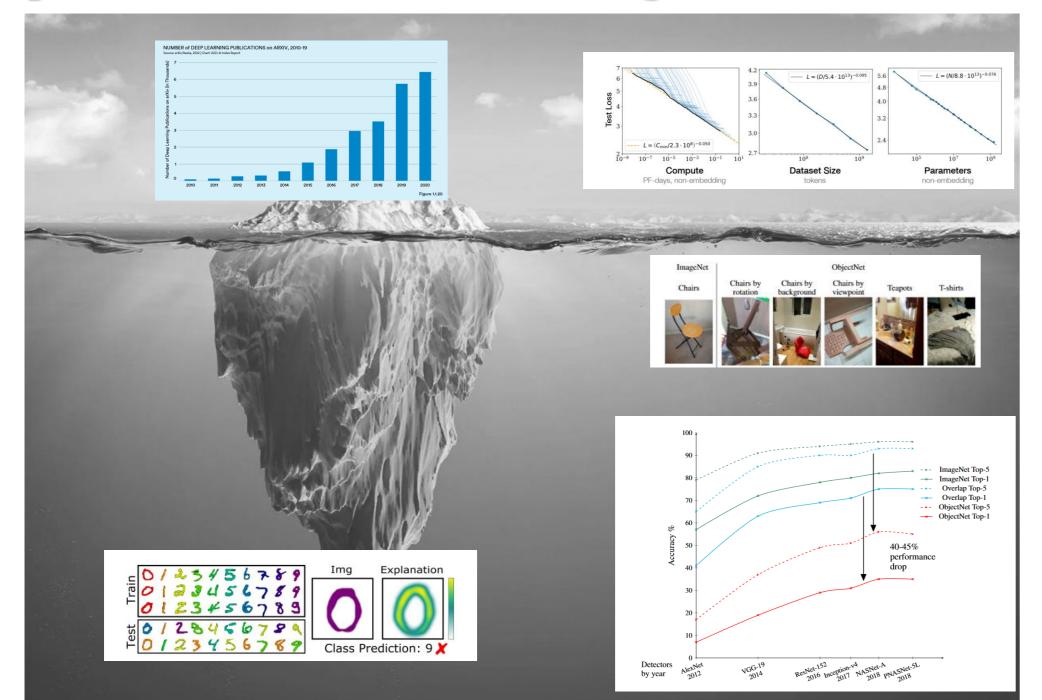
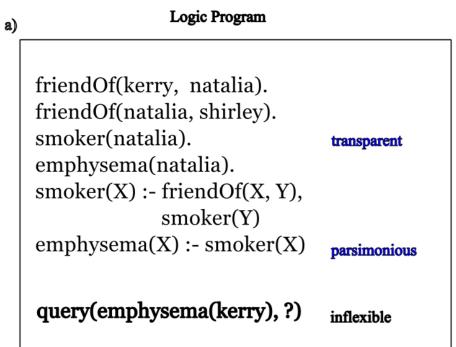
Charting the Landscape of Neuro-Symbolic Reasoners

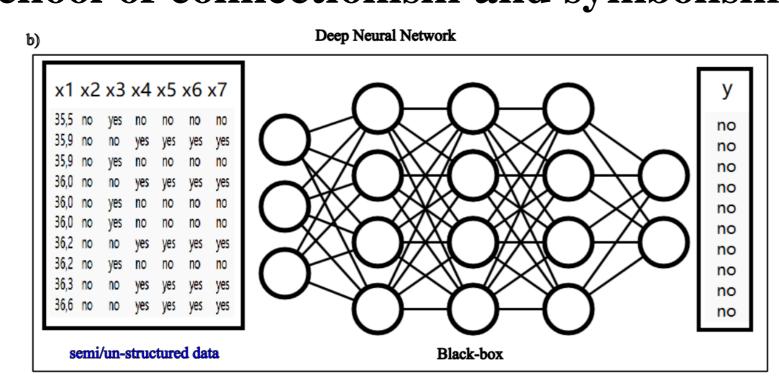
Whydunit?

