

# AI Platform for Active Portfolio Management (applied to Crypto Market Making)

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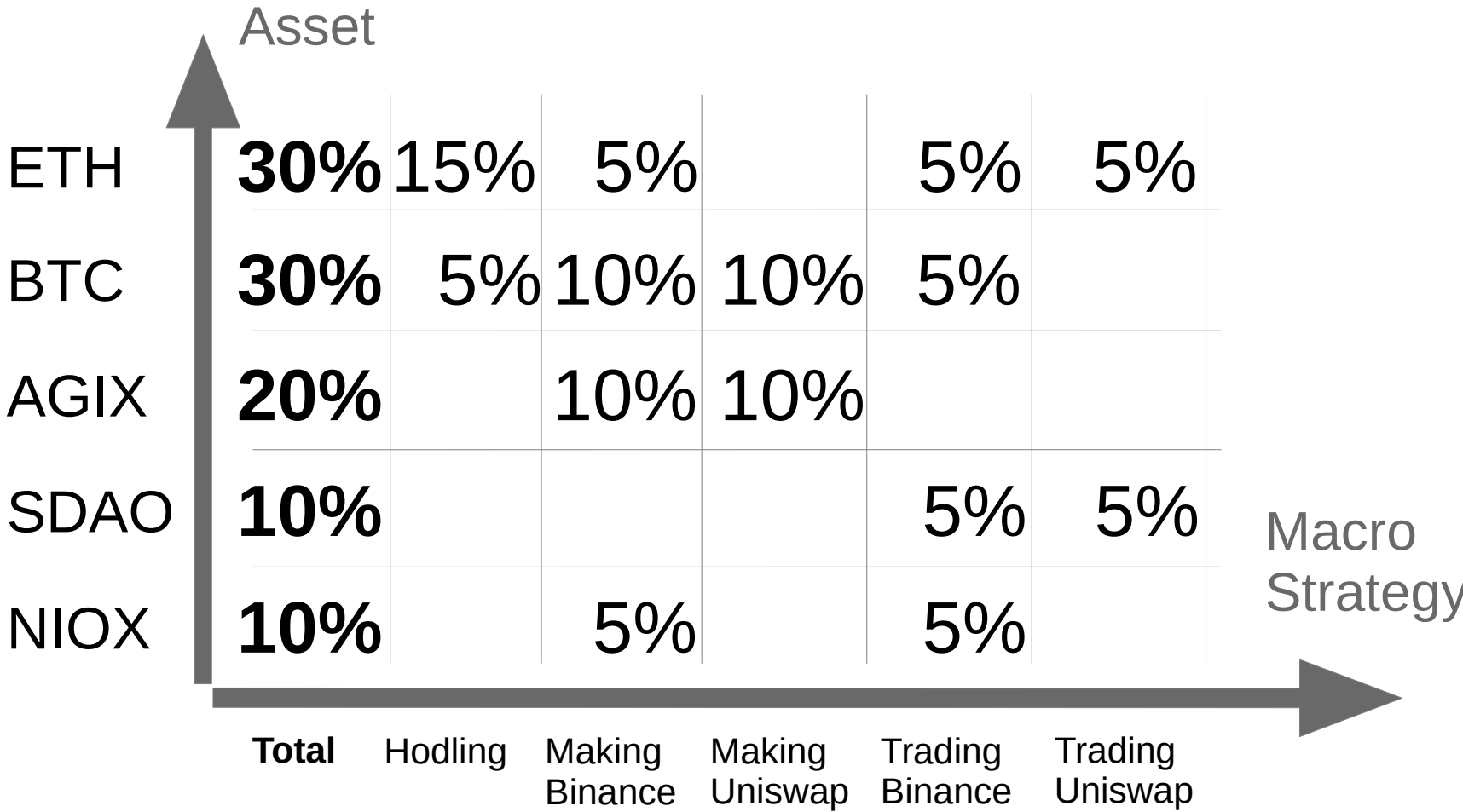
Telegram: akolonin

With:

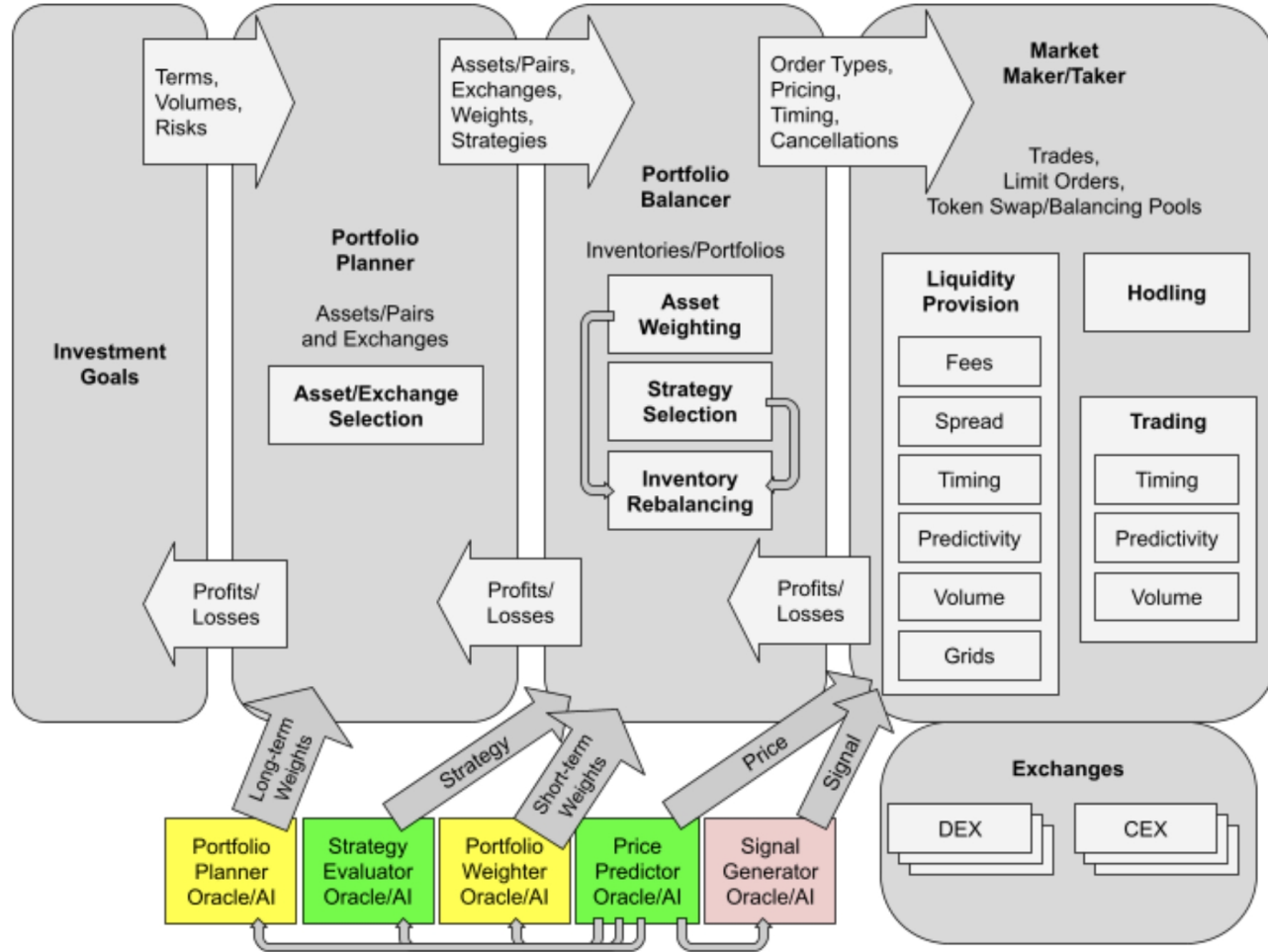
Alexey Glushchenko, Ali Raheman, Alice Ho, Arseniy Fokin, Ben Goertzel, Gergely Hegykozi, Igors Fridkins, Ikram Ansari, Juan Pinzon, Marcello Mari, Mario Casiraghi, Mukul Vishwas



