

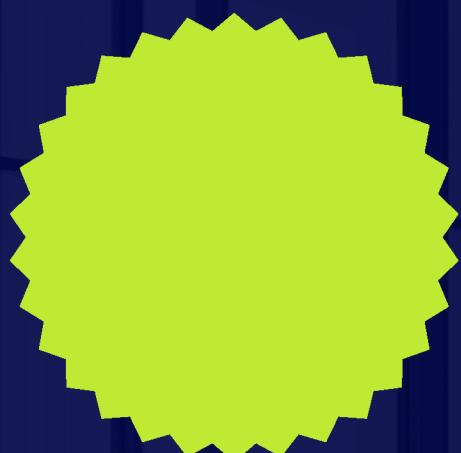
Presented by: Paya, Julia, Kevin, Benassar

SIGNAL SIGMA

Building a Future of Financial Independence

Date: 15th May 2025

DISCLAIMER



This project is intended solely for research, educational and prototyping purposes. It does not constitute financial advice and should not be used for real-world trading or investment decisions without independent verification and consultation with a qualified financial advisor.

Although the developers have become very rich (purely coincidentally, of course), you should make your own decisions responsibly and at your own risk.

Presented by: Paya, Julia, Kevin, Benassar

SIGNAL SIGMA

Building a Future of Financial Independence

Date: 14th May 2025

BEHIND THE PROJECT

creative and smart



Julia Löschel
**Data Scientist
and Project
Management**



Kevin Dietrich
**Math and
Statistics
Aficionado,
Prospective
Data Scientist**

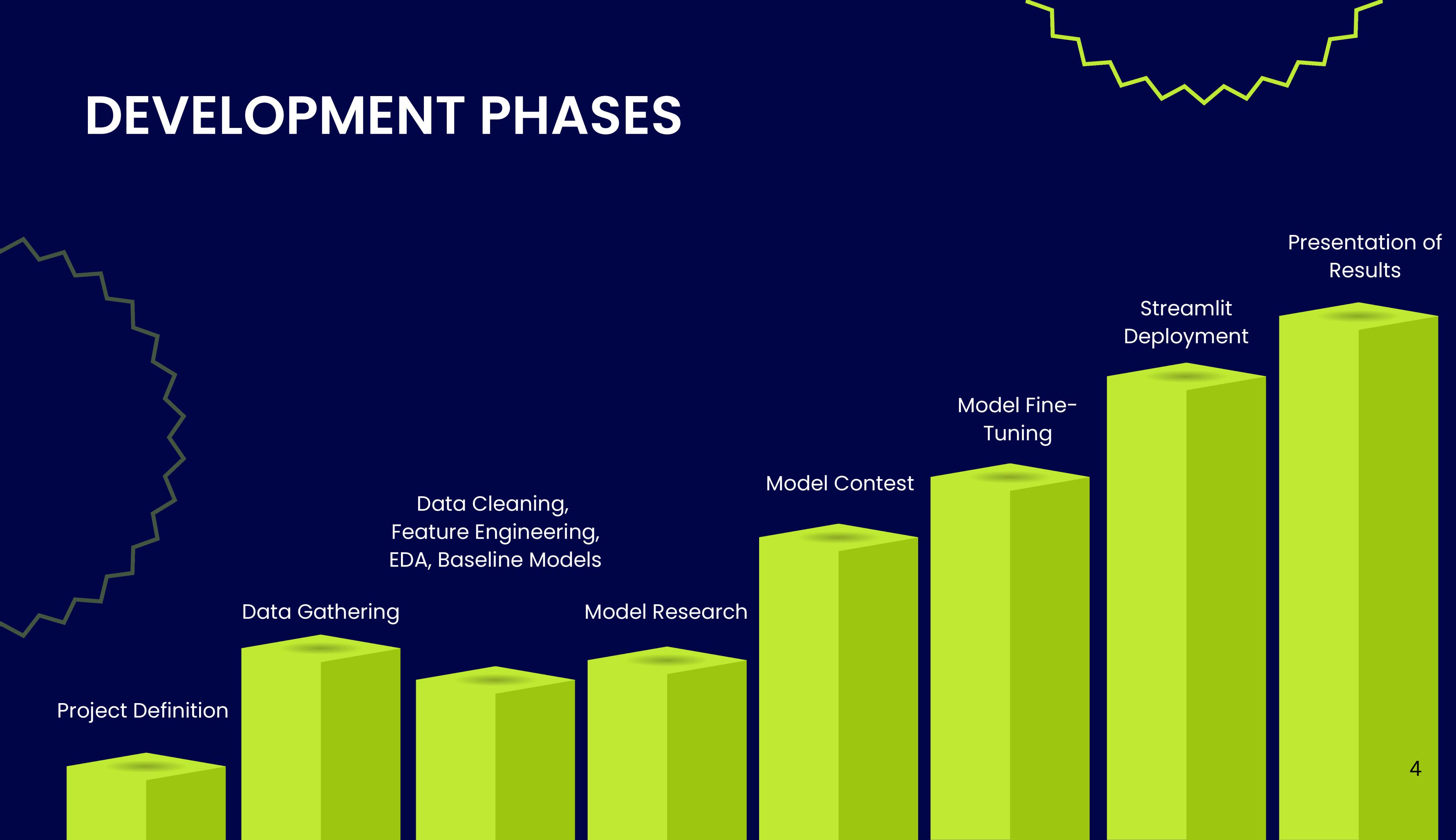


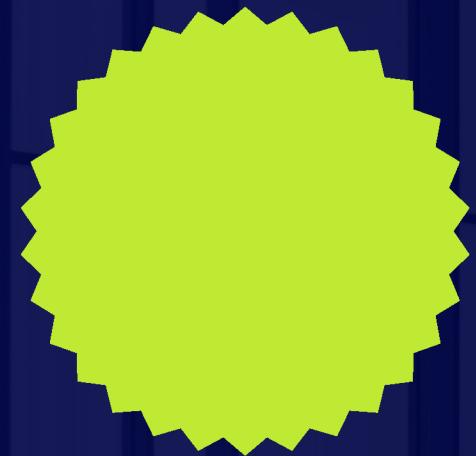
Paya Moghtanem
**Data Analyst
and Data
Scientist
AI enthusiastic**



Benasser Haidame
**Data Scientist
and Stock
Specialist**

DEVELOPMENT PHASES





KEVIN



STOCK MARKET PREDICTION

Why Predict Stock Prices?

💰💰💰, Risk Management, Portfolio Optimisation, ...

Long or Short Position?

Interest depends on whether you are holding stocks/calls or puts.

More than a single point estimation is demanded.

What Influences Stock Prices?

- **Intrinsic:** Management Decisions, Innovative Strength, ...
- **Extrinsic:** Macroeconomic Conditions, (Geo-)Political Events, ...

Simple ML-models can hardly forecast stock prices.

THE FACTS IN THE CASE OF STOCK MARKET MODELLING

- **Fama's* Efficient Market Hypothesis (1970):**

All publicly available information is instantly incorporated into stock prices.

- **Black-Scholes*-Merton* Model (1973):**

Stock prices behave like (geometric) random walks in continuous time.



- **Folk Saying in Statistics:**

All models are wrong but some are useful.

The first two results predate the advent of deep neural networks, of course.

