About Me



NAME

Thuan Luong Nguyen

TITLE

Clinical Professor

Data Analytics and Statistics

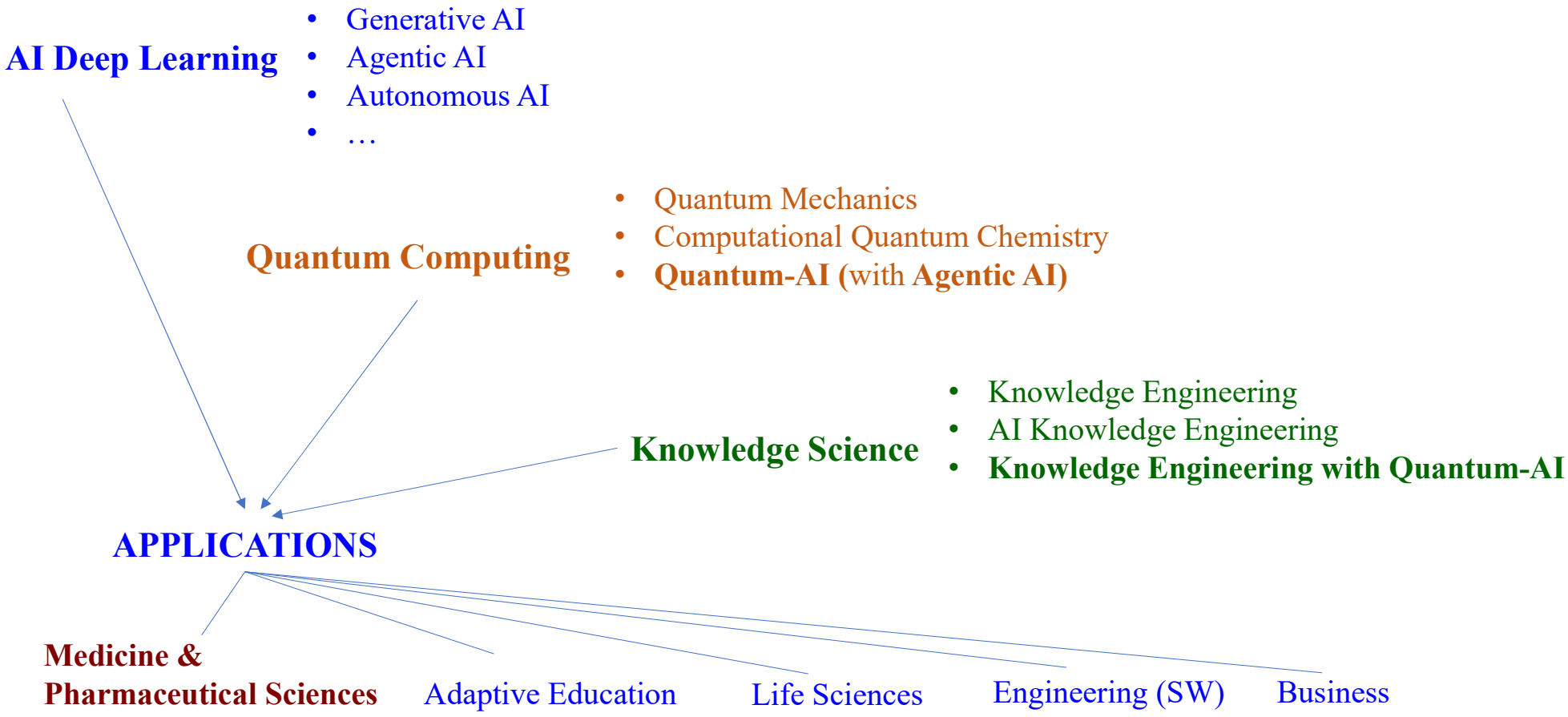
YEARS AT UNT

9 years

RESEARCH FOCUS AREAS

- AI Deep learning (Generative AI, Agentic AI, Autonomous AI, and beyond)
- Quantum Computing - Artificial Intelligence (Quantum-AI)
- Knowledge Science / Knowledge Engineering (closely related to Quantum-AI)

