Time Series Analysis for Foreign Exchange Rates

This presentation will explore various time series models, including machine learning (ML), deep learning (DL), and statistical methods, with a focus on the Prophet model's exceptional accuracy in forecasting exchange rates.

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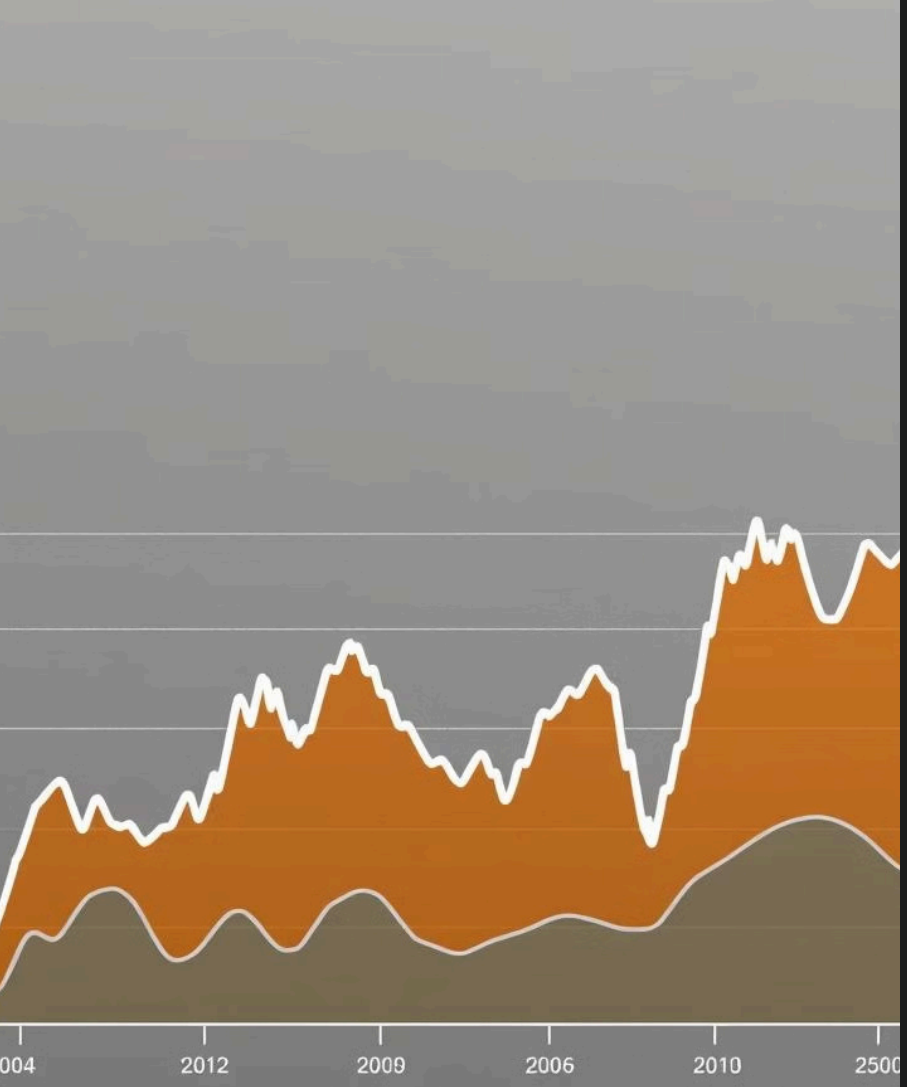
Introduction to Foreign Exchange Rates

Global Market

Foreign exchange rates are the prices at which currencies are exchanged. They fluctuate constantly due to various factors, such as economic data releases, political events, and market sentiment.

Key Factors

Interest rates, inflation, and economic growth rates significantly influence exchange rates. Currency traders constantly analyze these factors to predict future movements.



Statistical Methods for Time Series Analysis

ARIMA

Autoregressive Integrated Moving Average (ARIMA) models are widely used for time series forecasting. They capture trends and seasonality in data.

SARIMA

Seasonal ARIMA (SARIMA) models extend ARIMA by explicitly accounting for seasonal patterns in the data, making them suitable for data with recurring trends.