1. Deep Neural Networks have strengths and weaknesses

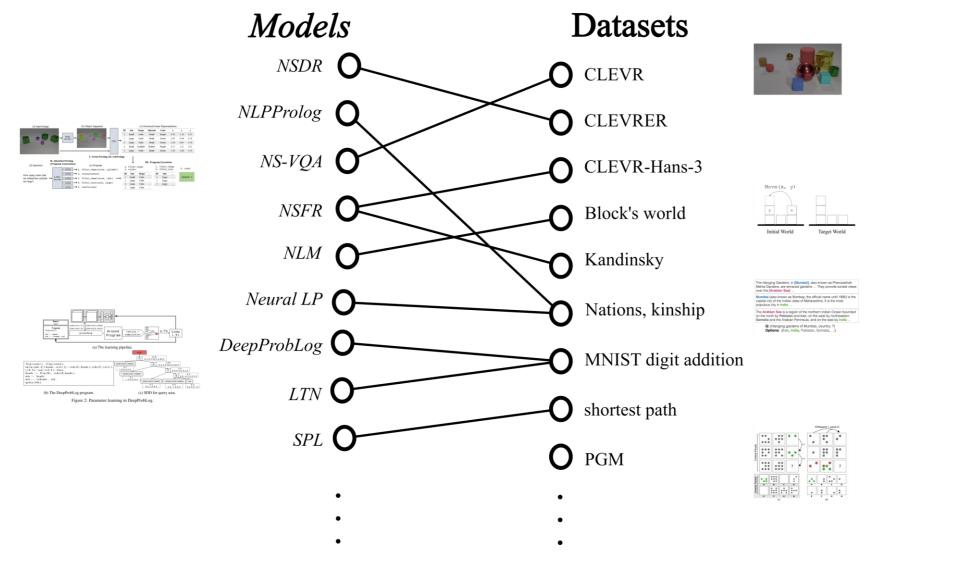


2. Complementarity of school of connectionism and symbolism





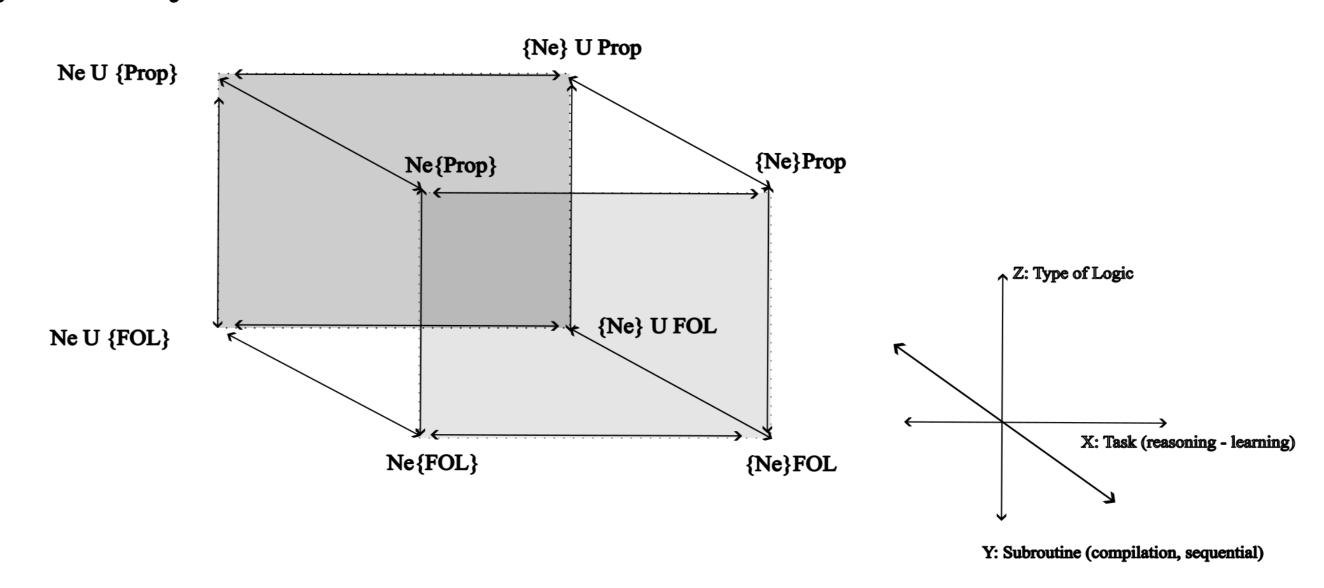
2.1 Glimpse of disparate successes



"NeSy AI is in need of standard benchmarks ... [to] provide a fair comparative evaluation of different approaches...(Garcez & Lamb, 2020)

Contributions

3. Taxonomy of NeSy model architectures



4. Taxonomy of NeSy datasets

Nature of Reasoning Task	Challenge	Input-output during inference	Datasets
Object-centric relational reasoning	Multiple visual confoundersNatural language queries	Query and image - answer	CLEVR CLEVR-Hans Kandinsky Patterns
Task-driven reasoning	New rules may have to be proposedSatisfiability and tractability	Axioms-goal completion	Sorting arrays Clustering (LTN) Block's World problem
Knowledge-graph reasoning	Multi-hop queries over KG.Satisfiability and tractability	Query-Answer	Wiki-hop KB Med-Hop KB
Object-centric abstract reasoning	Complete IQ like patterns	Image - Image	Procedurally Generated Matrices
Counterfactual reasoning	Hypothetical queries	Images and query - answer	CLEVRER

5. SaSSy-CLEVR

Large blue sphere and Small yellow sphere

Multi-hop Task **Abstract Object centric** Counterdriven relational reasoning reasoning factual reasoning reasoning reasoning CLEVR-Hans-3 Block's Queries Hypothetical IQ-style world with over queries over patterns (non-confounded) (confounded) Class Rule **CLEVR** synthetized **CLEVR** more predicates scene using OpenCV annotations Small metal cube Small (metal) sphere If the blue metal cube is taken, how many objects are

6. Object-centric reasoning

Model	Train %	Val.%	Test %
ResNet18	1±0	0.972±0.003	0.662±0.002
Slot Attention + ResNet18	0.929±0.002	0.922±0.003	0.831±0.014
Slot Attention + Set Transformer	0.984±0.003	0.985±0.003	0.8±0.021
Slot Attention + Forward Reasoner	0.915±0.082	0.911±0.088	0.915±0.084