

An Explainable Machine Learning Framework for Recurrent Event Data Analysis

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Abstract

This presentation introduces a novel explainable temporal point process (TPP) model, Stratified Hawkes Point Process (SHPP), for modelling recurrent event data (RED). Unlike existing approaches that treat temporal influence as a black box or rely on post-hoc explanations, SHPP structurally decomposes event intensities into semantically meaningful components for describing self-, Markovian, and joint influences. This decomposition enables direct quantification of how past events contribute to future event risks, termed as influence values. We further provide a sufficient condition for mean-square stability based on kernel decay, ensuring long-term boundedness of intensities and realistic behavioural predictions. Experiments and an e-commerce case study demonstrate SHPP's ability to deliver accurate, interpretable, and stable modelling of complex event-driven systems.