

Monitoring Data Analytics

Background: Modern monitoring systems continuously generate large, multivariate data streams. Analyzing them is essential for forecasting, generative modeling, and anomaly detection. Two complementary perspectives guide this agenda: time-series analysis, which models temporal and spatial dependence, distribution shifts, and uncertainty; and functional data analysis, which treats each segment or cycle as a curve to capture shape and phase variation across time, units, or locations. Viewed jointly, these lenses enable models that reason at both pointwise and whole-trajectory scales, providing a clear and flexible foundation for modern monitoring data analytics.

Methods: Deep Learning (Neural ODEs; GNNs; Causal inference; Attention mechanisms.)

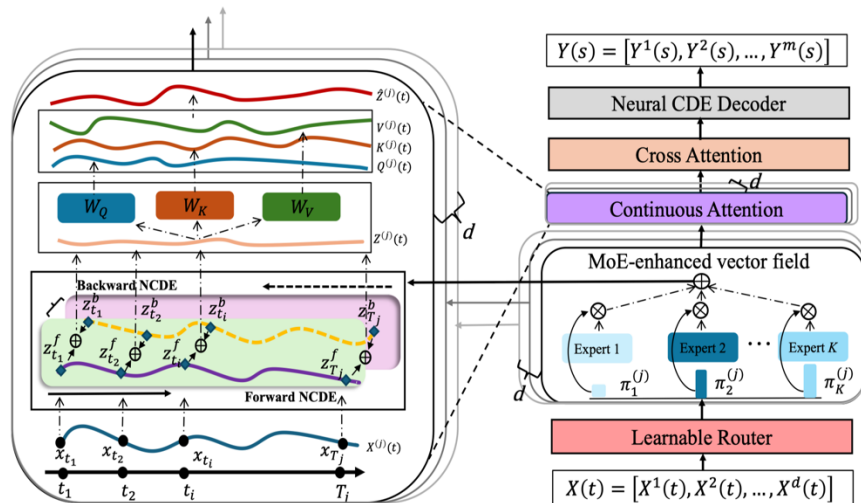


Figure 1: Architecture of the FAME.

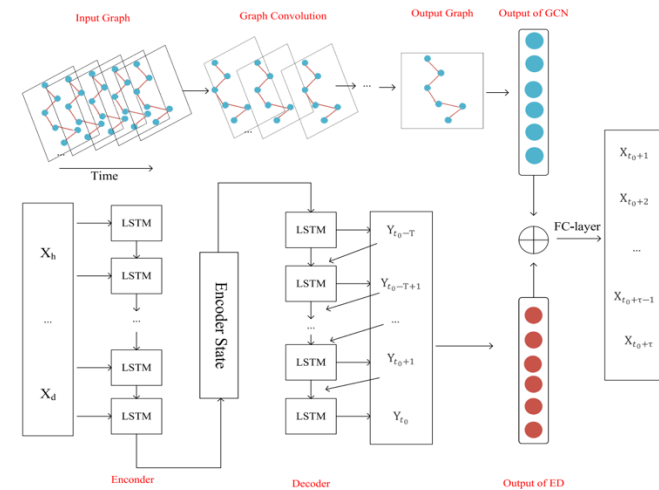


FIGURE 2. The framework of the GCN-ED model.