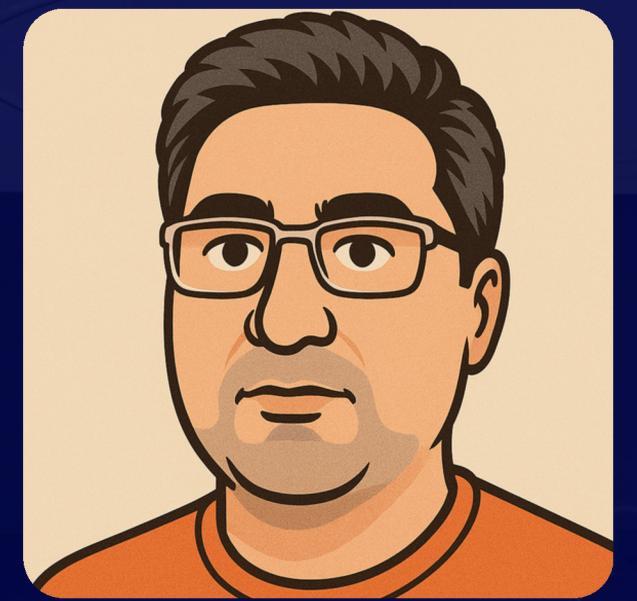
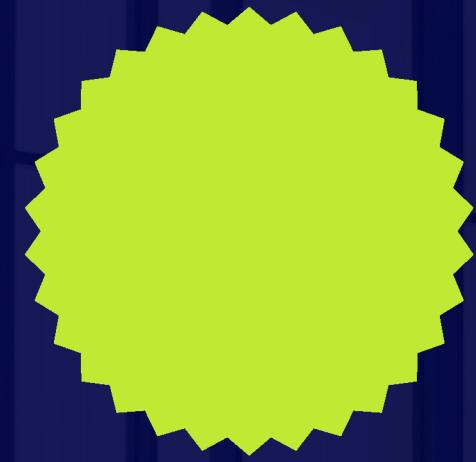
THE DATA SET

Data Sources:

- Yahoo Finance
 - Stocks (Apple, Tesla, ...)
 - Market Indicators: Indices (Dow Jones), Commodities (Gold), ETFs
 - Cryptocurrencies (Bitcoin)
- FRED (Federal Reserve Economic Data)
 - Interest Rates (Prime Interest Rate)

Key Properties:

- Focus on US market
- (Essentially) One sample per trading day
- Publicly available
- Data very clean 😊



PAYA

MODEL CONTEST



LSTM

captures long-term
patterns

Deep AR

excels in probabilistic
time series forecasting

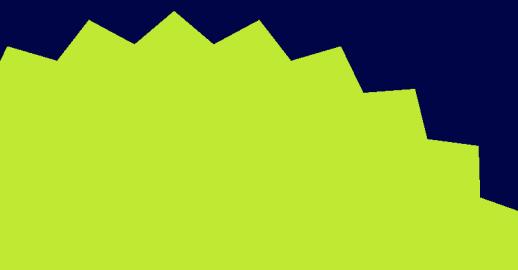
DSSM

drives relevance in
matching tasks like
search and
recommendation.

TFT

adds interpretability
and attention

Results





METRICS

Single-Point Forecast Metrics

- MAE (Mean Absolute Error)
- R² (R-squared)

Quantile Forecast Metrics

- Pinball Loss
- Quantile Width (e.g., p90 - p10)

Random Forest Importance

Gauges feature contribution based on ensemble tree splits.

