

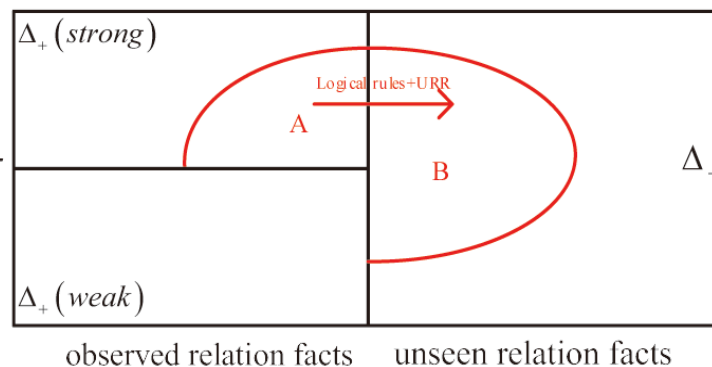
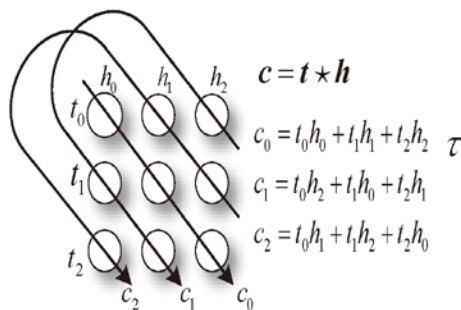
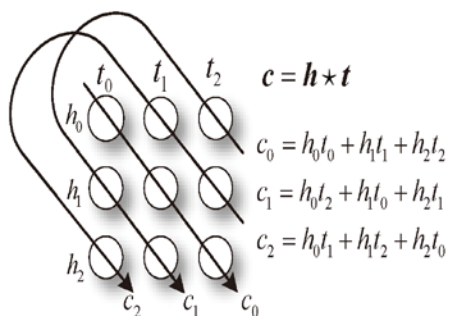
Uncertain Knowledge Graph Embedding: An Effective Method Combining Multi- relation and Multi-path

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Problems & Ideas

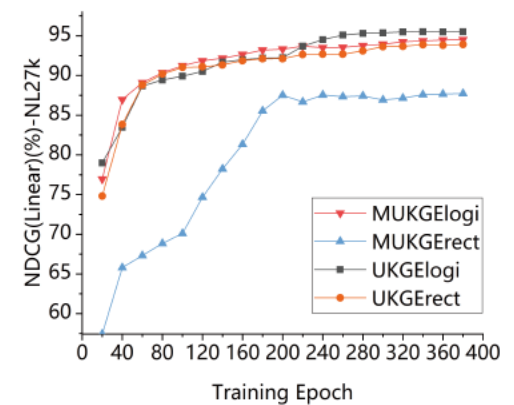
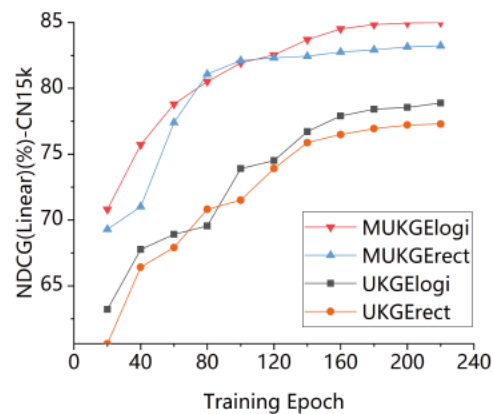
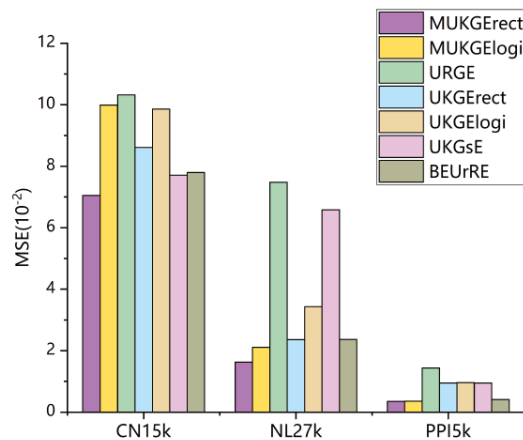
- Problems of conventional uncertain knowledge graph embedding model:
 - When reasoning the confidence of unseen relation facts, the introduced probabilistic soft logic cannot be used to combine multi-path and multi-step global information, leading to information loss.
 - Existing uncertain knowledge graph embedding model can only model symmetric relation facts, but the embedding problem of asymmetric relation facts has not been addressed.
- Ideas: An effective model of uncertain knowledge graph embedding combining multi-relation embedding and multi-path information reasoning (MUKGE)



For the combination of multi-path information in the uncertain knowledge graph, by taking the uncertainty as a resource flow, the uncertain resource ranking (URR) algorithm reasons the existence probability of the uncertain relation facts; For the multi-relation embedding in the uncertain knowledge graph, by utilizing the circular correlation to model the confidence function, which has a significant effect on the asymmetric representation and embedding of the uncertain knowledge graph.

Main Contributions

- Contributions:
 - A reasoning method combining multi-path and multi-step in uncertain knowledge graph, comprehensively considering more information and obtaining more comprehensive and accurate results;
 - A multi-relation embedding method based on confidence function, modeling the asymmetry in the uncertain knowledge graph, and can represent more kinds of uncertain relations;
 - An experimental design of asymmetric embedding, verifying the effect of embedding model of uncertain knowledge graph with the condition of asymmetry.



Partial results of MSE verified by experiment and NDCG values generated by training iteration. Left: the average MSE values of MUKGE; Right: the NDCG value of MUKGE verified by training iteration.