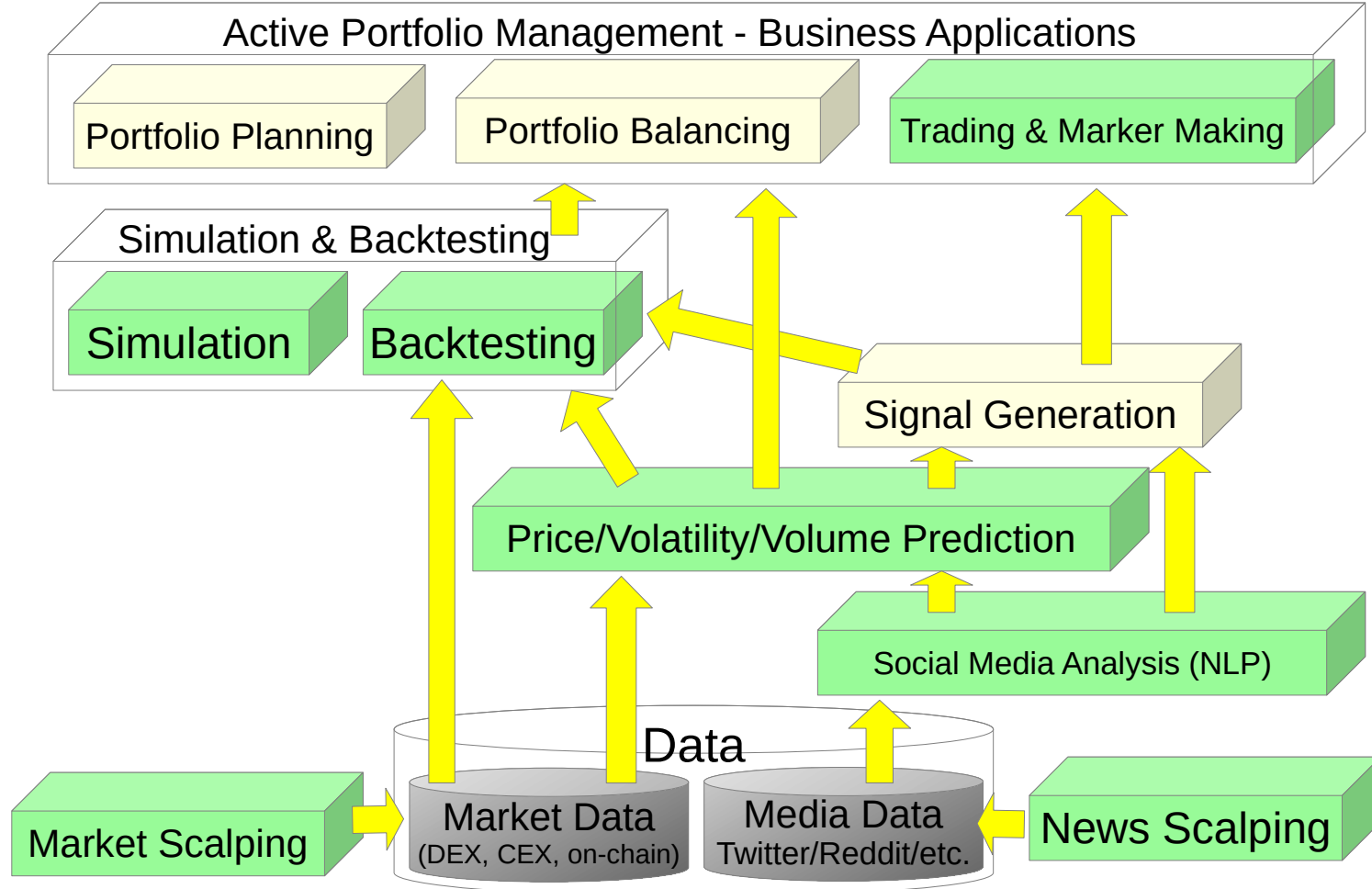
# Optimization Space for Active Portfolio Management