Mutual Information

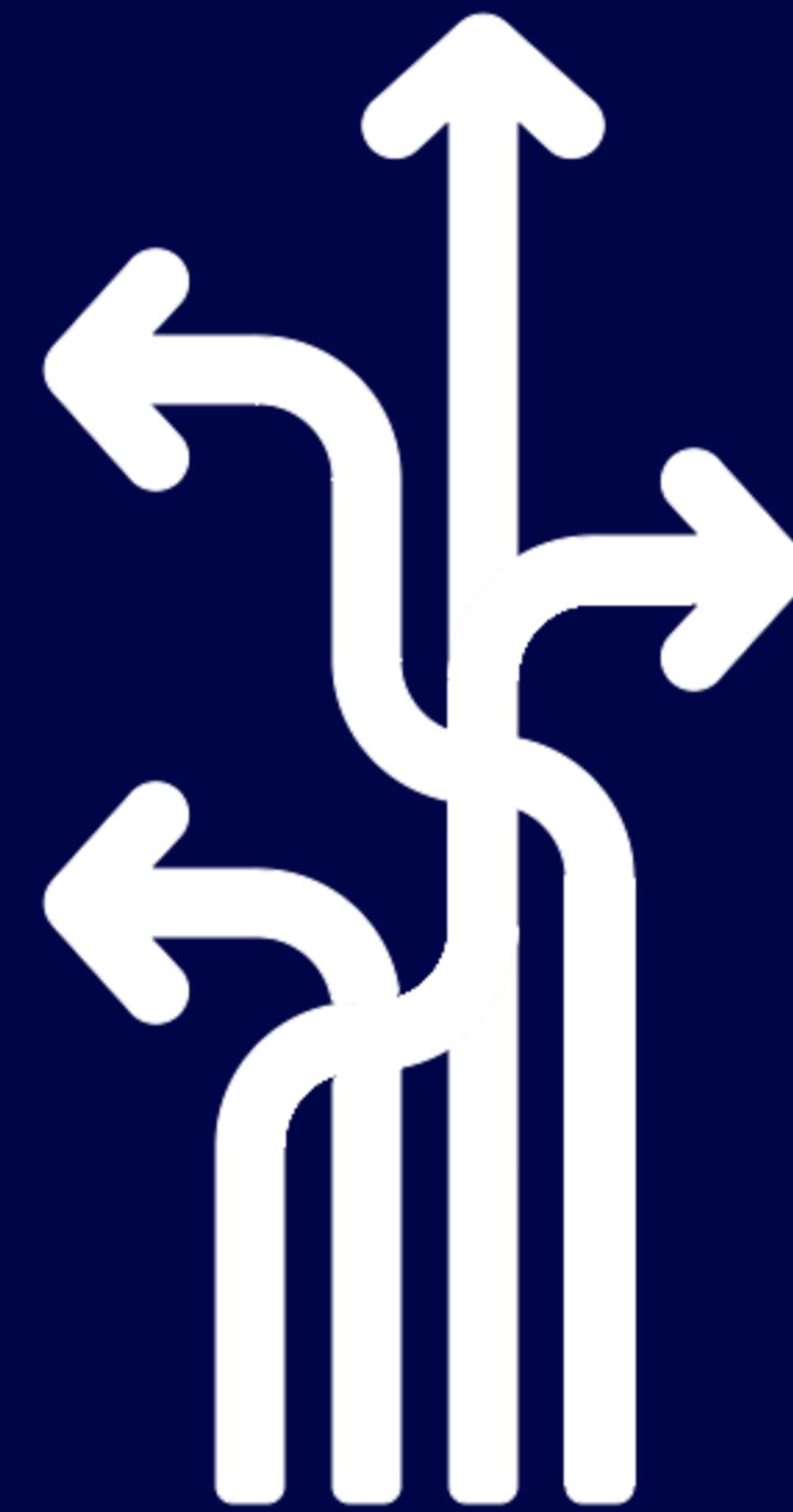
Captures nonlinear dependencies between features and target variable.

