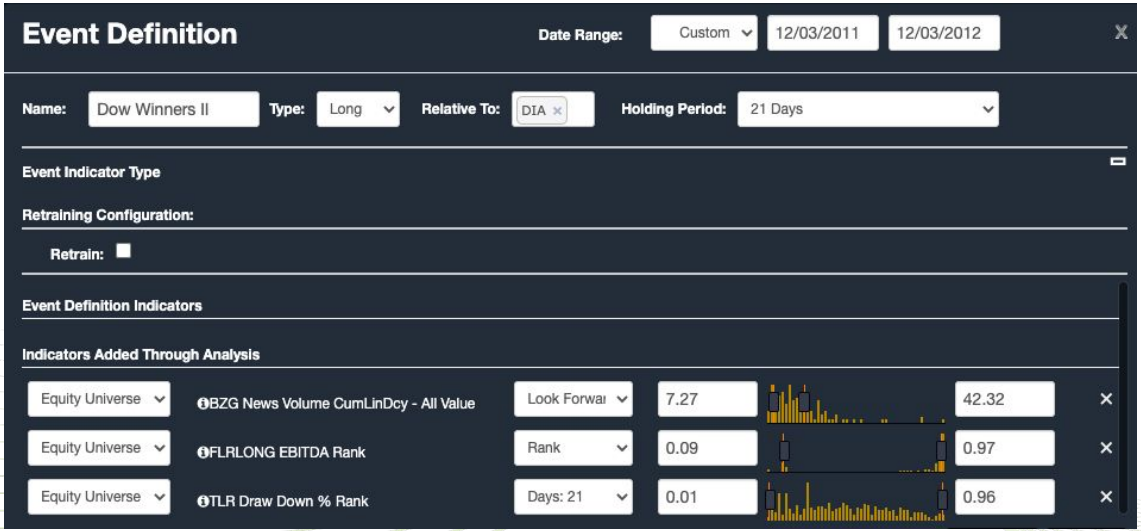
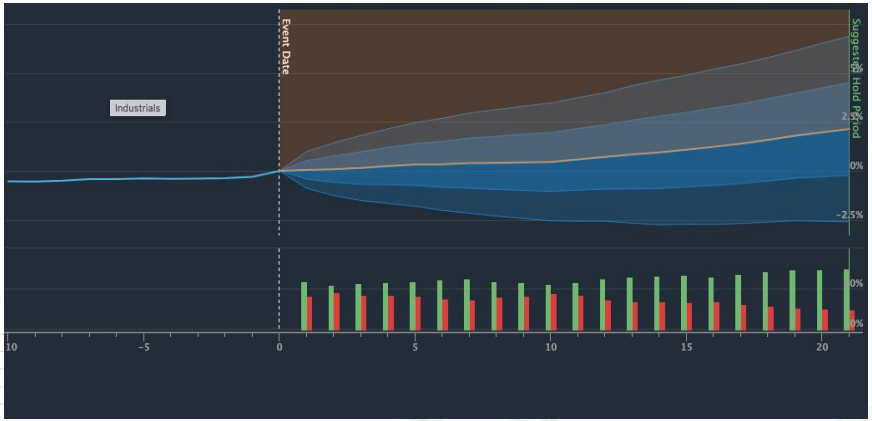
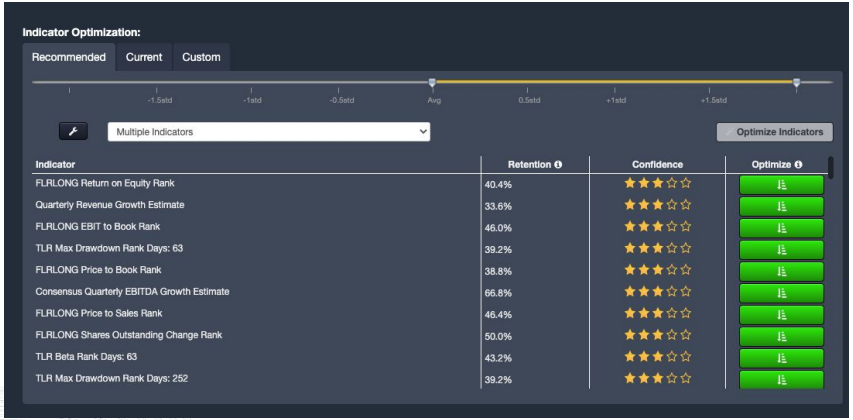


Event Study Overview

- Using ML to maximize the classification efficacy





Questions?

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Asset allocation/diversification does not guarantee a profit or protect against a loss.

***For Backtests**

For the Hypothetical backtest results, past performance is not indicative of future returns. Results are net of transactions' costs, management fees of 40 basis points, and performance fees which use a hurdle rate of 8%. Our performance fee in excess of hurdle rate is 10%. Results are as of March 31, 2021.

****For Our Model Portfolios**

Hypothetical paper trading simulation results, past performance is not indicative of future returns. Results are net of transactions' costs, management fees of 40 basis points, and performance fees which use a hurdle rate of 8%. Our performance fee in excess of hurdle rate is 10%. Results are provided as informational and could potentially include misleading and hypothetical information. If you are a retail investor this information is NOT intended for you. Results are meant as information only for Institutional Accredited Investors Only. If you are looking to engage Neuravest in any of the product offerings, minimum investment size requirement is $1MM USD.

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