# Active Portfolio Management

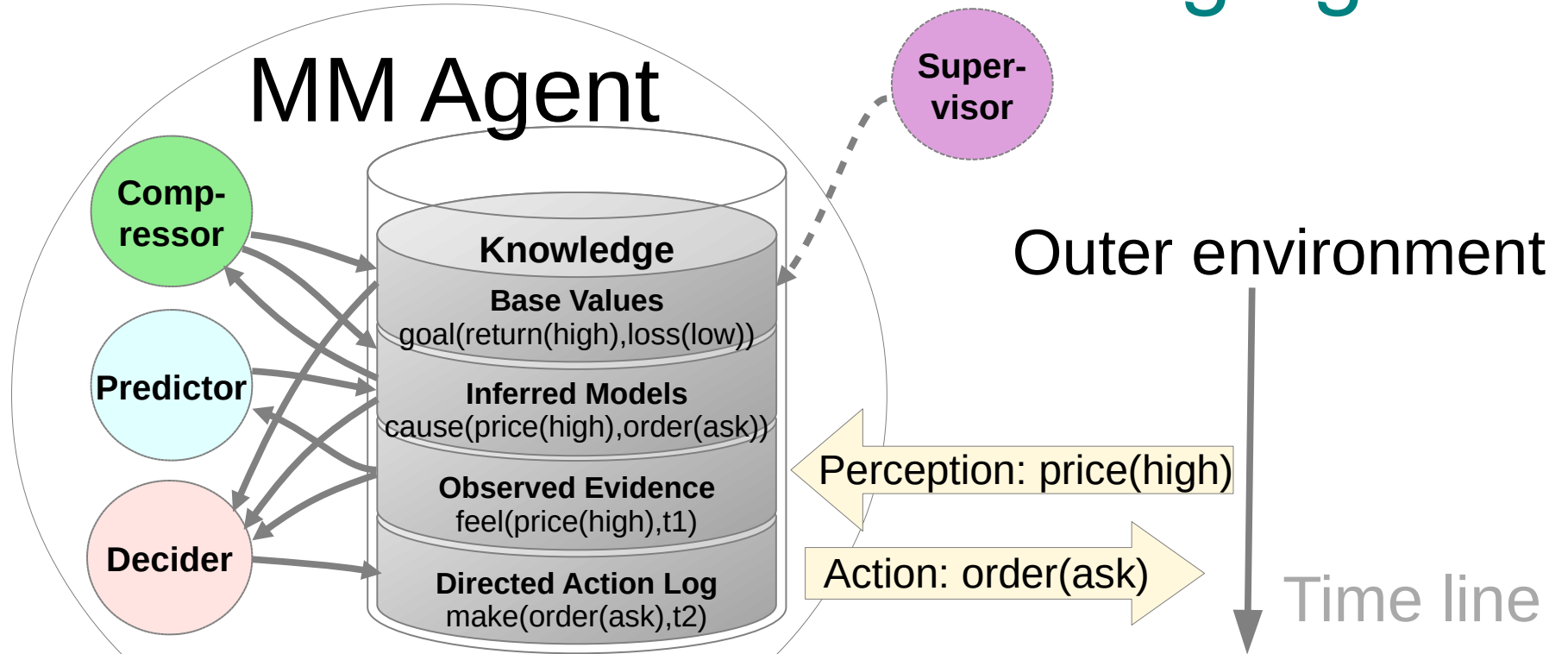


# Services and APIs





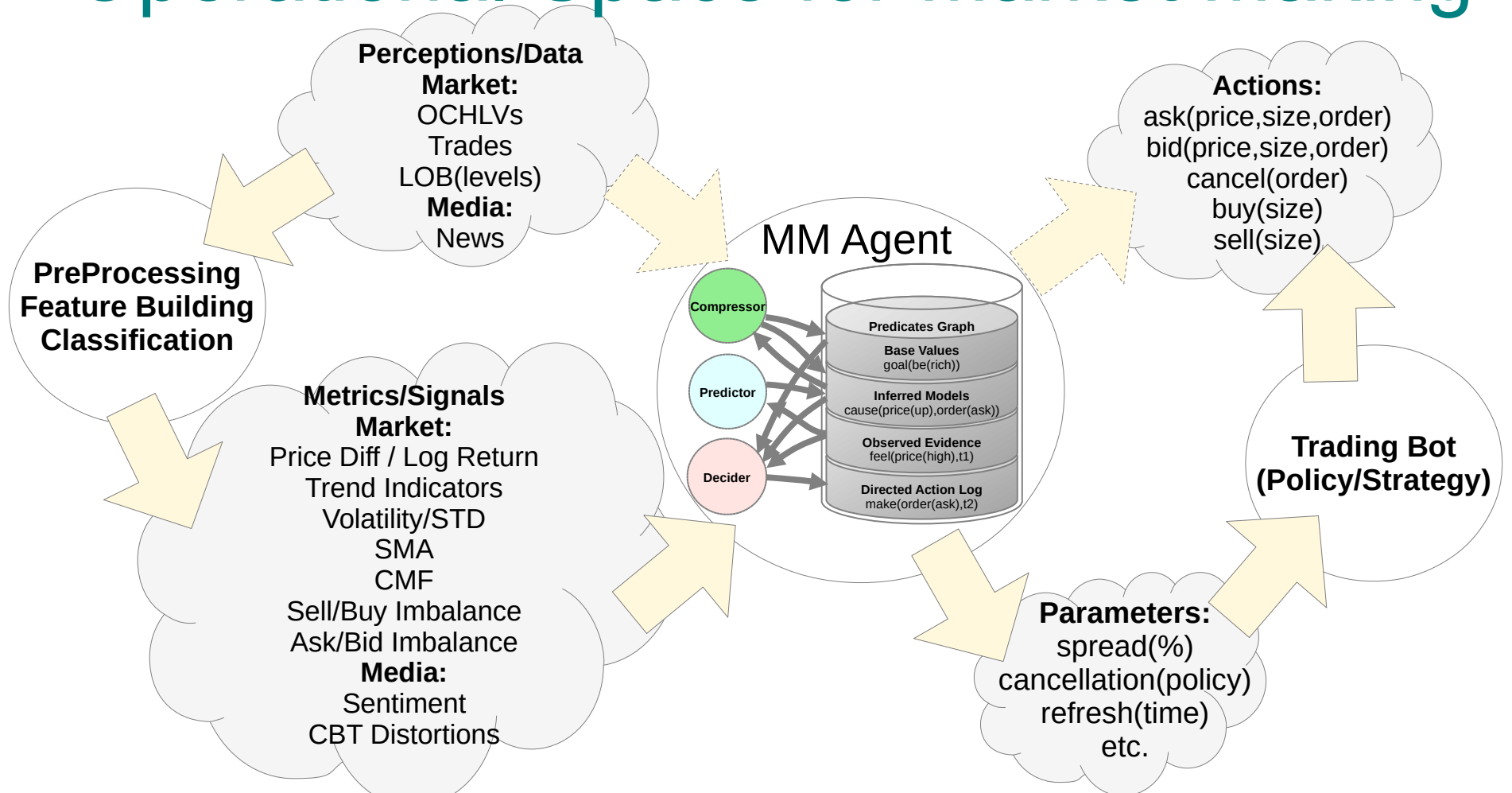
# Narrow AGI for Market Making Agent



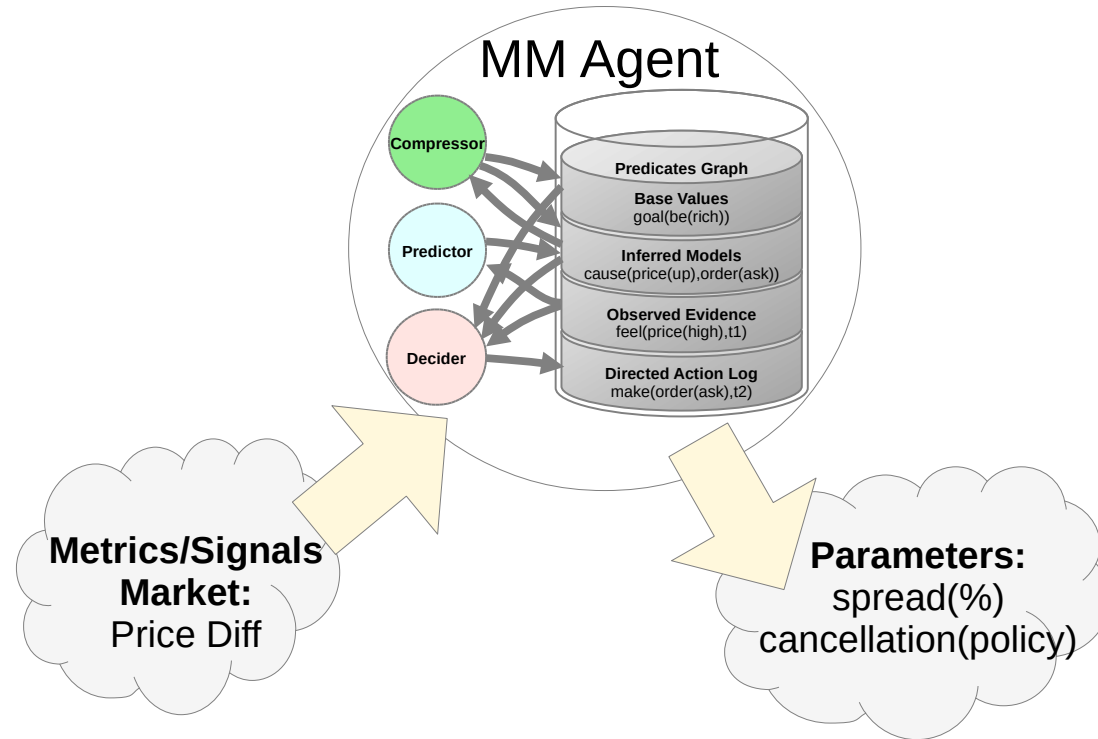
Evgenii E. Vityaev Purposefulness as a Principle of Brain Activity // Anticipation: Learning from the Past, (ed.) M. Nadin. Cognitive Systems Monographs, V.25, Chapter No.: 13. Springer, 2015, pp. 231-254.

Anton Kolonin: Neuro-symbolic architecture for experiential learning in discrete and functional environments // AGI-2021 Conference Proceedings, 2021

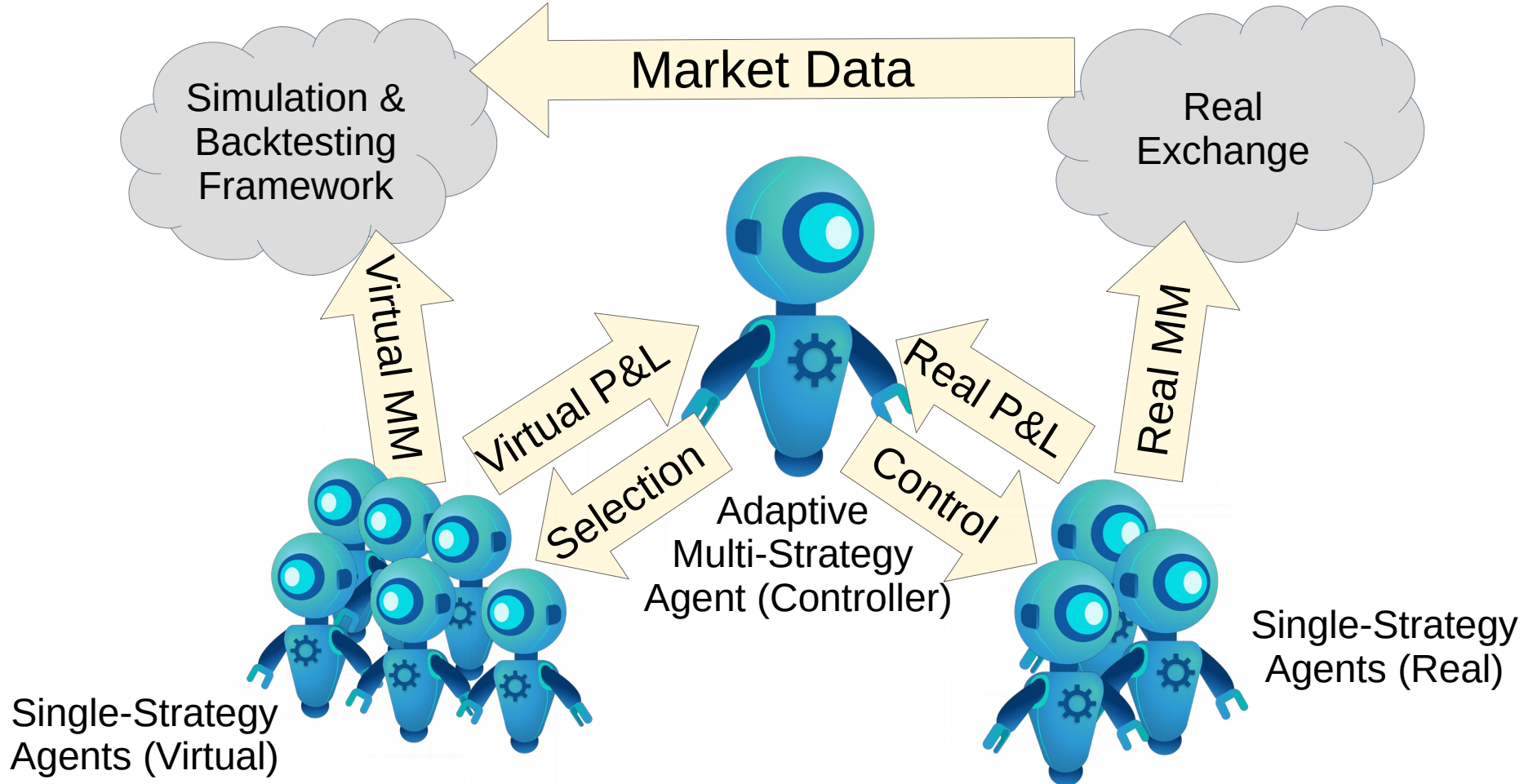
# Operational Space for Market Making



# Operational Space for Market Making (Simplified)

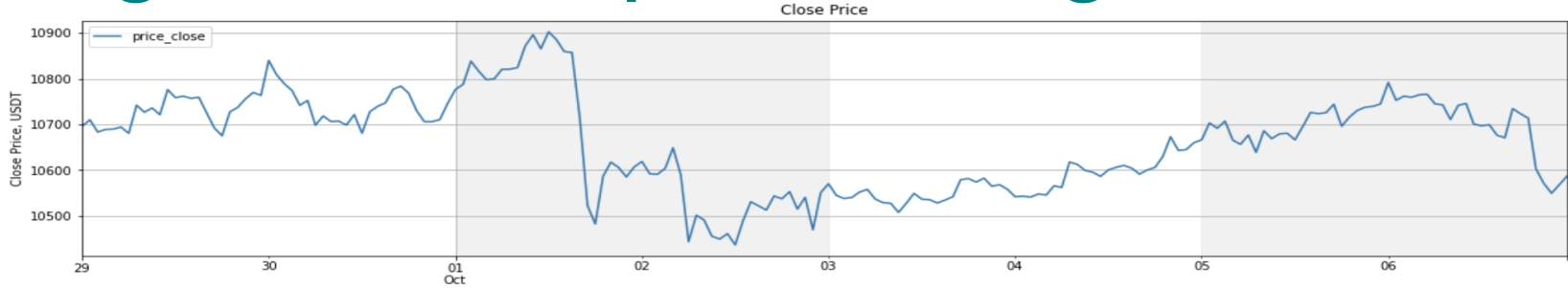


# Adaptive Multi-Strategy Agent



# Trading with multiple Strategies at a Time

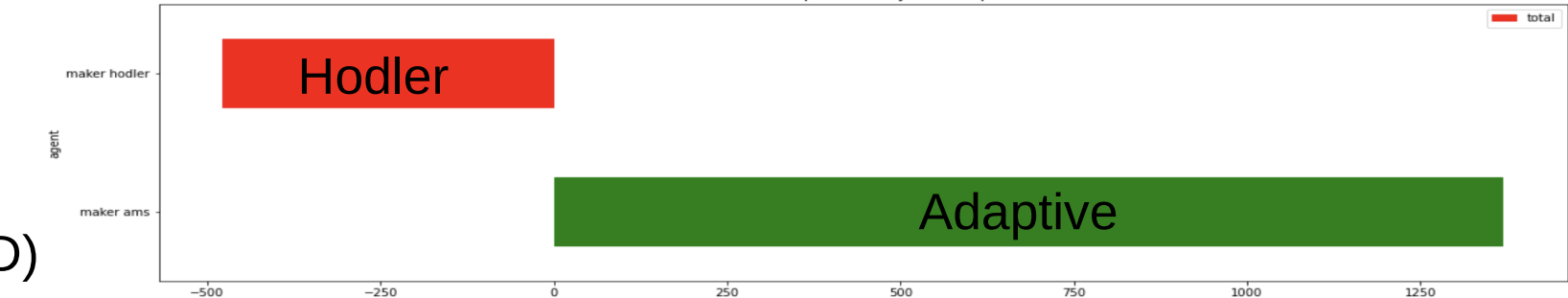
BTC/  
USDT



Order Grid  
Marker  
Making  
P & L (USD)



