Brain Machine Learning Middle-Frequency Signals on Cryptocurrencies

Product Summary

Brain has developed a **machine learning framework** to create middle-frequency trading signals based on systematic investment strategies designed for integration into client operations. This approach combines rigorous quantitative modelling with flexible parameterization, enabling **consistent performance across various cryptocurrencies.**

The key objectives of the strategies are the following:

- **Return maximization:** exploitation of inefficiencies in the cryptocurrency market through optimized parametric strategies that capture **time-based inefficiencies, combining momentum and mean-reversion trends.**
- **Volatility reduction:** diversification by combining weakly correlated strategies.
- **Ease of implementation**: middle-frequency trading (e.g. hourly), also suitable for initial manual or paper-trading setups before automation.
- **Scalability:** adaptable to larger trading volumes and multiple asset classes.
- **Robustness:** effective under varying market conditions, with strong overfitting control via proprietary validation.

Methodology and Technical Details

- Parametric strategies are driven by a set of parameter-controlled conditions that must be satisfied to generate a trading signal.
- The input data primarily consist of prices and volumes with intraday frequency. Additional inputs may include the Brain's NLP datasets for sentiment extraction from news flows.
- The output is a set of operations, such as entries and exits, applied to the portfolio assets. The strategies can be optimized to incorporate trading costs, as well as stop-loss and take-profit risk limits.
- The approach uses proprietary robust optimization techniques in **a machine learning framework**. to avoid overfitting risks in the walk-forward optimization of parameters.

Dataset Frequency and Delivery

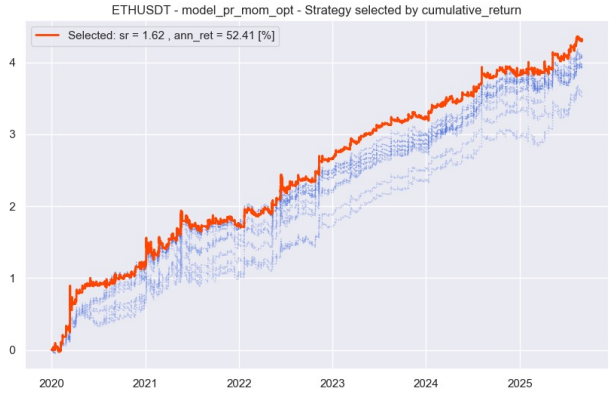
The dataset is updated at intraday frequency (e.g., hourly), with several years of historical data available for testing depending on the asset. Data is delivered daily as CSV files published in an S3 bucket.

Systematic Strategies on Crypto

The following plots show results for the most liquid cryptocurrencies, ETH and BTC. The red line marks the selected strategy within the walk-forward setup. Using our proprietary Walk Forward Bundle as a robustness check, out-of-sample segments are used to estimate the expected P&L distribution across different training-window lengths and re-training frequencies.

ETHUSDT: out-of-sample performance 2019-2025

- Annualized return: 52.4 [%]
- Volatility: 32.8 [%]
- Sharpe ratio: 1.6



BTCUSDT: out-of-sample performance 2019-2025

- Annualized return: 39.6 [%]
- Volatility: 30.4 [%]
- Sharpe ratio: 1.3

Contacts

BRAIN is a research focused company that develops proprietary signals based on alternative data and algorithms for investment strategies on financial markets.

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