

NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS

PROJECT PROPOSAL

TIME SERIES FORECASTING WITH TEMPORAL FUSION TRANSFORMERS

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In this project I research interpretable model for multi-horizon time series forecasting based on temporal fusion transformers that was proposed in the article [1]. The model will be reproduced on PyTorch framework, then I will extend training data for model and will experiment with hyperparameters and model.

Introduction

Multi-horizon forecasting is the prediction for estimates across several steps in future. It has many real-world applications. Typically, models provide forecasts from “black-box” models, while Temporal Fusion Transformer combines high-performance multi-horizon forecasting with interpretable insights into temporal dynamics. To learn temporal relationships at different scales, TFT uses recurrent layers for local processing and interpretable self-attention layers for long-term dependencies. TFT utilizes specialized components to select relevant features and a series of gating layers to suppress unnecessary components, enabling high performance.

Project goals:

1. Reproduce the experiment with volatility dataset [2].
2. In the original paper data used from 2000-01-03 to 2019-06-28. I will train model on data to 2021-05-01.
3. Tune model's hyperparameters.
4. Experiments with changing the model:
 - a. Change Softmax to SM-Taylor softmax [3]
 - b. Add linear layer to GRU

References:

- [1] Lim, Bryan & Arik, Sercan & Loeff, Nicolas & Pfister, Tomas. (2019). Temporal Fusion Transformers for Interpretable Multi-horizon Time Series Forecasting.
- [2] G. Heber, A. Lunde, N. Shephard, K. K. Sheppard, Oxford-man institute's realized library (2009)
- [3] Kunal Banerjee, Vishak Prasad C, Rishi Raj Gupta* , Karthik Vyas* , Anushree H* , Biswajit Mishra. (2020). Exploring Alternatives to Softmax Function.