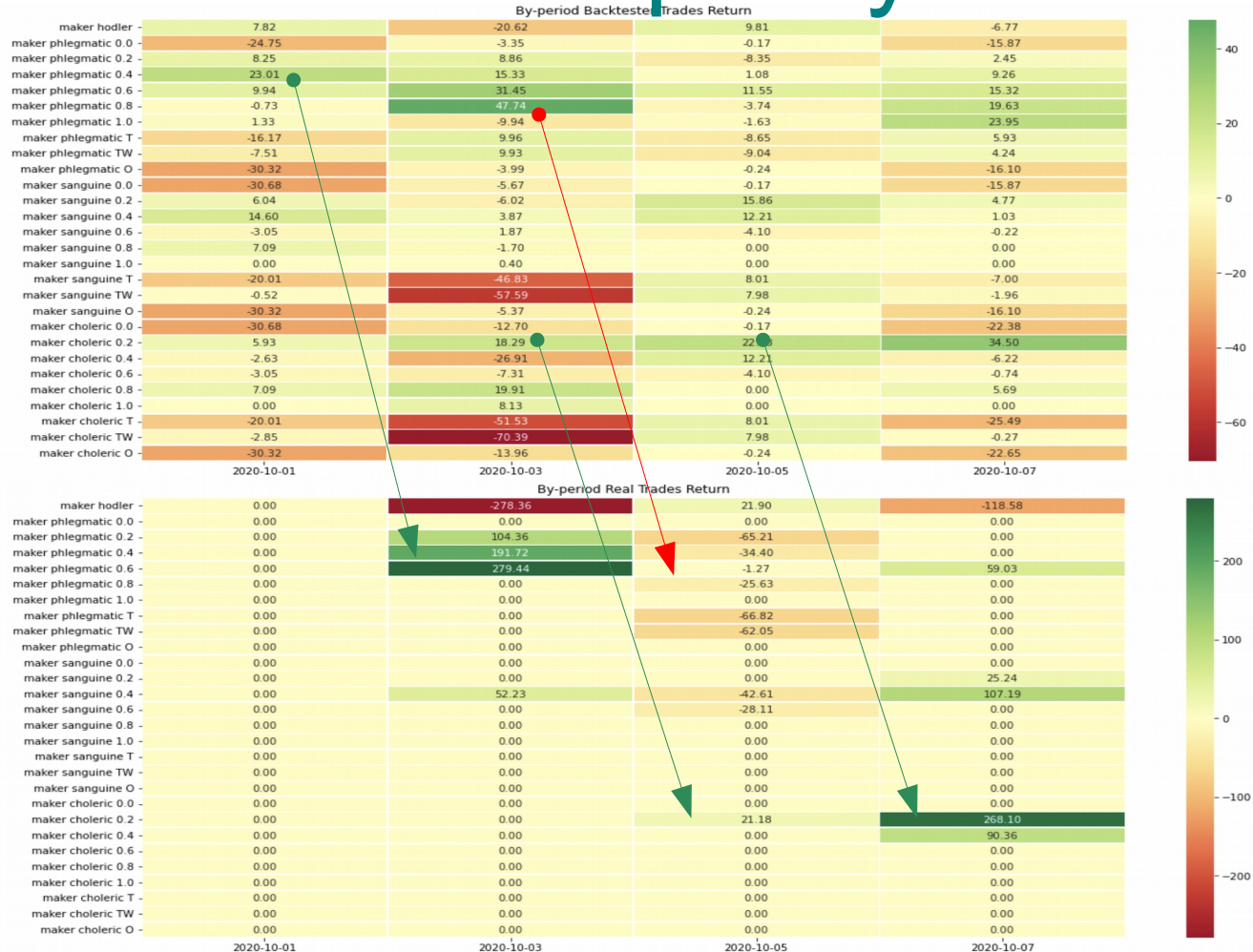
Adaptive  
Multi  
Strategy  
Agent  
P & L (USD)



# Real-time model-based policy selection

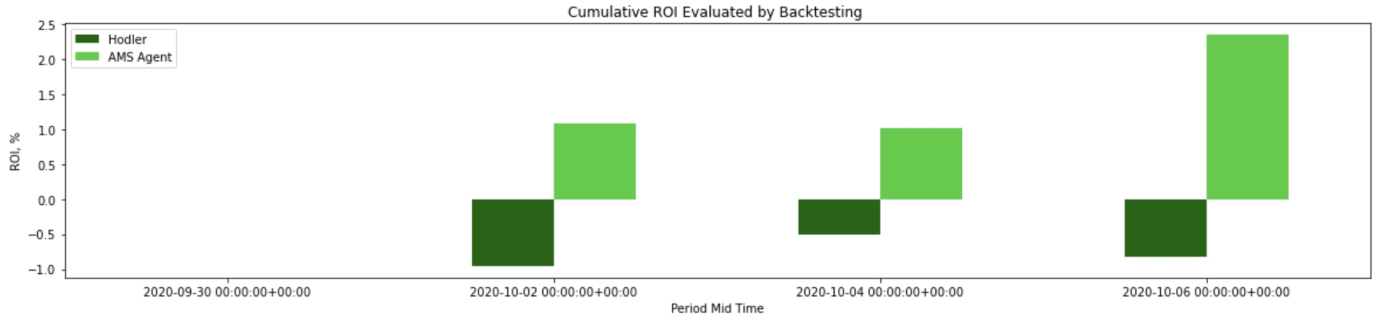
Profit and Loss for Backtesting on historical data / Forward testing on live market data

Profit and Loss for Trading on live market data (still, "backtested")

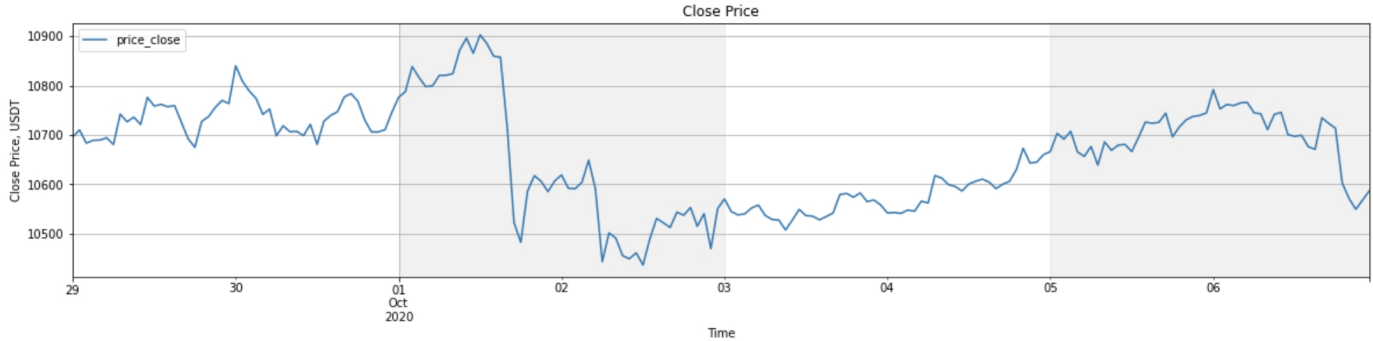


# Incremental ROI for adaptive MM strategy

Cumulative  
Adaptive  
P & L (USD)

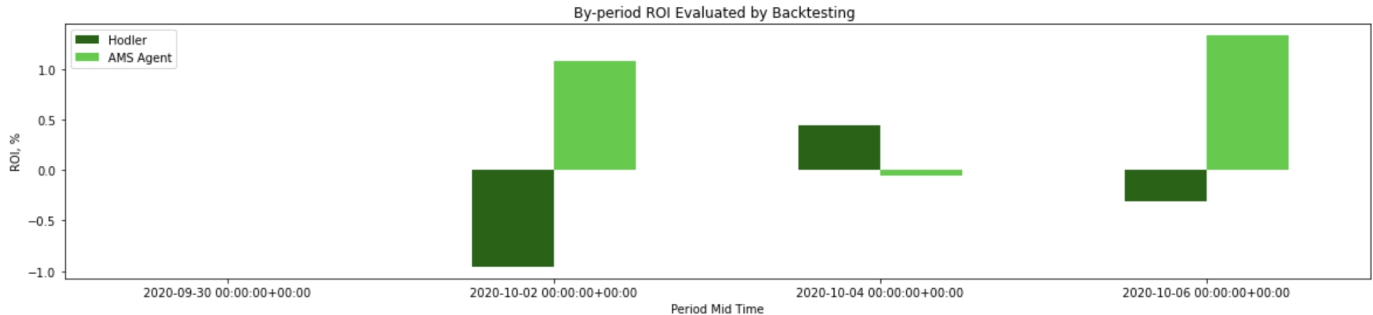


BTC/  
USDT



“NIOX”  
Strategies

Incremental  
Adaptive  
P & L (USD)