Focused Research Interest Domains & Applications



Theories on Generative AI LLM's Incomplete Knowledge

The Completeness and Consistency of Knowledge in Generative AI Large Language Models
A Theoretical Framework

Preprint: https://doi.org/10.6084/m9.figshare.31211626

Published: https://papers.academic-conferences.org/index.php/eckm/article/view/4737

(*Proceedings of the 27th European Conference on Knowledge Management*)

Theoretical Framework: Two theories: Theory I and Theory II

- **Theory I: The Completeness of Knowledge Theory** provides the explanatory foundation, articulating why **human-made systems** inevitably exhibit **extreme knowledge gaps** while human knowledge systems, developed through rigorous educational scaffolding, structurally prevent such gaps.

- **Theory II: The AI Knowledge Consistency Test Theory** translates these theoretical insights into an operational diagnostic framework, enabling reliable identification of human-made systems through systematic detection of extreme gaps. Critically, Theory II reframes "hallucinations" or errors not as random noise, but as structural signals that distinguish human-made systems from biologically educated systems by the presence of **Extreme Knowledge Gaps**.

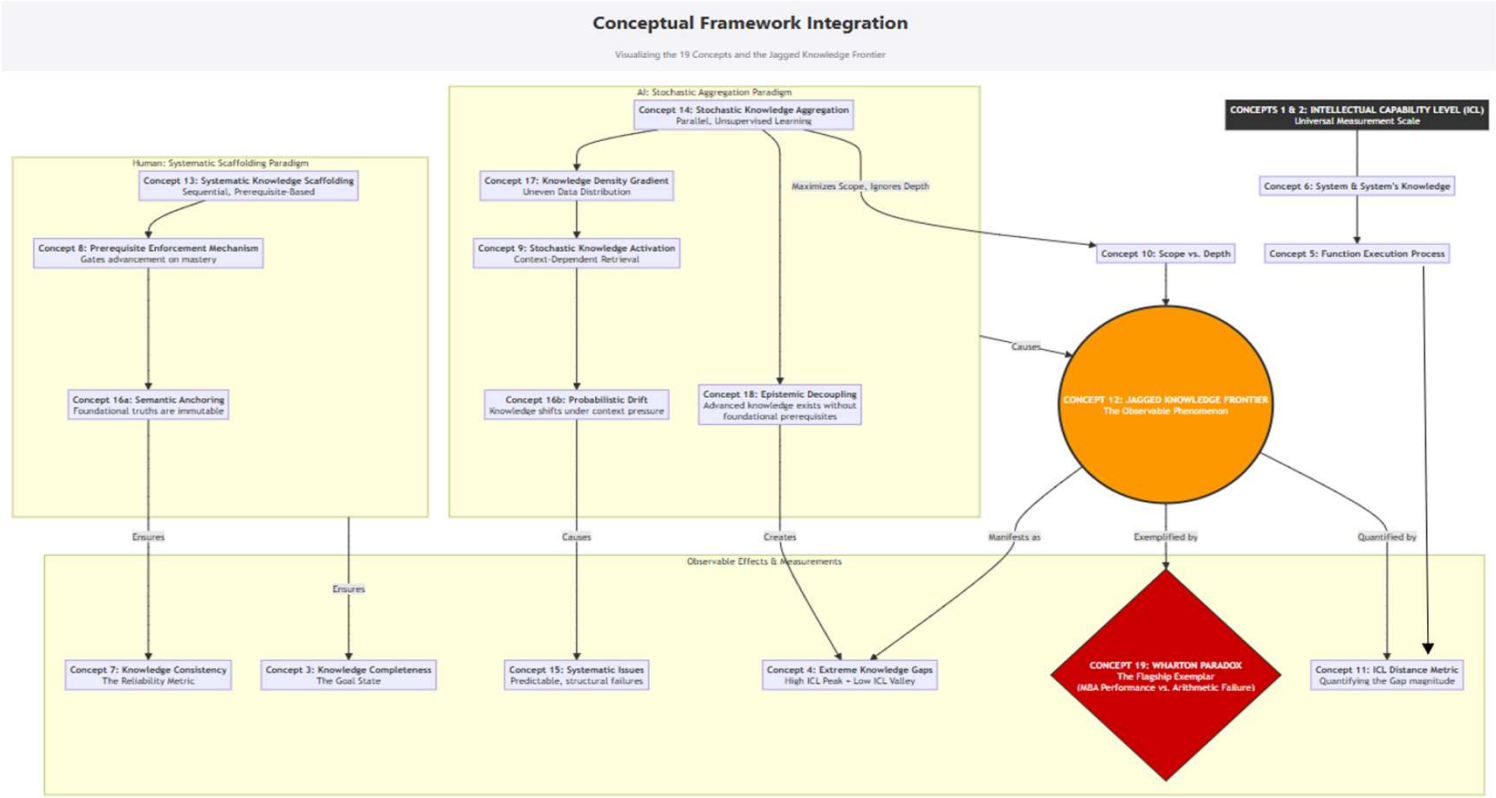
Theory I: Part I and Part II

- **PART I** → **Corollary I**: LLM's knowledge is **incomplete** (=/= human complete knowledge) – A structural issues, not a bug
- **PART I** → **Corollary II**: LLM's behaviors are **inconsistent**, unexpected actions and outcomes

Theories on Generative AI LLM's Incomplete Knowledge

Foundational Conceptual Framework of 19 Concepts: Wharton Paradox

1. Intellectual Capability Level (ICL) - Human Context
2. Intellectual Capability Level (ICL) for Generative AI LLMs
3. Knowledge Completeness
4. Extreme Knowledge Gaps
5. Function Execution Process
6. System and System's Knowledge
7. Knowledge Consistency
8. Prerequisite Enforcement Mechanism
9. Stochastic Knowledge Activation
10. Knowledge Scope vs. Knowledge Depth
11. ICL Distance Metric
12. Jagged Knowledge Frontier
13. Systematic Knowledge Scaffolding
14. Stochastic Knowledge Aggregation