Exponential Smoothing

Exponential smoothing techniques are used to forecast future values based on past data, giving more weight to recent observations.

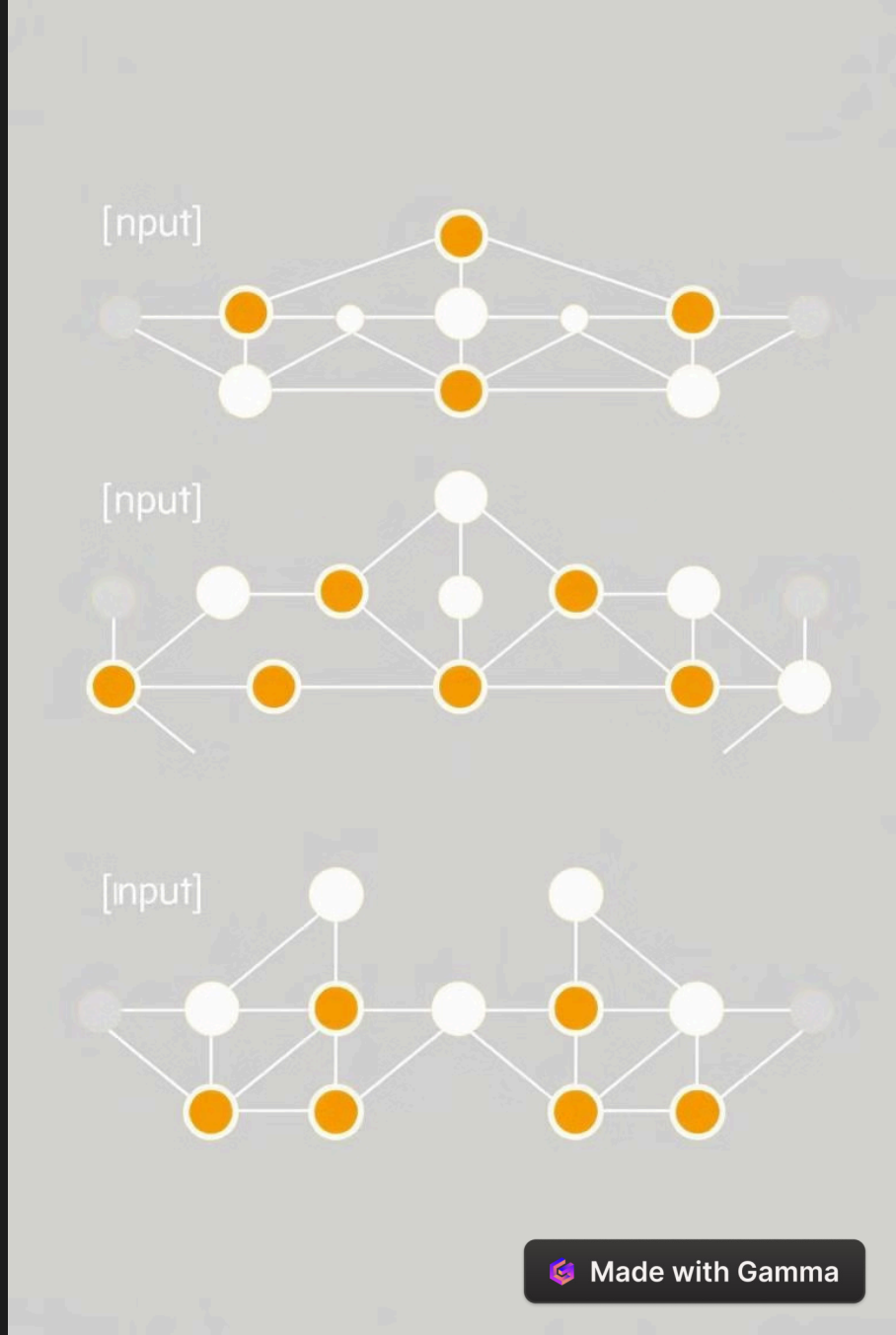
MA Model

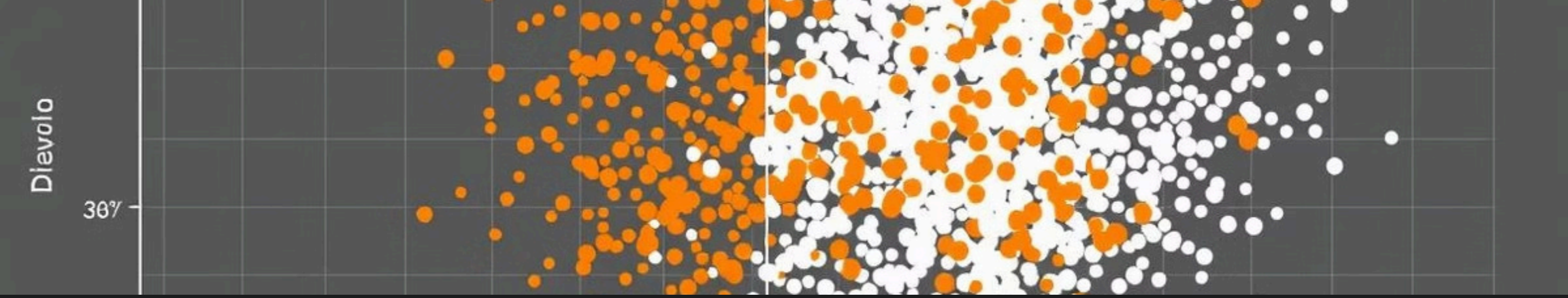
Moving average (MA) models use a weighted average of past errors to predict future values, focusing on short-term fluctuations.

Deep Learning for Time Series Analysis

TST

Time Series Transformers (TST) are a powerful DL approach for time series forecasting, leveraging attention mechanisms to capture long-term dependencies.