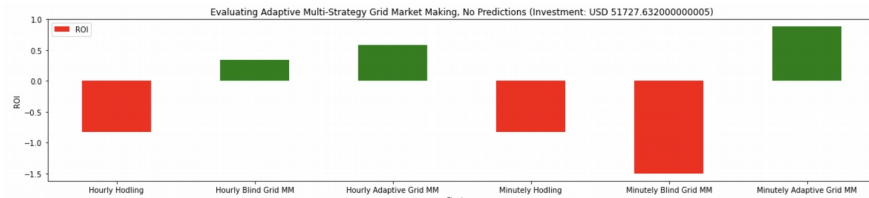


# ROI for adaptive MM strategy

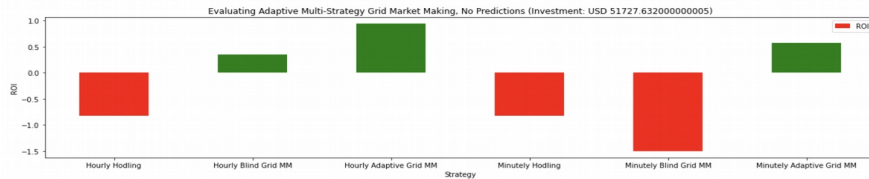
BTC/  
USDT



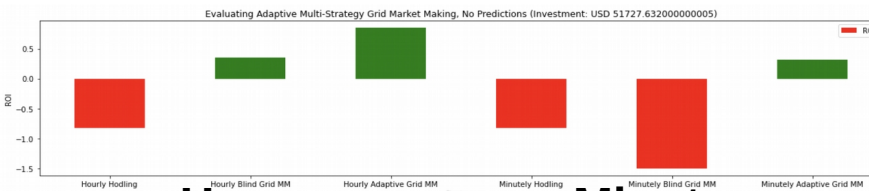
1 day strategy update interval



2 days strategy update interval



3 days strategy update interval



Hours

Minutes

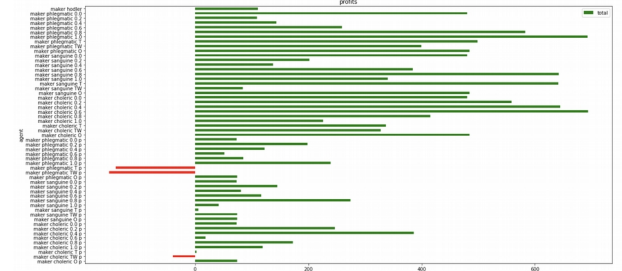
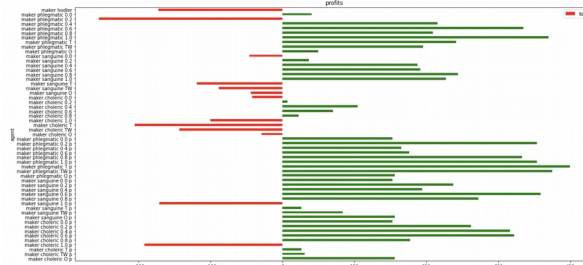
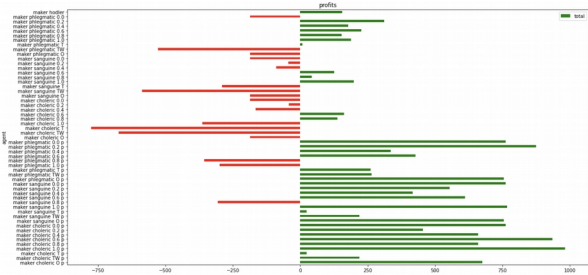
“Hummingbot”  
Pure Market Making  
Strategy

**1% ROI / 6 days**  
**80% ROI / 1 year**

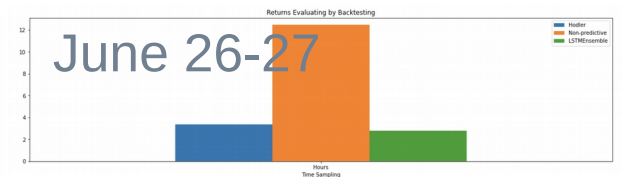
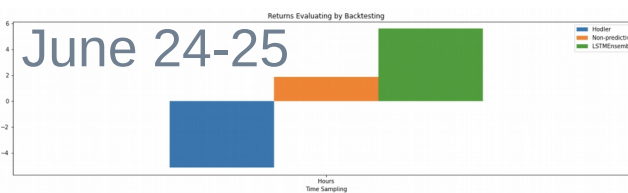
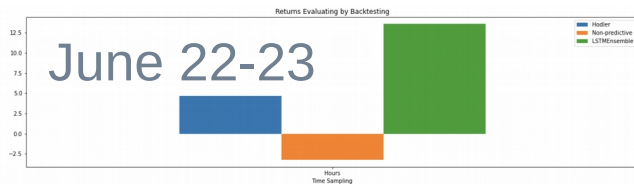


# Non-predictive vs. Predictive (LSTM) MM

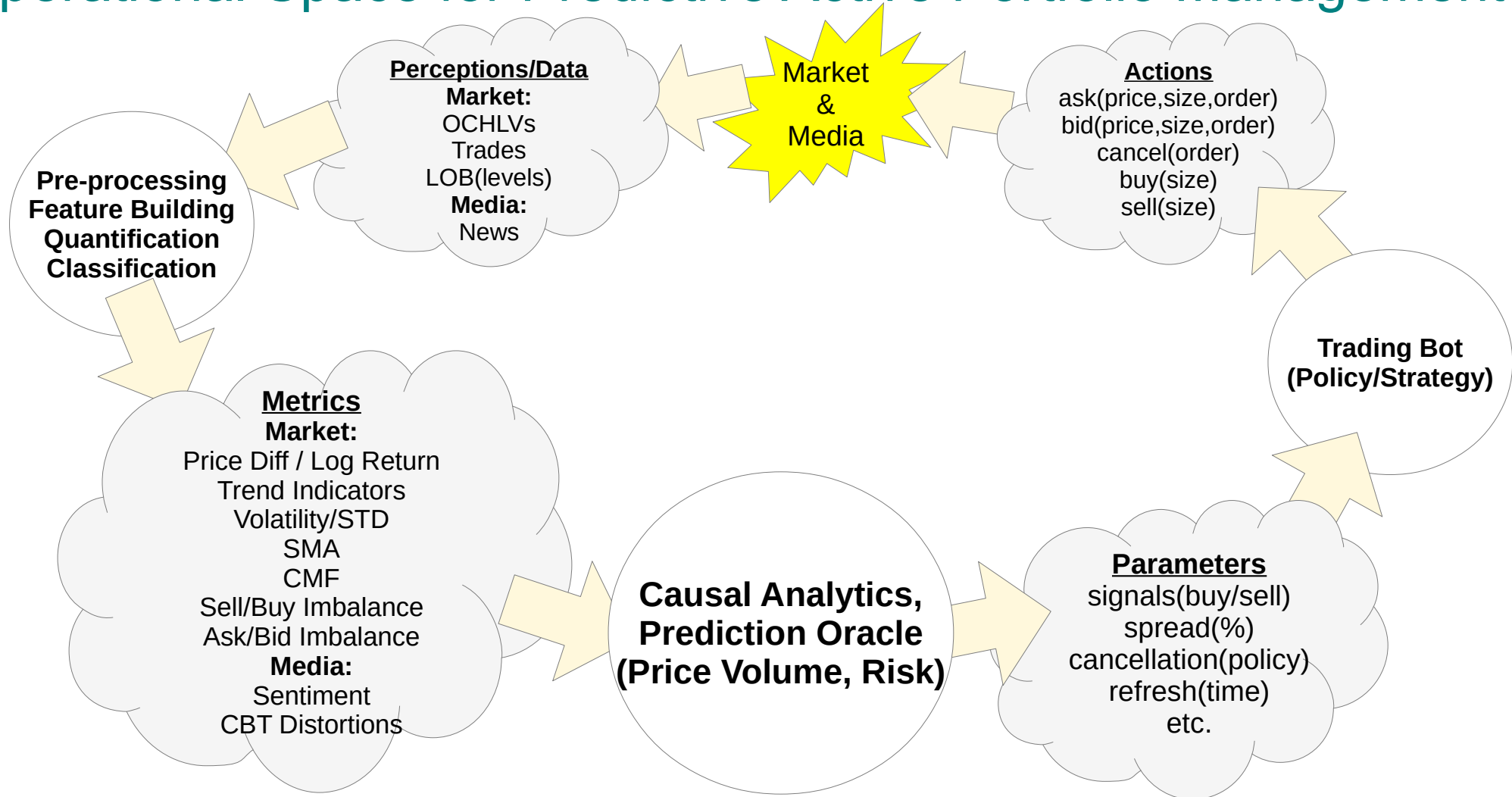
BTC/USDT June 22-27, 2021



## ROI % per Agent Strategy (Hodler, Non-Predictive MM, Predictive MM)



# Operational Space for Predictive Active Portfolio Management



# Mining Market Patterns as Invariants

## ANNEX IN FINANCIAL FORECASTING

Mining temporally invariant structures (“scenarios”) in historical time series data recording financial “processes” with the **Discovery system**  
[www.math.nsc.ru/AP/ScientificDiscovery/PDF/data\\_mining\\_for\\_financial\\_applications.pdf](http://www.math.nsc.ru/AP/ScientificDiscovery/PDF/data_mining_for_financial_applications.pdf)

### Symbolic Methodology in Numeric Data Mining: Relational Techniques for Financial Applications

Boris Kovalerchuk, Evgenii Vityaev, Husan Yusupov  
<https://arxiv.org/pdf/cs/0208022.pdf>