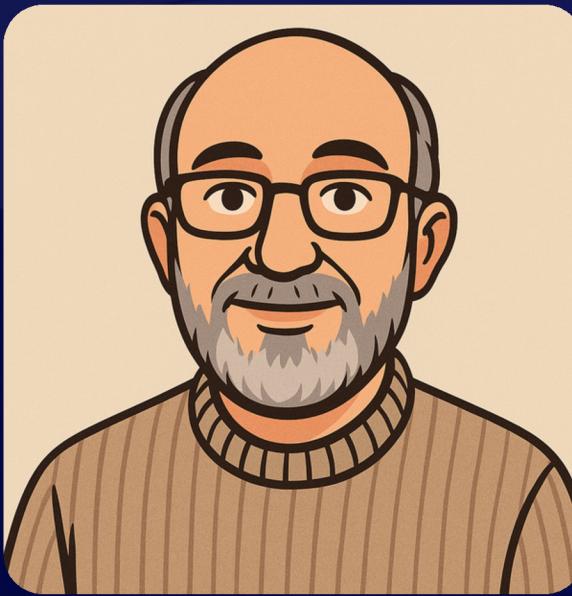
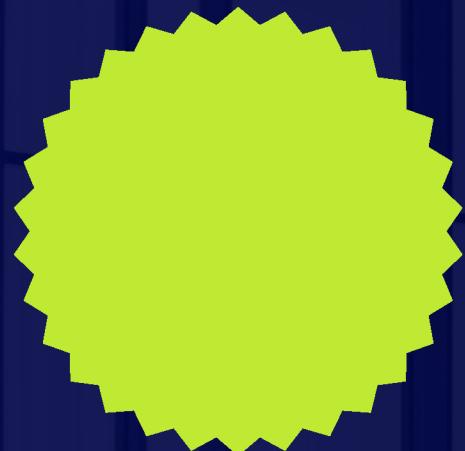
Pearson Correlation

Measures linear relationships between features and target variable.

XGBoost Importance

Estimates feature gain in prediction accuracy using gradient boosting.





BENASSER

MODEL DECICION

Work in progress

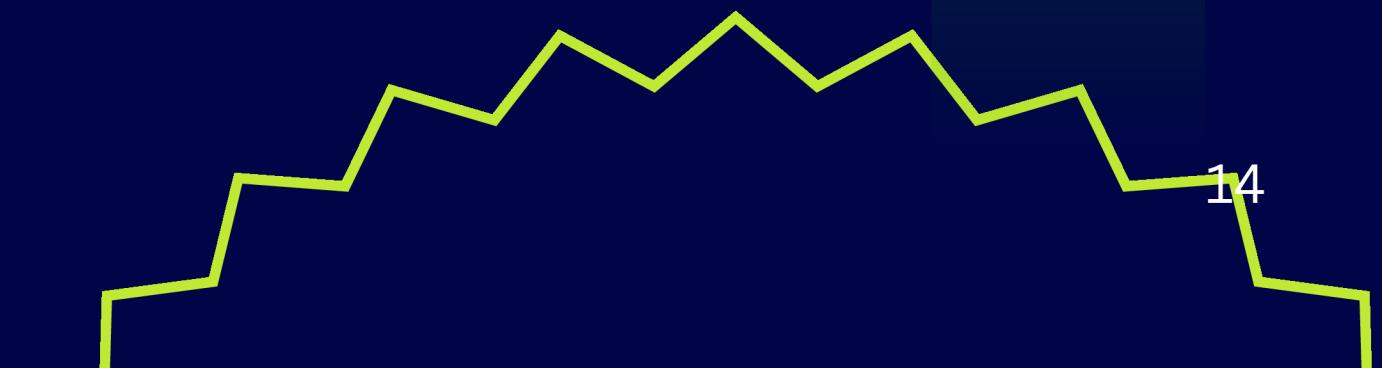
LSTM

- Some
- information

TFT

- Some
- information

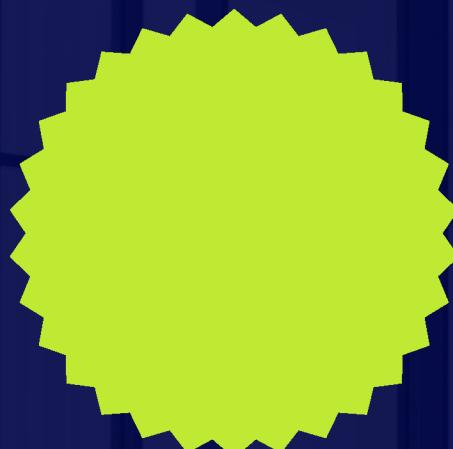
Importance of staying informed with news and reports.