15. Systematic Issues vs. Stochastic Errors
16. Semantic Anchoring vs. Probabilistic Drift
17. Knowledge Density Gradient
18. Epistemic Decoupling
19. Wharton Paradox



Theories on Generative AI LLM's Incomplete Knowledge

Theoretical Framework's Theoretical Predictions of Generative AI LLM's Behaviors

--)LLMs' Epistemic Failures

Anthropic: Patterns and problems in emerging multiagent systems

https://www.anthropic.com/research/multiagent-systems

Epistemic failures

When we humans learn new information, we use our discretion in determining how to apply it to future decisions. We might consider the content of the information itself, like how consistent it is with what we already know, or whether it appeals to our values—or we might consider the source, e.g. how historically reliable it has been, and whether it has a vested interest in changing our beliefs. Our world contains deceptive actors, and we need to apply skepticism to guard against them. AI models, however, lack this—and their more brittle epistemics affect their behavior toward humans and toward each other.

It is tempting to file AI agents under "automation" and move on – to assume they are a faster way to do the work we already had. The data points somewhere more interesting. Agents do save striking amounts of time and money, yes. But ***the deeper change*** *is that they* ***move people*** *from accessing information* ***to commissioning execution****, from operating tools* ***to supervising them****, and from staying in their lane to crossing into work they would never have attempted before …*

--) Agentic AI Agents' "Unexpected Behaviors" – A structural Issue, not a bug!

https://www.nytimes.com/2026/09/25/technology/openais-ai-us-government-websites.html

https://abcnews.com/Business/anthropic-ai-models-escaped-test-hacked-3-organizations/story?id=135256212

https://www.wsj.com/tech/ai/gemini-hacked-three-companies-in-first-known-breakout-by-googles-ai-5c0baba2

--) AI – Human "Professional" Relationship: DOER – REVIEWER

MIT - Research: How AI Agents Broaden the Scope of Knowledge Work

https://hbr.org/2026/07/research-how-ai-agents-broaden-the-scope-of-knowledge-work