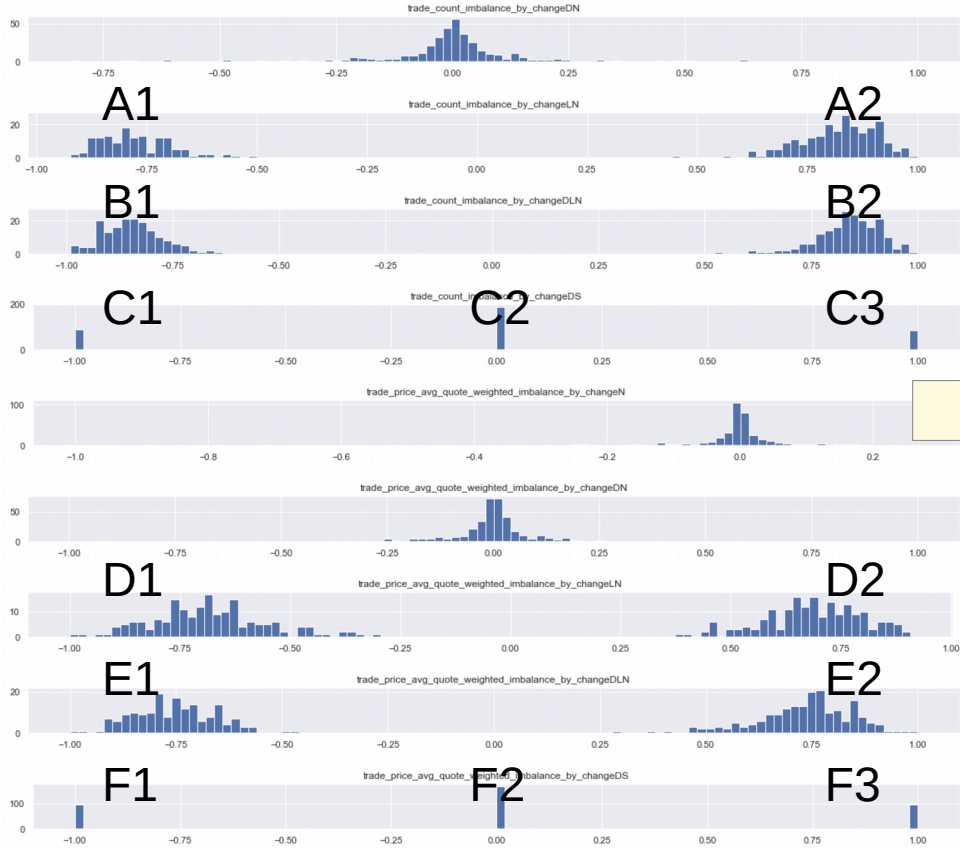
### Brain Principles Programming

Evgenii Vityaev, Anton Kolonin, Andrey Kurpatov, Artem Molchanov  
<https://arxiv.org/abs/2202.12710>

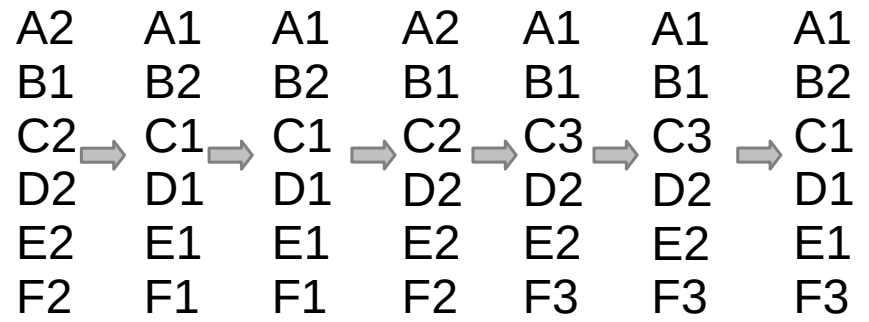
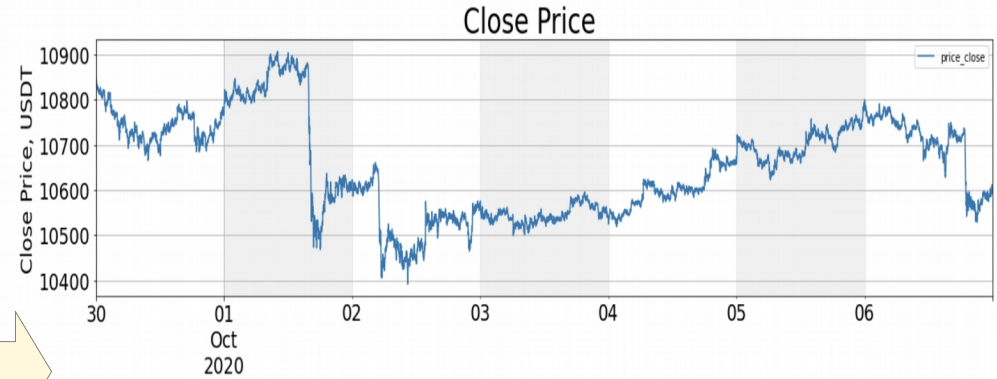
structure1	structure2	structure3	structure4	weekday	week
			forecast for	Friday	forecast week
		forecast for	up	Thursday	forecast week
	forecast for	up	up	Wednesday	forecast week
forecast for	up			Tuesday	forecast week
up	current day	current day	current day	Monday	forecast week
current day	down	down	down	Friday	current week
	anchor2	anchor2	anchor2	Thursday	current week
down	down anchor1	down	down	Wednesday	current week
		anchor1		Tuesday	current week
anchor2				Monday	current week
up				Friday	one week ago
anchor1				Thursday	one week ago
				Wednesday	one week ago
				Tuesday	one week ago
				Monday	one week ago
			up	Friday	two weeks ago
				Thursday	two weeks ago
				Wednesday	two weeks ago
				Tuesday	two weeks ago
			anchor1	Monday	two weeks ago
				Friday	three weeks ago
				Thursday	three weeks ago
				Wednesday	three weeks ago
				Tuesday	three weeks ago
				Monday	three weeks ago
training 0.74	training 0.72	training 0.7	training 0.7		
testing 0.78	testing 0.73	testing 0.71	testing 0.82		

# Market Data: Mining “Market States”

## Market Metrics



Flat → Crash → Crash → Flat → Up → Up → Crash



Time →

# Social Media: Sentiment and Cognitive Distortions

On highly-manipulative markets – sentiment and intent (even if false and manipulative) are the best predictors ... if you get them

**CNBC** @CNBC  
Following

Walmart to accept payments with cryptocurrencies using litecoin  
[cnb.cx/3A3cWuR](https://cnb.cx/3A3cWuR)

1:58 PM - 13 Sep 2021

CNBC deleted after 48 minutes  
ID: 1437415272206450692  
links in original tweet: <https://cnb.cx/3A3cWuR>

210 16:46





# On-Chain Data: Kind of “Insider Information”

**Indicator:** movement of large wallets from wallet to exchange and vice versa

**Influence:** arrival to exchange lowers the price, withdrawal from exchange increases the price

For the reference: [https://twitter.com/whale\\_alert](https://twitter.com/whale_alert)

**Indicator:** blocking and unblocking, approaching the deadline for unblocking funds (for example staking) - so called TVL (total value locked)

**Influence:** blocking funds increases the price, unlocking decreases the price

**Indicator:** adding new coins to circulation

**Influence:** decreases the price

**Indicator:** token burn

**Influence:** increases the price

**Indicator:** increase of unique addresses / owners

**Influence:** increases the price

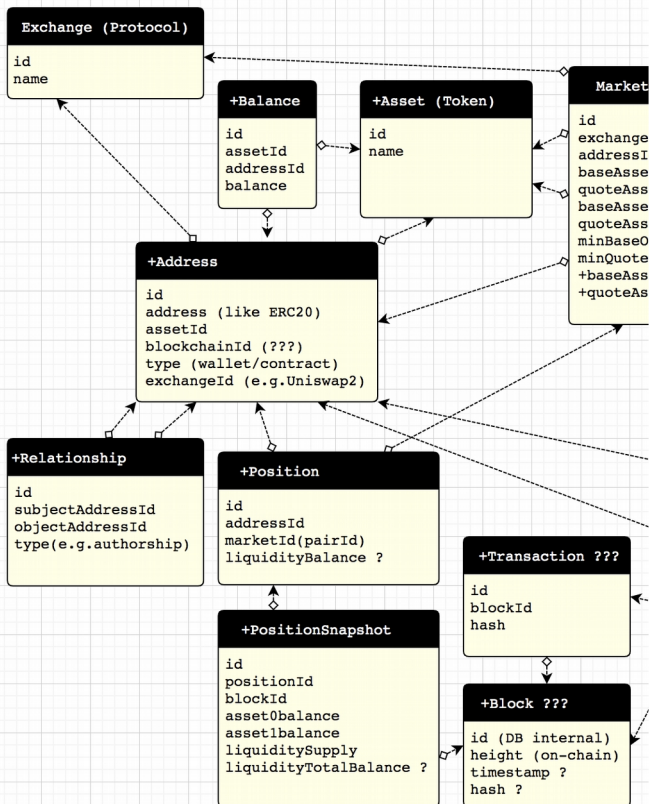
**Indicator:** decrease of unique addresses / owners