STREAMLIT DEMO

RESULTS

Work in progress



How do we evaluate the model

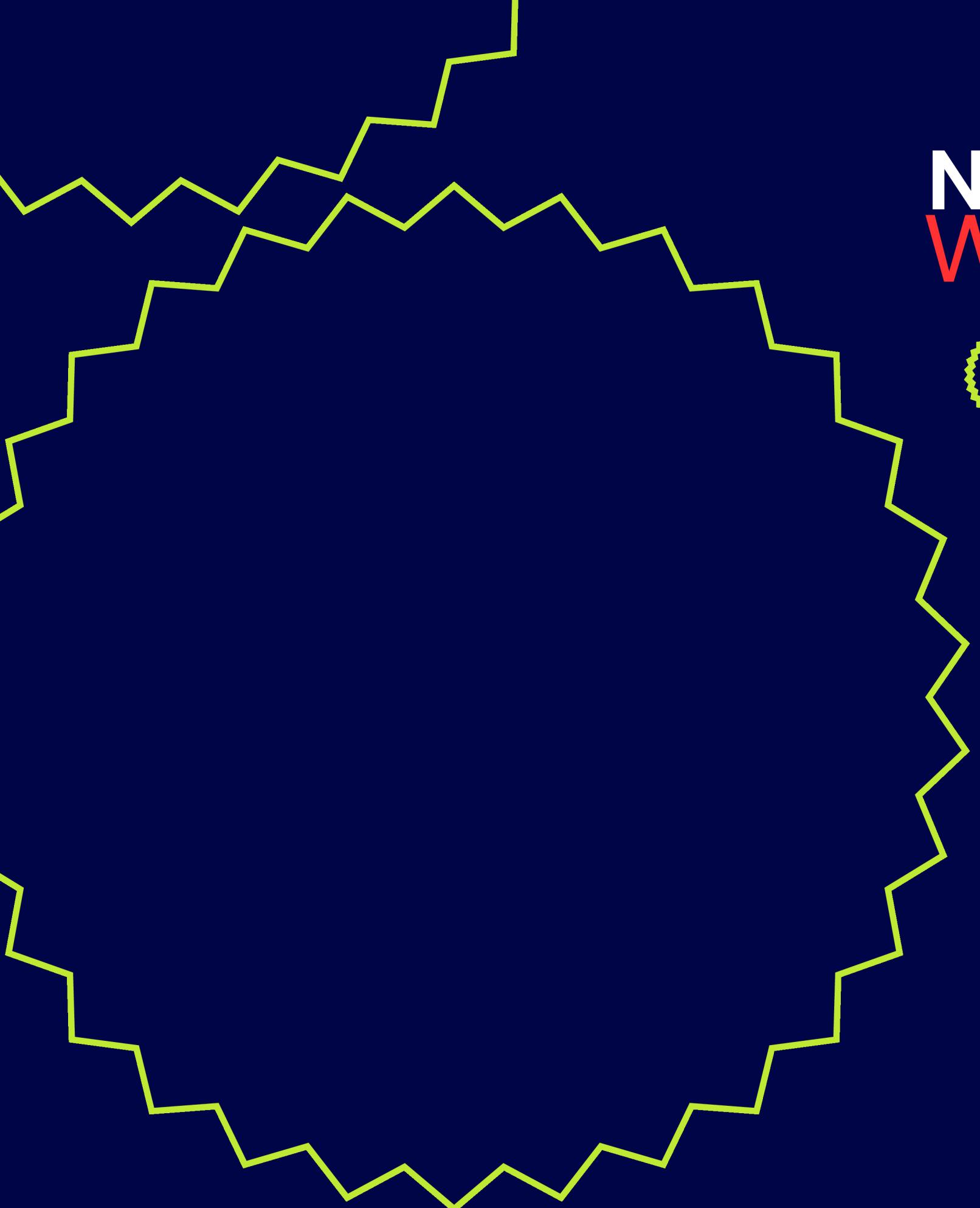
MSE,
MSRE...

