# Inventing What's Beyond Research

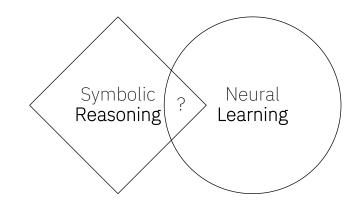


Naweed Khan Research Scientist: NSAI LNN Lead Developer

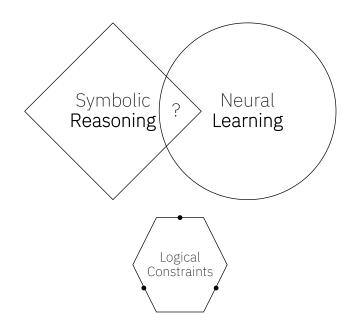




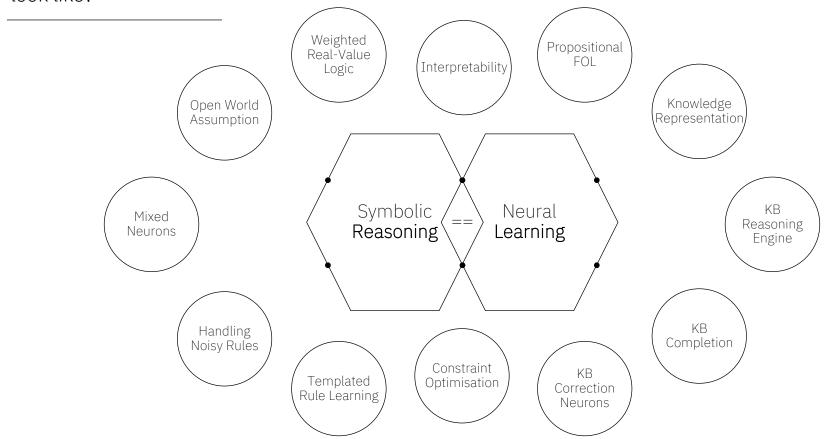
How do you fit a square peg into a round hole?



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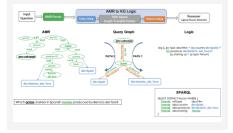
# What do LNNs currently look like?



# What's Next in LNN Research

## **KB QA Reasoning**

Leveraging Abstract Meaning Representation for Knowledge Base Question Answering ACL '21



#### Logical Neural Networks

Logical Neural Networks arXiv

**RL** Optimal Action

arXiv

quantity of water

Generalization for Text-based

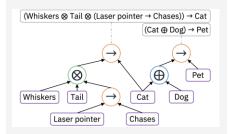
You are in the kitchen of the white house. A table seems to have been used recently for the preparation of food.

A passage leads to the west and a dark staircase can be

seen leading upward. A dark chimney leads down and to the east is a small window which is open. On the table is

an elongated brown sack, smelling of hot peppers. A bottle is sitting on the table. The glass bottle contains a

Reinforcement Learning Agents



Eye of the Beholder: Improved Relation

#### **Bounded Uncertainties**

Foundations of Reasoning with Uncertainty via Real-valued Logics arXiv

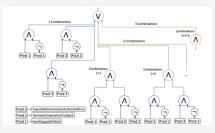


#### **Time Series Classification**

Neural Network for Weighted Signal Temporal Logic arXiv

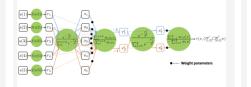
### Training LNNs

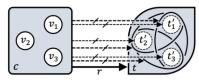
Training Logical Neural Networks by Primal–Dual Methods for Neuro-Symbolic Reasoning ICASSP '21



### **KB** Completion

Logic Embeddings for Complex Query Answering arXiv





Inventing What's Beyond Research

Open development on LNN framework



Lifting reasoning beyond grounded FOL

Scalable computing for large propositional KBs



Interpreting and explaining machine reason



