Technical Report: Forecasting with Darts Library

Introduction

Darts is a Python library designed for time-series forecasting that provides a unified interface to multiple forecasting models, including machine learning algorithms, statistical models, and deep learning-based approaches. One of the popular models in Darts is the **N-BEATS** algorithm, a neural network-based approach for time-series forecasting.

N-BEATS Model

N-BEATS (Neural Basis Expansion Analysis) is a state-of-the-art deep learning model specifically designed for time-series prediction. Unlike traditional models, N-BEATS doesn't rely on explicit seasonal or trend components, making it flexible for forecasting non-linear patterns. It is based on fully connected feed-forward neural networks, making it end-to-end trainable.

Key Parameters for N-BEATS in Darts:

- **`input_chunk_length`**: Specifies the number of historical data points used for making predictions. A longer chunk length can capture more temporal dependencies but may increase model complexity.
- **`output_chunk_length`**: Defines how many future time steps the model predicts. For instance, forecasting for the next 7 days requires setting this value to 7.
- **`num_blocks`**: The number of N-BEATS blocks (sub-networks) used to capture various patterns in the time-series data.
- **`hidden_size`**: Size of the hidden layer in the neural network blocks. It determines the model's capacity to learn from the data.
- **`activation`**: The activation function used in the network, typically ReLU or Tanh.

Conclusion

The N-BEATS model in Darts provides a powerful tool for time-series forecasting with flexible configuration options. By adjusting model parameters like `input_chunk_length`, `output_chunk_length`, and `hidden_size`, users can fine-tune the model to achieve optimal forecasting performance for different applications.