Julia Löschel

Performance of the product (user)

Risk,
Return,
volatility...

Julia Löschel



NEXT STEPS

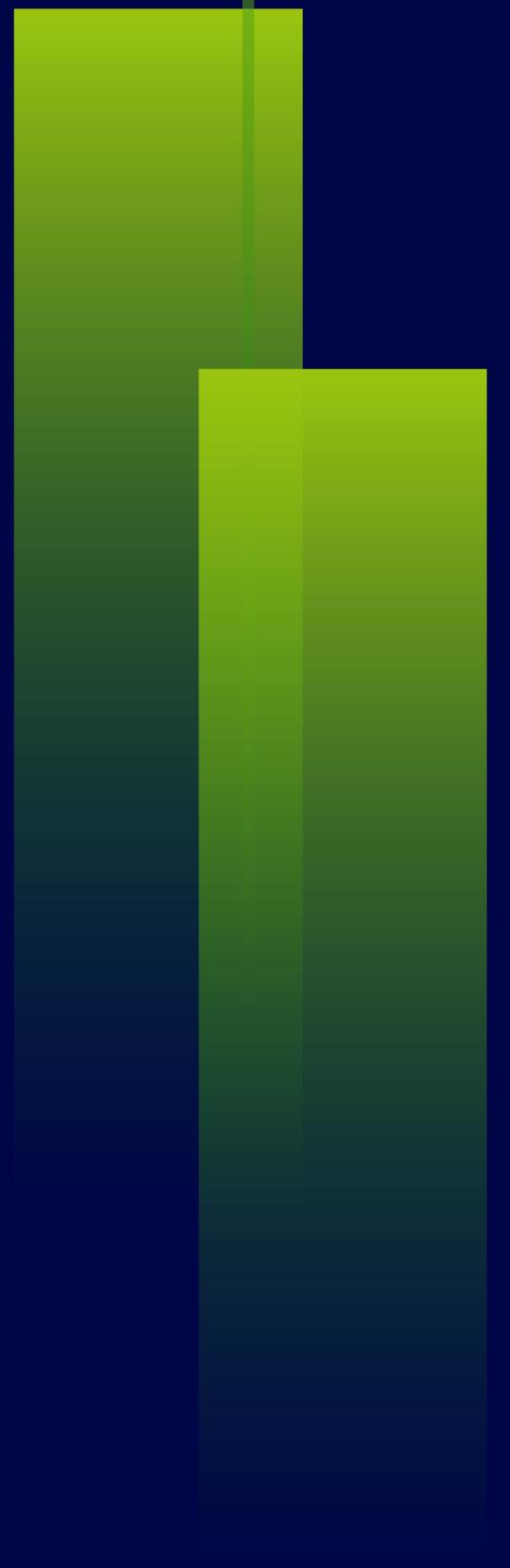
Work in progress

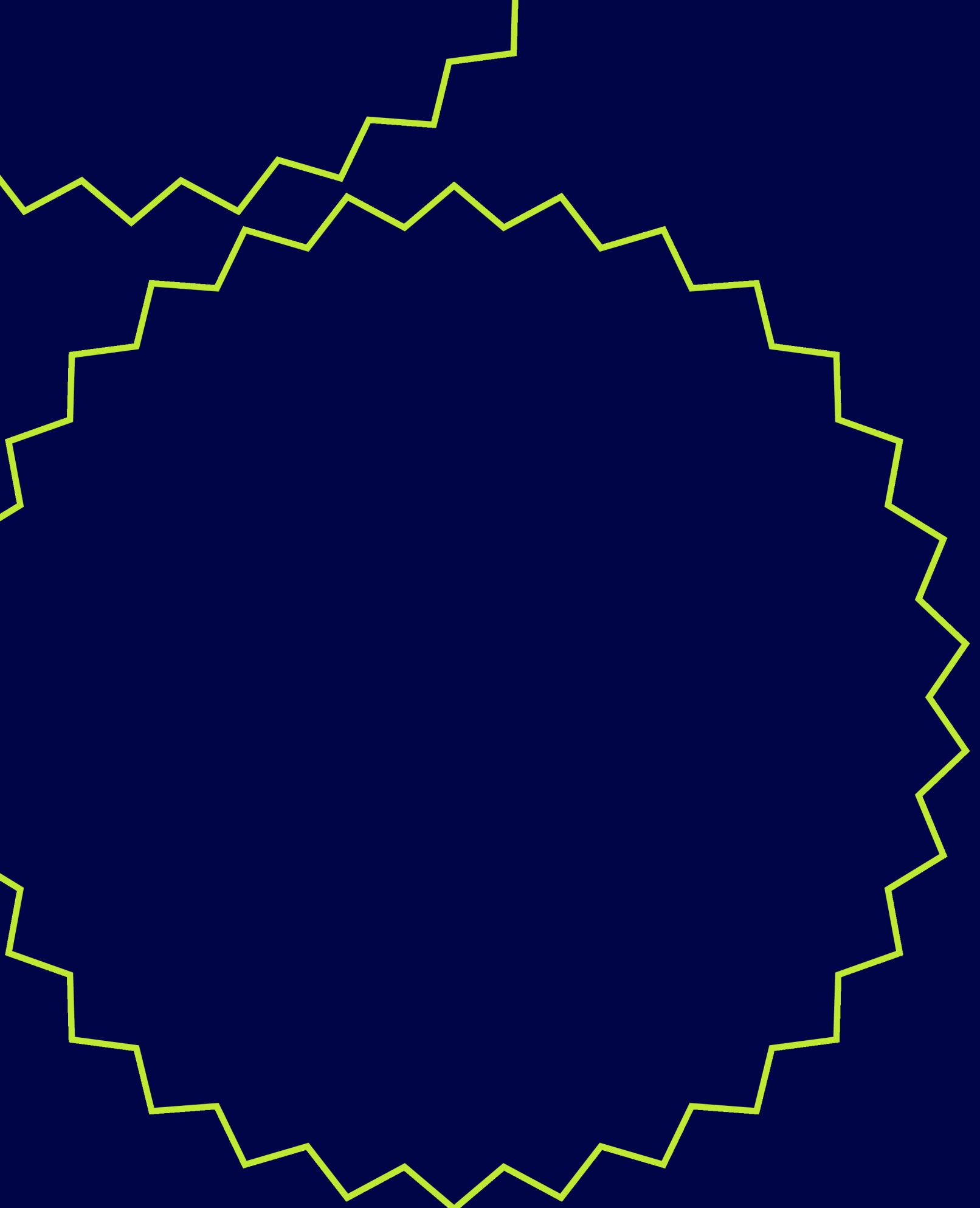
Add morde stocks

Add more models

Add more models

Provide prediction
functionality as package:
import signal_sigma as sisi





QUESTIONS ?

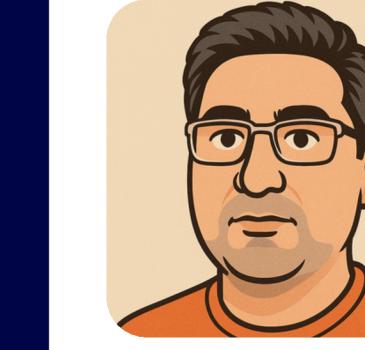
CONNECT WITH US ON LINKEDIN



Julia Löschel



Kevin Dietrich



Paya Moghtanem



Benasser Haidame

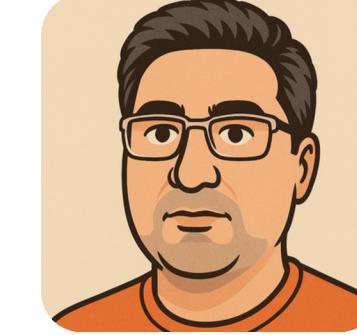




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