Machine Learning for Time Series Analysis

1 SVM

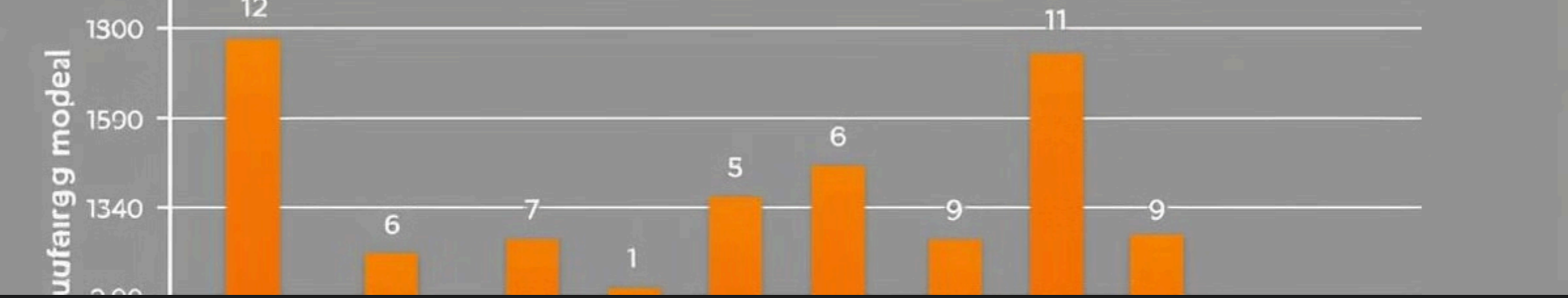
Support Vector Machines (SVM) are used for both classification and regression, seeking the optimal hyperplane to separate data points.

2 K-NN

K-Nearest Neighbors (K-NN) is a non-parametric method that classifies data points based on their proximity to known neighbors.

3 Gradient Boosting Ensemble

Gradient boosting algorithms combine multiple weak learners to create a strong predictor, sequentially improving the model by focusing on misclassified data.



