



Synthesis I - April 3, 2024 *Ontology Summit 2024* *Track A and B*

Draft



Synthesis I - April 3, 2024 Ontology Summit 2024 Track A

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Dr. Ravi Sharma

[Ken Baclawski](#) [Slides](#)

Welcome to the Ontology Summit 2024

Memorials

Planning for the 20th Anniversary in 2026

Synthesis of the Fall Series

Track A Foundations and Architecture

[Ravi Sharma](#) [Slides](#)

Track B Large Language Models, Ontologies and Knowledge Graphs

[Gary Berg-Cross](#) [Slides](#)

Track C Applications

[Ram D. Sriram](#) [Slides](#)

Track D Risks and Ethics

[Mike Bennett](#) [Slides](#)

Overview

Dr. Ravi Sharma

Gary Marcus No AGI (and no Trustworthy AI) without Neurosymbolic AI

Gave examples of cognitive problems, need for reliability in generative AI as integrating learning with basic laws is missing. Went on reasoning, relationships and finally on ethics.

Referenced great work of Doug Lenat.

Sessions and Speakers

John Sowa Without Ontology, LLMs are clueless
18 theories of Language and thought
Language, thought Perception,
Mental Maps and Models, OODA,
Abduction, Deduction, Testing, Induction
Empathy and sincerity depend on feelings.
AI systems don't have feelings. Could they fake them?

Sessions and Speakers

6 March 2024 Track B Session 1 Hamed Babaei Giglou LLMs4OL:
Large Language Models for Ontology Learning
13 March 2024 Track B Session 2 Fabian Neuhaus Ontologies in the era
of large language models – a perspective
20 March 2024 Track A Session 2 Till Mossakowski Modular design
patterns for neural-symbolic integration: refinement and combination
27 March 2024 Track A Session 3 Markus J. Buehler Accelerating
Scientific Discovery with Generative Knowledge Extraction, Graph-
Based Representation, and Multimodal Intelligent Graph Reasoning

Sessions and Speakers

Can LLMs effectively apply their language pattern capturing capability to OL, which involves automatically extracting and structuring knowledge from natural language text? Shoed Role of Encoder Decoder

*Applied to 11 LLM Models incl encoder BERT, PubMed and Deocoder GPT, Bloom
3 types of Task databases and zeroshot and finetuning results*

The obtained empirical results show that foundational LLMs are not sufficiently suitable for ontology construction that entails a high degree of reasoning skills and domain expertise

When LLMs effectively fine-tuned they just might work as suitable assistants, alleviating the knowledge acquisition bottleneck, for ontology construction.

Hamed Babaei Giglou LLMs4OL: Large Language Models for Ontology Learning

Referenced Cyc - Discussed and concluded that ontology automation is not possible nor easy as domain consensus is required

ChatGPT gave wrong answers to Number theory simple tests

LLMs are not designed for persistent ontological commitments.

Will not replace Ontologies or Engineers.

Grunninger – LLMs do not have Ontologies? Have no notion of Bug or deficiency.

GPT and ontology of Physical objects like caves were discussed.No unified view of LLMs

Train LLM for expansion of new chemicals.

Track B Session 2 Fabian Neuhaus Ontologies in the era of large language models - a perspective

Ontology of Chemical Entities of Biological Interest (ChEBI)
Symbolic KR. NeSy extension of Ontologies?
Trnsformers revolutionized Neural Deep Learning, Transformers
Improvements with ontology pretraining.
Rule based ClassyFier tool, Improved Toxicity DB.
Compared varius ML algorithms and statistics
CheBI improved with AI used for chem structure improvement.
NeSy Design patterns can improve with ontology pretraining.

Till Mossakowski Neuro-symbolic integration for ontology-based classification of structured objects

Looking at Materials at Nano and macroscales, multilevel models, scaling from Q to Macro scales, Generative AI used for multimodal integrations, discover design and understand materials and Info to Knowledge, make neural nets Self aware and efficient, Protein design forward and reverse simulations, discover new molecules proteins etc, multi agent with Physics and AI integration, KGs used, Ontological use of LLMs, Graph based Explainability and Reasoning, Extraction of new Knowledge paths from graphs, bio integrated materials, materials for living systems, visual dynamic languages using KGs. Heteraxical structure

Markus J. Buehler Accelerating Scientific Discovery with Generative Knowledge Extraction, Graph-Based Representation, and Multimodal Intelligent Graph Reasoning

Analyse where Ontologies contribute to new knowledge in the domain of use of AI

List the LLMs types and their use in generating or attempting ontology

AI based good and other examples

more...

Fall outs such as dynamic visual learning

new chem and bio materials and cross domain such as healthcare!

More...

Next Steps