# T2LP: mining hidden relationships between relationships

## Abstract

Recently, knowledge reasoning technology has been made towards improving with the development of knowledge map embedding. Researchers have evolved knowledge graph embedding research based on TransE. But people ignores that there are often connections between relationships in reality. In this paper, we propose to generate the time-based knowledge graph link prediction (T2LP) according to time-evolution knowledge graph embedding, which enables knowledge graph contains time information. We effectively use hidden Markov theorem to explore the possible relationships between relationships from T2LP and improve the accuracy of link predictions. Experimental results on temporal datasets extracted from read-world KGs show that our model achieves significant improvements compared to baselines.

## 1 Introduction

Recent years, With the development of machine learning, knowledge graphs (KGs) are applied to more and more fields. For example, it is applied in the dialogue system [<https://arxiv.org/abs/1906.02738> // <https://www.aclweb.org/anthology/P19-1081>]. They can help users complete specific tasks such as ordering, driving and also keep users from feeling lonely. Recently KGs are also more popular and used in NLPs [<https://drive.google.com/file/d/1-sIhvWD-kPiwabImXS-dgvDNPOsGNV-n/view> // <https://www.aclweb.org/anthology/P19-1598 //> <https://arxiv.org/abs/1904.03396>]. They express triples as natural language like pic1[<https://drive.google.com/file/d/1-sIhvWD-kPiwabImXS-dgvDNPOsGNV-n/view>]. As a type of reading comprehension task, researchers like to use a "QA system" to track the latest progress of large models such as BERT [<https://arxiv.org/abs/1810.04805>]. [A. Saha, G. Ahmed, A. Laddha][ <https://www.mitpressjournals.org/doi/pdf/10.1162/tacl_a_00262>] includes several actions (e.g., set up intersection. Knowledge graph embedded lookup, etc.) is proposed for reinforcement learning to use to derive logical programs that can answer complex questions in a conversational environment. In fact, KGs embedding is also one of the classic research points.



## 2 Background

## 3 T2LP

## 4 Experiments

## 5 Conclusion