**Influence:** decreases the price

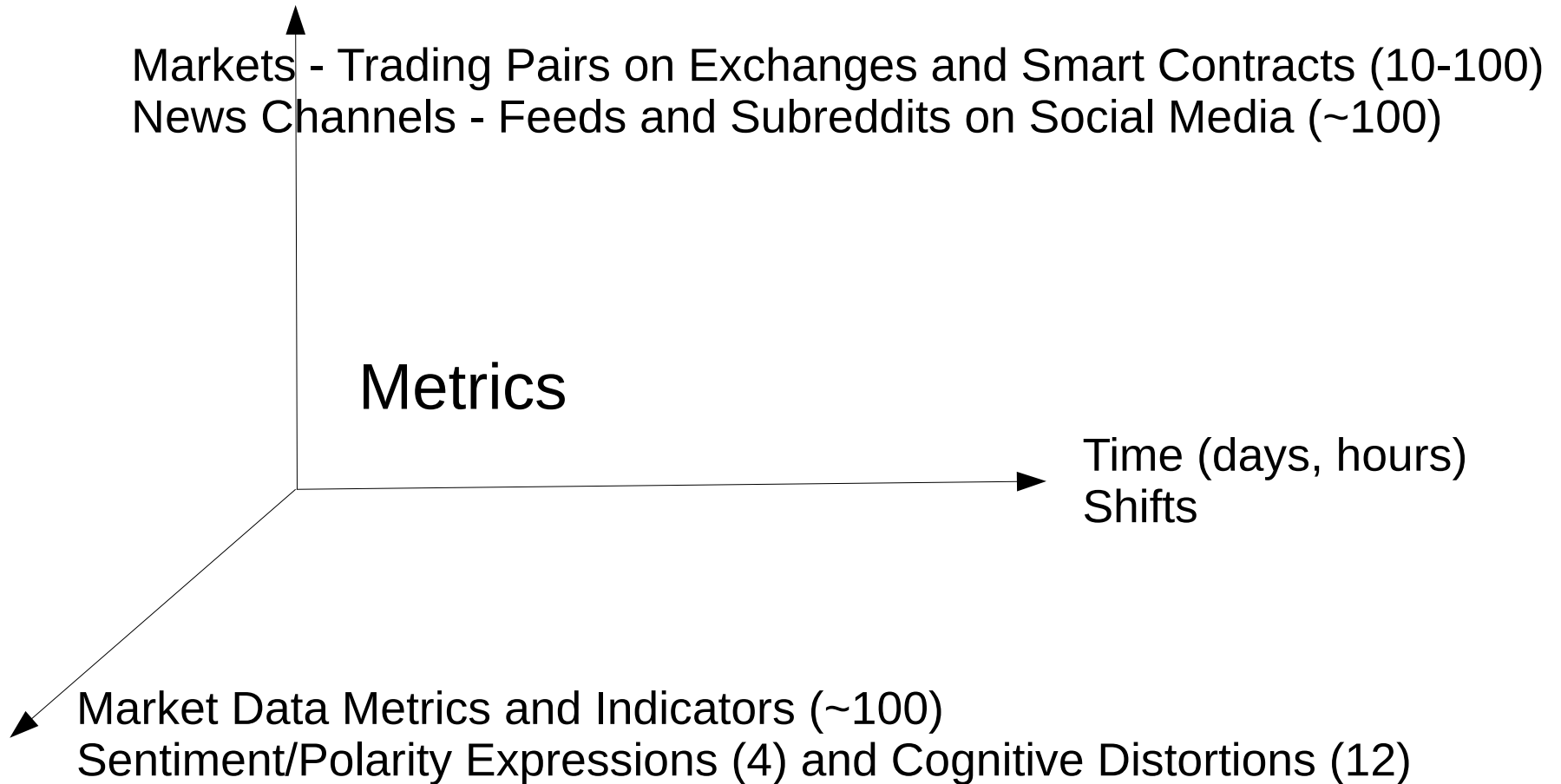
**Indicator:** sending (to other addresses) / decreasing project team tokens

**Influence:** lowers the price

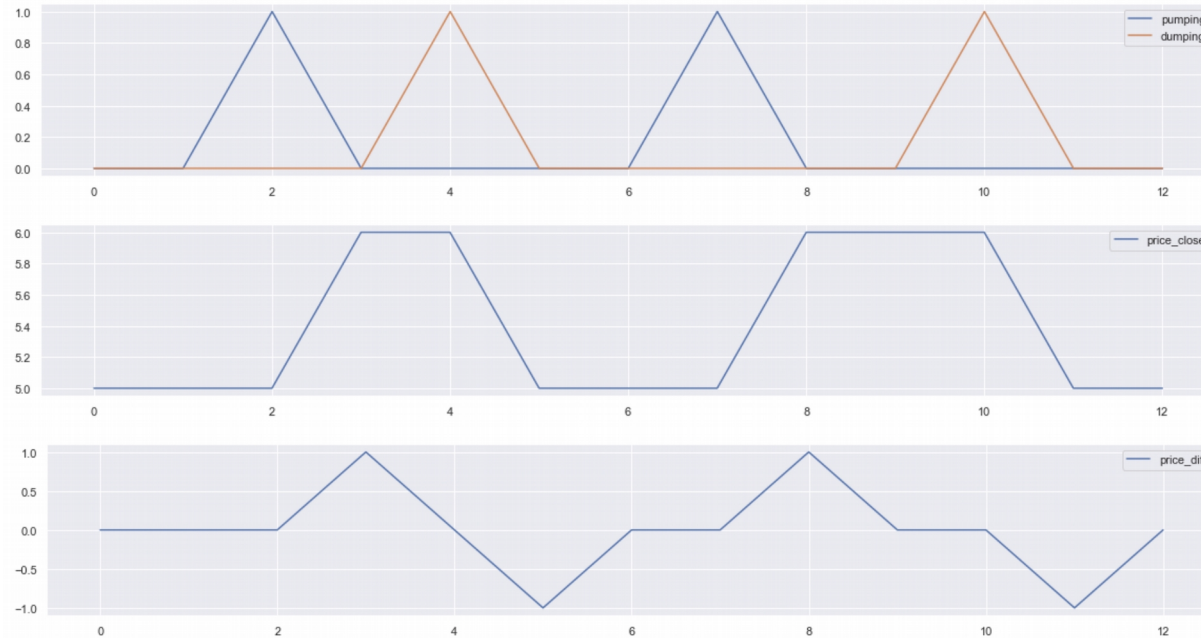
**Similarly, according to the above** – decrease/increase of unique addresses and large wallets (whales) in the structure of positions per market?



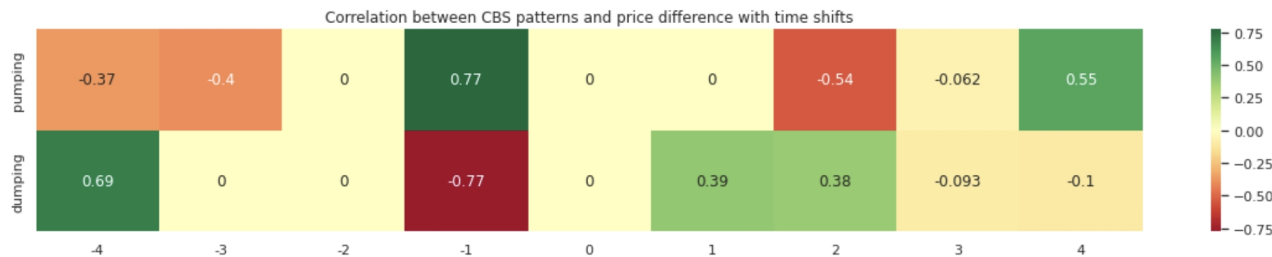
# “Temporal Cube” Correlational Analysis



# Causal Indicator Mining for Price Moves



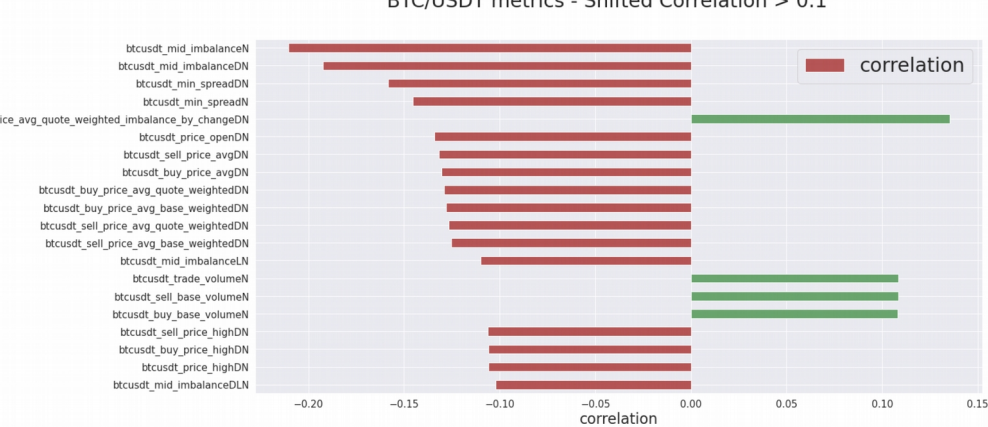
**Reverse temporal correlation as causal connection between market and/or media metrics and price changes**





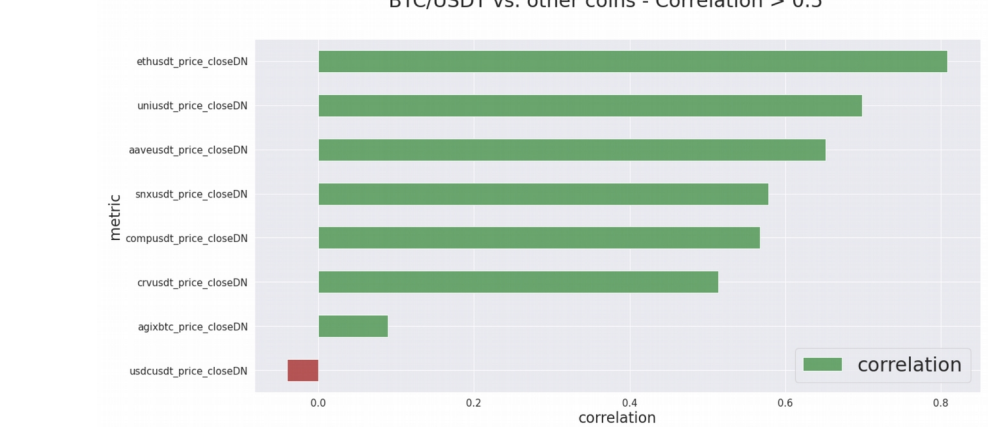
# Market Data Temporal Correlation Analysis

