Forecasting Enterprise Data At Machine Scale

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Enterprise data is often messy, with complex dynamics at play

Traditional approaches to time series forecasting are usually unreliable

Auto ARIMA
Exponential Smoothing
Seasonal Naive
TBATS

Graphs combined with non-parametric additive regressive forecasting provide a scalable, robust approach.

Leaf node forecast generated using PROPHET.
Non-Parametric Additive Regressive Modeling with Prophet

Four Main Components

• Piecewise linear or logistic growth curve trend
  – Prophet automatically detects changes in trends by selecting changepoints from the data
• Yearly seasonal component modeled using Fourier series
• Weekly seasonal component using dummy variables
• User-provided list of events

Key Benefits

• MAP optimization for parameters performed in Stan
  – Speed, enables Hamiltonian Monte Carlo
• Use of regressors is very flexible and not limited to various seasonality factors, can add other independent variables
• Can repurpose for impact of discrete events

A Hybrid Graph-Based Prophet Approach Provides a Significantly Better Forecast Scalable Across The Enterprise

**Metric 1**

- **Legacy**
- **Nodin**

**Metric 2**

- **Legacy**
- **Nodin**

**Metric 3**

- **Legacy**
- **Nodin**
Technology Stack

- Python
- Prophet
- ArangoDB
- Google Cloud
- Scikit Learn

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Resources

Prophet:  https://facebook.github.io/prophet/

Forecasting At Scale:  https://peerj.com/preprints/3190/


PyStan:  https://github.com/stan-dev/pystan
Thank You

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