TITLE: **Taking Artificial Intelligence Where the Human Brain Goes and to Live With Smart Machines**

INTEREST AREA/TRACK: AI - Living With Smart Machines - Healthcare

SUB CATEGORY: Neuroscience-Inspired Artificial Intelligence

KEYWORDS: Artificial Intelligence, Smart living, Cognition, Neural network, learning

LEVEL OF DIFFICULTY: Intermediate

LEARNING OBJECTIVES: Explains

- How AI-based applications could improve health outcomes and quality of life for millions of people in the coming years
- Why is General/Super intelligence incomplete without machine learning?
- Diagnosis and healthcare delivery, Drug/treatment development

ABSTRACT TEXT: The fields of neuroscience and artificial intelligence (AI) have a long and intertwined history. In more recent times, however, communication and collaboration between the two fields has become less commonplace. In this session, I wish to argue that better understanding biological brains could play a vital role in building intelligent machines. We survey historical interactions between the AI and neuroscience fields and emphasize current advances in AI that have been inspired by the study of neural computation in humans and other animals. I would conclude by highlighting shared themes that may be key for advancing future research in both fields.

I feel building human-level general AI (or "Turing-powerful" intelligent systems; Turing, 1936) is a daunting task, because the search space of possible solutions is vast and likely only very sparsely populated. I argue that this therefore underscores the utility of scrutinizing the inner workings of the human brain— the only existing proof that such an intelligence is even possible. Studying animal cognition and its neural implementation also has a vital role to play, as it can provide a window into various important aspects of higher-level general intelligence.

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The benefits to developing AI of closely examining biological intelligence are two-fold.

First, neuroscience provides a rich source of inspiration for new types of algorithms and architectures, independent of and complementary to the mathematical and logic-based methods and ideas that have largely dominated traditional approaches to AI. Second, neuroscience can provide validation of AI techniques that already exist. If a known algorithm is subsequently found to be implemented in the brain, then that is strong support for its plausibility as an integral component of an overall general intelligence system. Such clues can be critical to a long-term research program when determining where to allocate resources most productively

In addition, ***we present the latest discoveries in the field of machine intelligence and data analytics techniques and methods for sustainable future smart cities***

To conclude, just a few of the big questions I would like to discuss will include:

What we are interested in is a systems neuroscience-level understanding of the brain, namely the algorithms, architectures, functions, and representations it utilizes.

Patient relationships: smart systems will shift some care and monitoring directly to patients; will patients now well equipped to manage their own data fall through the cracks?

Diagnostics and healthcare delivery: services and outcomes are already unequally distributed, how will we avoid amplifying inequities with AI?

Ethics: How will AI challenge core values such as confidentiality, dignity, continuity of care, avoiding conflicts of interest, and informed consent? How will we contest AI-based clinical decisions or AI health services outcomes?

Closing Remarks on "Orchestrating smart living to enrich the quality of life using AI"

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