BTC/USDT metrics - Shifted Correlation > 0.1



## Single Market, Multiple Metrics

BTC/USDT vs. other coins - Correlation > 0.5



## Single Shift, Single Metric, Multiple Markets

## Single Market, Multiple Metrics, Multiple Shifts

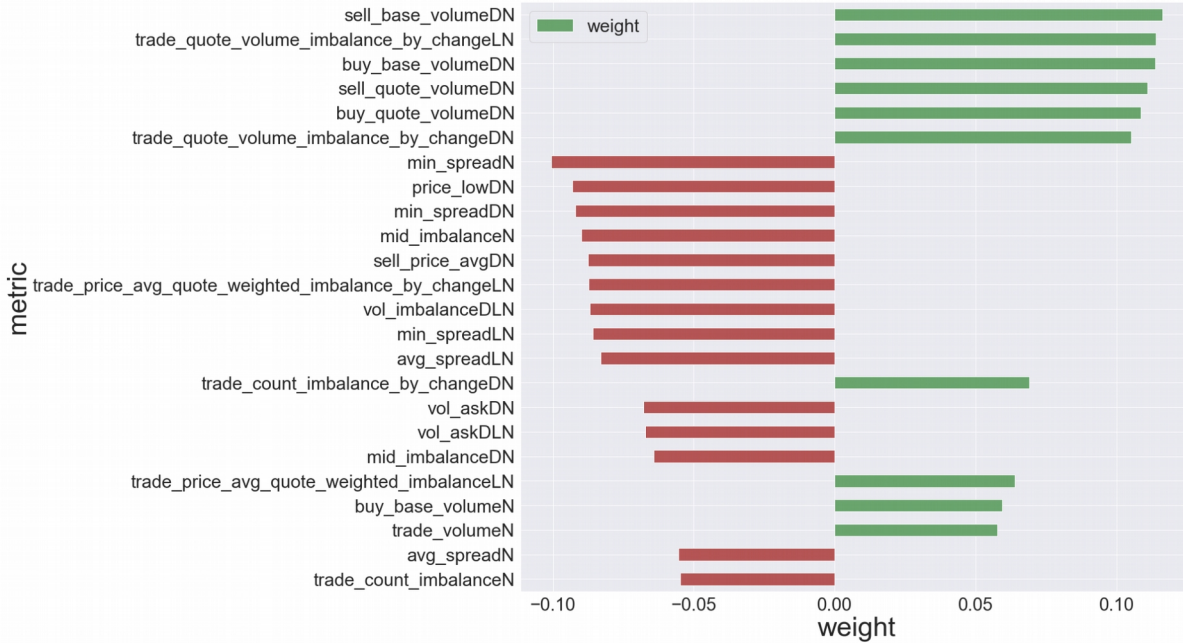




# Building Compound Metrics/Indicators

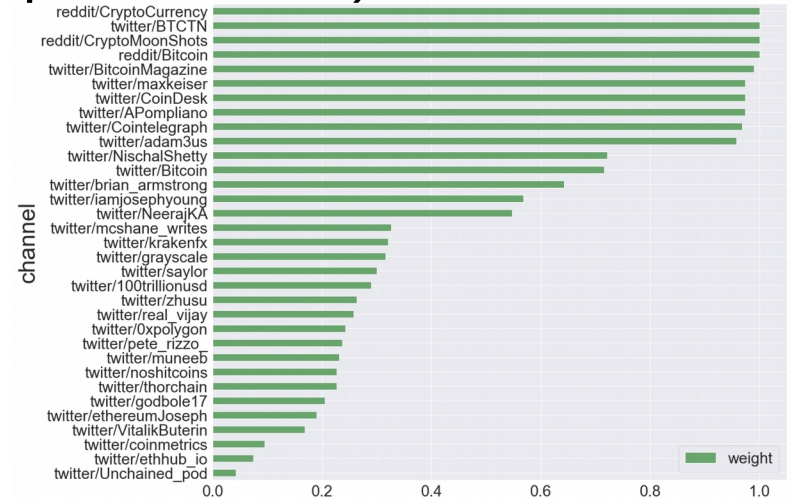
## Market Metrics (single market)

Weight by metric > 0.5

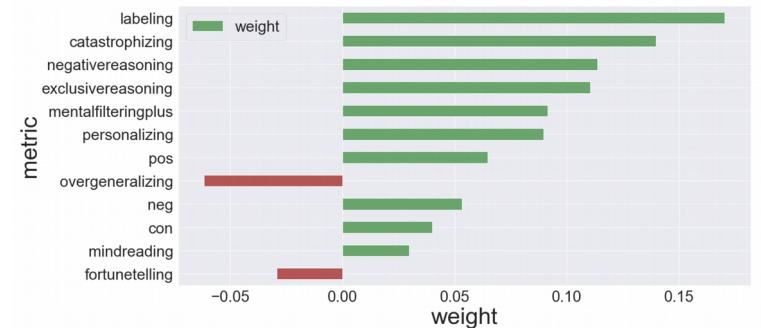


## Media Metrics

(multiple channels) <sup>Weight by channel</sup>

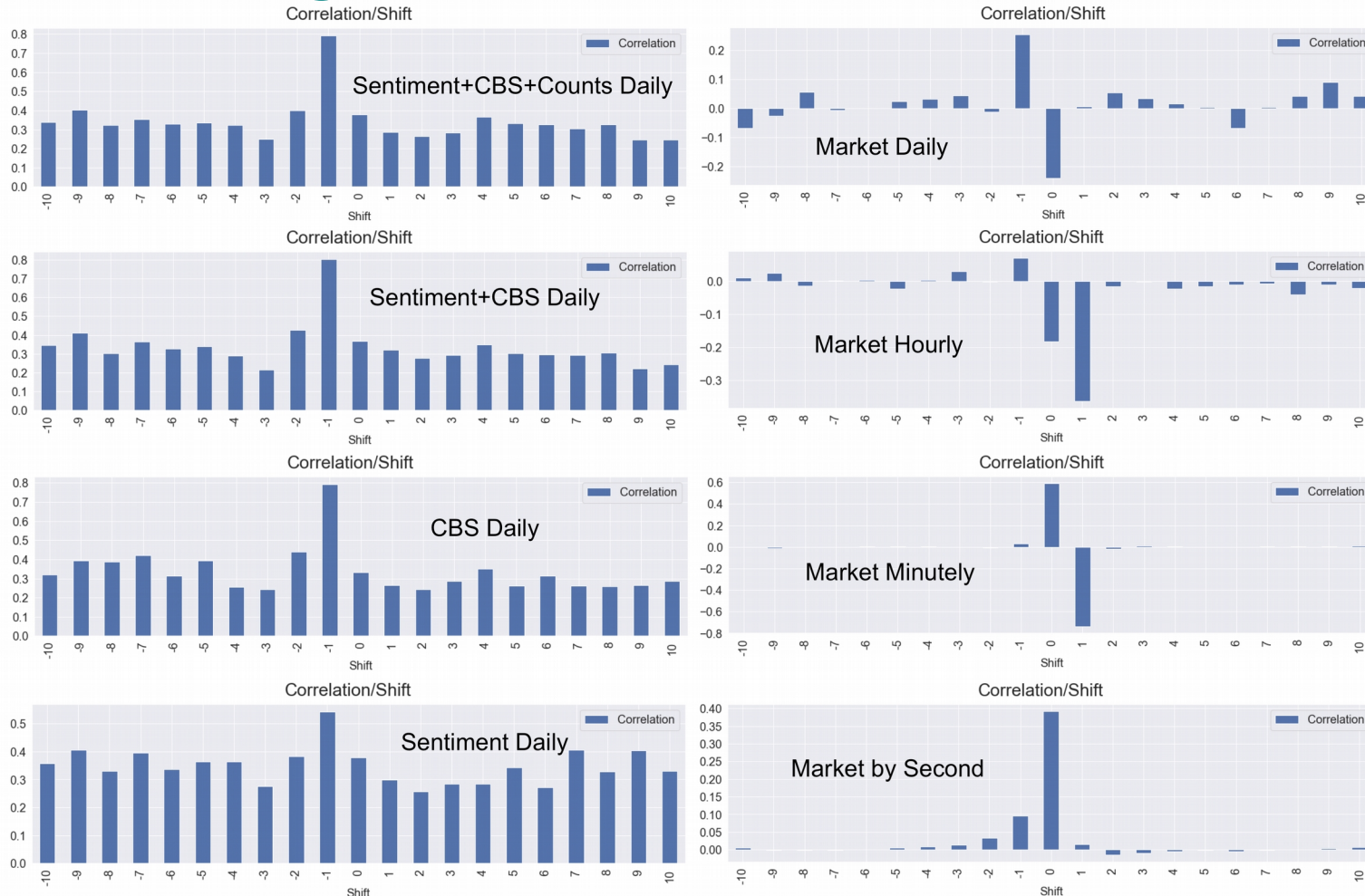


Weight by metric: twitter/BTCTN (1.0)





# Searching for Compound Causation



# Publications

Architecture of Automated Crypto-Finance Agent

<https://ieeexplore.ieee.org/document/9686345>

<https://arxiv.org/abs/2107.07769>

Adaptive Multi-strategy Market Making Agent

[https://link.springer.com/chapter/10.1007/978-3-030-93758-4\\_21](https://link.springer.com/chapter/10.1007/978-3-030-93758-4_21)

Adaptive Multi-Strategy Market-Making Agent For Volatile Markets

<https://arxiv.org/abs/2204.13265>

Causal Analysis of Generic Time Series Data Applied for Market Prediction

<https://arxiv.org/abs/2204.12928>

Social Media Sentiment Analysis for Cryptocurrency Market Prediction

<https://arxiv.org/abs/2204.10185>



# Thank you and welcome!

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With:

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