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CTHTC: A Convolution-Backed Transformer Architecture for Temporal Knowledge Graph Embedding with Periodicity Recognition

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Abstract : Temporal Knowledge Graph Completion (TKGC) has attracted increasing attention for its enormous value; however, existing models lack capabilities to capture both local interactions and global dependencies simultaneously with evolutionary dynamics, while the latest achievements in convolutions and Transformers haven't been employed in this area. What's more, periodic patterns in TKGs haven't been fully explored either. To this end, a multi-stage hybrid architecture with convolution-backed Transformers is introduced in TKGC tasks for the first time combining the Hawkes process to model evolving event sequences in a continuous-time domain. In addition, the seasonal-trend decomposition is adopted to identify periodic patterns. Experiments on six public datasets are conducted to verify model effectiveness against state-of-the-art (SOTA) methods. An extensive ablation study is carried out accordingly to evaluate architecture variants as well as the contributions of independent components in addition, paving the way for further potential exploitation. Besides complexity analysis, input sensitivity and safety challenges are also thoroughly discussed for comprehensiveness with novel methods.

Keywords : temporal knowledge graph completion, convolution, transformer, Hawkes process, periodicity
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