

# MultiResFormer: Transformer with Adaptive Multi-Resolution Analysis for Long-Term Time Series Forecasting

The first Transformer-based model with Fourier-guided time series segmentation which surpasses naive patch-based Transformer and CNN-based methods.

**Linfeng Du**

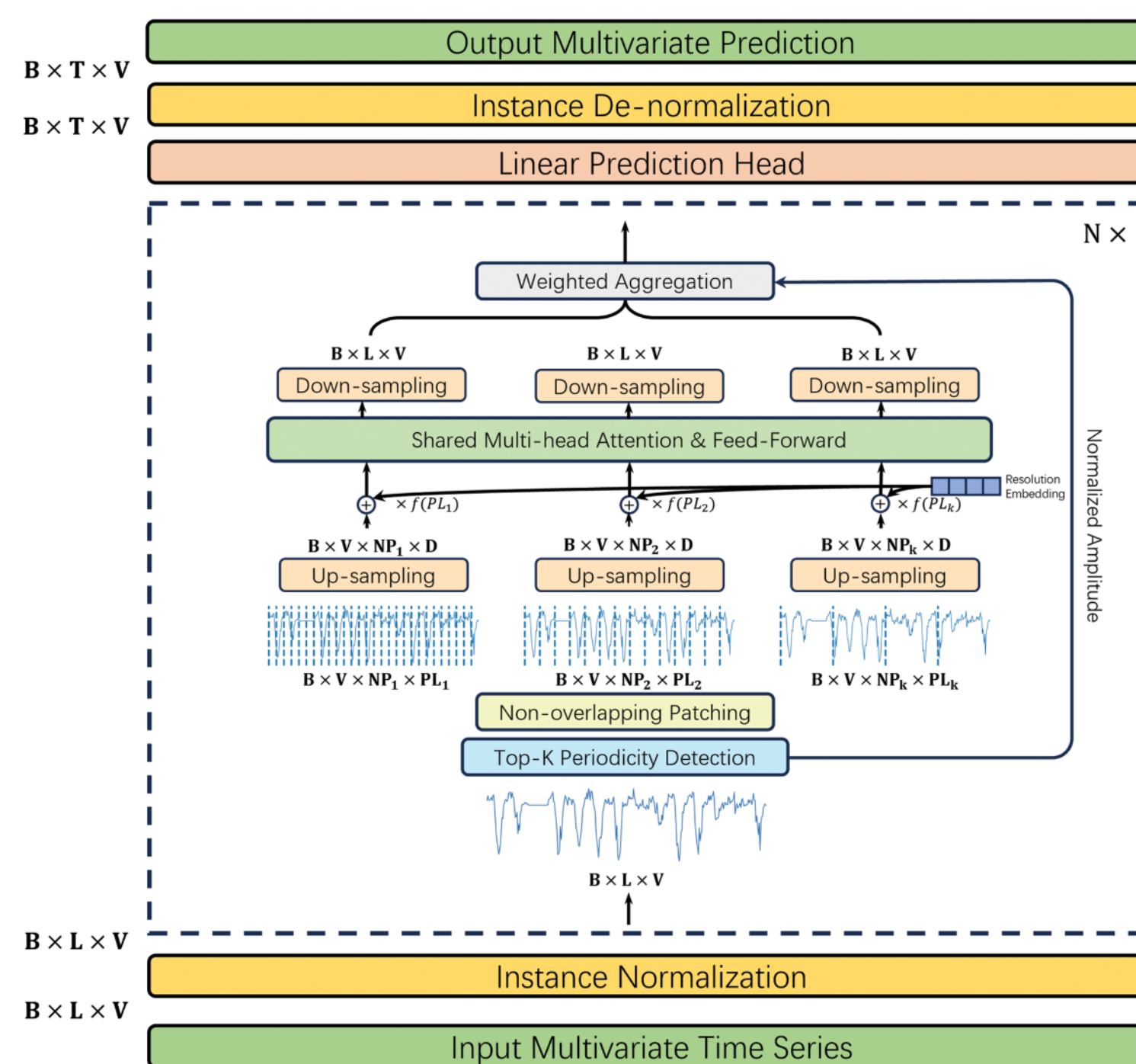
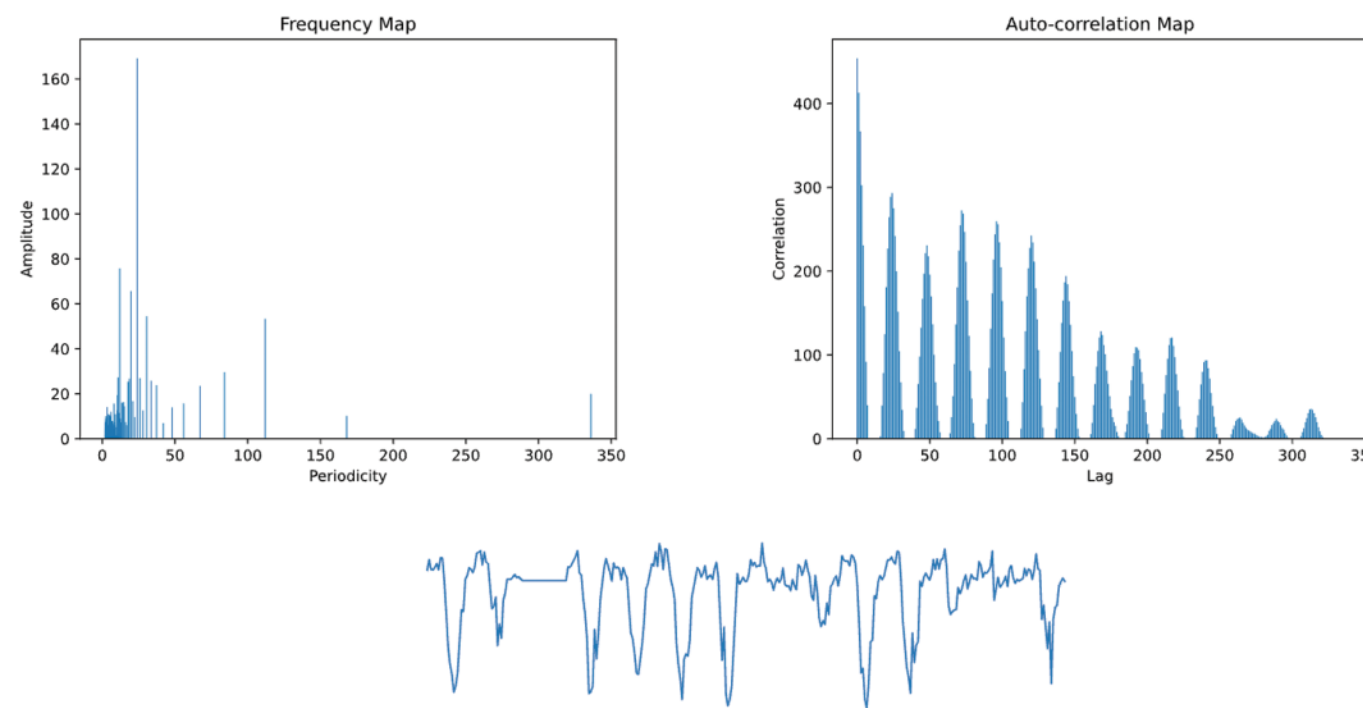
**Rahul Krishnan**

ACADEMIC SUPERVISOR

**Saba Zuberi**

INDUSTRY SUPERVISOR

Fourier/Auto-correlation based Periodicity Detection



## PROJECT SUMMARY

Accurate forecasting of the long-term future based on the past values of time series data is of immense importance for risk-aversion and decision-making in various domains. While Transformer-based methods have recently re-established themselves as the state-of-the-art for long-term time series forecasting (LTSF) with the idea of patching borrowed from the vision domain, the multi-periodicity nature of real-life time series data is not fully explored in their modeling scheme. In this work, we propose the first Transformer-based method that effectively leverage the multi-periodicity property via Fourier-guided series segmentation and propose a up-and-down sampling paradigm which enables efficient parameter-sharing and multi-resolution representation aggregation. Extensive experiments on LTSF benchmark datasets show that MultiResFormer outperforms convolution and Transformer based methods with fixed resolutions with remarkable margins, and outperforms competitive patch-based Transformer on most cases. Our raw-series input-output scheme enables MultiResFormer to handle various tasks in time series analysis, opening up a new possibility as a general foundation model for the time series domain.