Knowledge Graph Embedding With Attentional Triple Context

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Abstract

Knowledge graph embedding can represents entities and relations with efficient low-dimensional embedding vectors. The outstanding performance on knowledge graph completion has led to an increase in the knowledge graph embedding research. State-of-the-art knowledge graph embedding approaches treat each triple independent and neglect structure information. However, as a fact, the rich graph features in knowledge graph can be considered as contexts of a triple which contain large information to describe entities and relations. In this paper, we proposes an Attentional-Triple-Context-based knowledge Embedding model(ATCE), which formulates a local structures around a triple as a context. For each triple, two kinds of structure information are considered as its context, which we refer to *as triple context* : 1) Neighbor context is the outgoing relations and neighboring entities of an entity; 2) Path context is connective relation paths between a pair of entities, both of which contains rich useful and unrelated information for entities and relations. ATCE learns embedding for entities and relations with a attention mechanism and is expected to select the useful information in triple context. The experimental results show that our model outperforms the state-of-the-art methods for link prediction and entity prediction.

1 Introduction

Recent advances in information extraction have led to huge Knowledge graphs(KGs),such as DBpedia,YAGO,Freebase and NELL. These KGs contain facts which represent relations between entities as triples $< h, r, t >$. A triple indicate that entities h and t are connected by relation r. Even a KG contains a very large number of triples, it is still far from complete. The completeness of KGs damage their usefulness in downstream task. Knowledge graph completion or link predictions is thus important approaches for populating existing KGs.

Knowledge graph embedding models for KG completion have attracted much attention, due to their outstanding performance. These embedding model is to represent entitles and relations in a KG into a low dimensional continuous vector space, such vectors contain rich semantic information, and can benefit many downstream tasks especially knowledge graph completion or linked predictions. Whether two entities have a previously unknown relationship can be predicted by simple functions of their corresponding vectors.

Despite the success of previous approaches in KG embedding, most of them mainly model triples individually, ignore lots of information implicitly provided by the structure of the KG. In fact, triples are connected to each other and many triples around a triple could be regarded as a description of it. Recently, Several authors have addressed this issue by incorporating relation path information into model learning and have shown that the relation paths between entities in KGs provide useful information and improve KG completion. These approaches only consider relation information while miss more structure information, such as K-degree neighbors of a given entity, a connected subgraph which n could be exploited for better KB completion. For instance, the whole neighborhood of entities and a connected subgraph between two entities could provide lots of useful information for predicting the relationship between two entities.

In this paper, we present a novel approach to embed a knowledge graph by utilizing the structure information called

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The advantages of our approach are three-fold.1)

2 Triple Context

3 Knowledge Graph Embedding With Attentional Triple Context

4 Experiments

4.1 Data Sets

5 Related Work

6 Conclusion

In this paper, we proposed a novel approach to learning disjointness and subclass axioms from incomplete semantic data under OWA. We first applied the type inference algorithm to generate new probabilistic type assertions. We then introduced novel definitions of support and confidence using negative examples as constraints. The experimental results

were provided to compare our system with existing one and showed that SIFS-P performs better with respect to precision and recall in most cases.

In the future, we plan to extend the SIFS-P to learn more kinds of axioms such as the axioms with existential restriction, universal restriction and the limited extensional quantification.

References