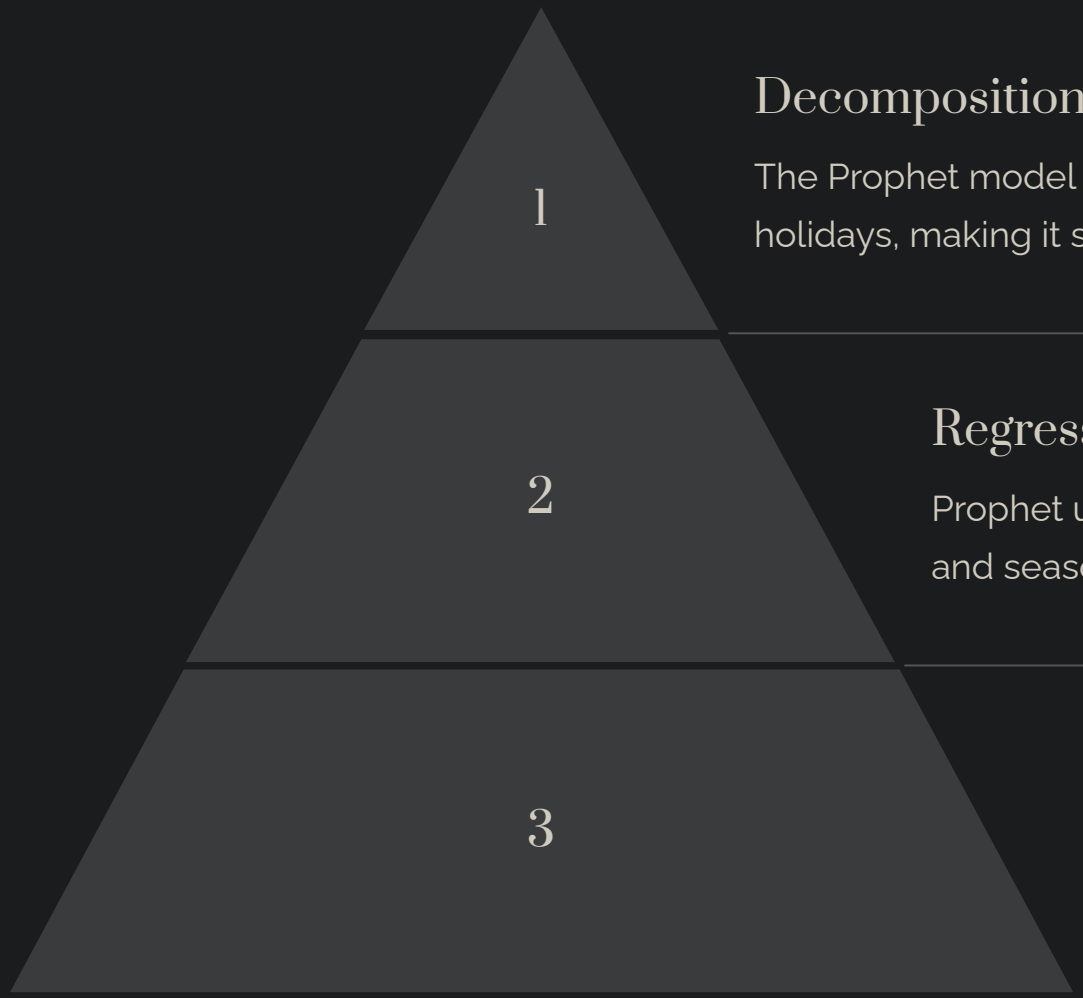
Evaluation of Model Performance

98%

Accuracy

Model performance is evaluated by comparing actual values to predicted values. This metric measures the model's ability to accurately forecast future outcomes.

Introduction to the Prophet Forecasting Model



Decomposition

The Prophet model decomposes time series data into trend, seasonality, and holidays, making it suitable for forecasting data with recurring patterns.

Regression

Prophet uses a piecewise linear regression model to capture trends and seasonality, allowing for flexible and accurate forecasts.

Uncertainty Estimation

The Prophet model provides uncertainty intervals for its predictions, allowing users to gauge the confidence of their forecasts.

Conclusion: Prophet Model Achieves 98% Accuracy

Among the explored models, Prophet demonstrates exceptional accuracy in forecasting foreign exchange rates, achieving 98% accuracy. Its ability to effectively capture trends, seasonality, and holidays, combined with uncertainty estimation, makes it a powerful tool for forecasting exchange rates.