Old Dominion University
Department of Physics
Colloquium

Tuesday, September 19, 2023

"Rational Deliberation in the Face of Inconsistency:" A Quantum Probability Approach to Understand Judgment and Temporal Evolution of Trust in AI-supported Decision"

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Abstract:

Artificial intelligence (AI) is set to take over several tasks within decision space that have traditionally been reserved for humans. In response, human decision-makers interacting with AI systems may have difficulty forming trust around such AI-generated information. Decision-making is currently conceptualized as a constructive process of evidence accumulation. However, this constructive process may evolve differently depending on how such interactions occur; thus, engineering decision-making is paramount. To understand various dynamics that influence the decision environment, an experiment (N=192) was conducted to understand the trust-related dynamics of human-AI interaction. The result of the study demonstrates that trust was found to oscillate over time, and it was discovered that eliciting a judgment on AI-provided advice exhibited a bolstering effect on trust. Additionally, it was revealed that participants exhibited violations of total probability that commonly used modeling techniques, e.g., Markov models, are unable to capture. Therefore, an approach using quantum open system modeling, representing trust as a function of time with a single probability distribution, is shown to improve modeling trust in an AI system over traditional Markovian techniques. The results of this study improve the understanding the Human-AI interaction dynamics and ameliorate time-critical decision-making situations in complex task environments.

Bio

Dr. Mustafa Canan is an Associate Professor (with tenure) in the Information Sciences Department at the Naval Postgraduate School. He holds two Ph.D. degrees completed his Physics Ph.D. (2011) at Old Dominion University and Systems Engineering (2017) at Old Dominion University. Before joining NPS, he was a National Research Council post-doctoral fellow and a research scientist at the Air Force Research Lab, Wright-Patterson Air Force Base. Dr. Canan's inter-disciplinary research interest includes Complex Adaptive Behavior of Systems, Dynamics of Human-Machine Teams, Quantum Information Processing, Application of Quantum Probability Axioms to Decision-making, Decision Making under Uncertainty, Digital Twins, and harnessing AI into human decision space.

Presentation: OCNPS 200 @ 3:00 pm
Refreshments: OCNPS Atrium @ 2:30 pm

All interested persons are cordially invited to attend.