Knowledge Representation and Reasoning with Artificial Neural Network - Learning Note

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1 Knowledge Representation and Reasoning with Deep Neural Network (Doctor Dissertation)

1.1 Framework

Certain structures in neural network are designed particularly for certain tasks. In the following table I show the goal and its corresponding structure.

Table 1: Goal and Structure List

goal	structure
reasoning on large knowledge graph	recurrent neural network with attention mechanism
learn latent programs	neural programmer

1.2 datasets

1.3 Learning Note for Certain Problems

1.3.1 Passage Overview: Key Questions

KRR system Knowledge Representing and Reasoning system.

Requirements for KRR system Generalize concepts and relationships.

Table 2: Goal and Structure List

system name	time	structure
natural language interface		
general problem solver		represent knowledge with symbol, reasoning through search
expert system (Inductive Logic Programming, Markov Logic Networks, Probabilistic Soft Logic)		enormous human interfere, need background knowledge.

Typical Symbolic KRR systems

drawbacks of symbolic system Firstly it fails to represent large numbers of concepts and relationships, because different concepts does not share components. Secondly, it needs large number of human effort. Finally, the mapping to concepts is usually naive, thus failing to deal with real world problem.

KRR with Neural Network Challenges (1) How to represent concepts and relationships with distributed representations (2) use these representations to reason.

Summary The main contribution to the work seems to be (1) present concepts and relationships with distributed representations and (2) use RNN with attention to reason based on this distributed representation.