



How AI Is Revolutionizing Healthcare

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Introduction

History happens. The development of civilization has continued to change over time. Significant periods of change include the Age of Dinosaurs, the Scientific Revolution of the late 18th Century, the Industrial Revolution, the Information Revolution, and now the Artificial Intelligence Revolution. Each change has had a good and bad impact on civilization. Humans have evolved over these changes. Now, humans feel threatened by technology.

The Healthcare system is a failure. It is time for a change.

- More data is being created than humans can intelligently use.

Genomic data

Determinants of Health

Health Nutrition

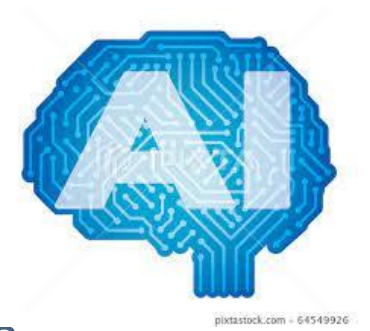
Geospatial inequalities

Climate Change

Increasing costs of healthcare

Diversity, equity, and inclusion

Artificial Intelligence



- Knowledge exceeds the ability of humans to use available facts to make decisions
- Computers are becoming able to learn from data and knowledge that is available on the internet and other sources. Computers are becoming self-aware. Create new knowledge.
- Driver for new groups entering the HIT marketplace: Google, Apple, Microsoft, Amazon, and others
- A network of computers can share learned knowledge instantly. Drug-drug interactions become globally known. The Borg concept.
- When will computers become smarter than humans?
- What will be the role of computers vs humans?

Artificial Intelligence has the potential for solving all these problems and more.

- AI is perhaps the most controversial scientific advance since the stethoscope was invented in 1816.
- AI comes in many forms:
 - pure AI with Neural Networks
 - Generative AI
 - Large Language models
- AI demands large databanks from which to learn. For that, we require data standards and interoperability.

Concerns

- Computers and robots will replace humans
- Computers hallucinate – make up answers
- Fraud
- Clinicians will become stale and ineffective

Let's start easy.

What is most acceptable?

- Clinicians will welcome AI Assistants – something to do that physicians dislike because it is time-consuming.
- Communicate with patients in their natural language
- Automate the collection and assimilation of data from all sources
- Help with diagnosing (maybe) and predicting outcomes.
- Enhancing true interoperability.

A project with DCHI and IEEE

Wearable sensors and AI

- Multiple sensors whose outputs are integrated to provide an awareness of the total environment. We use AI to incorporate the data in a meaningful way, making decisions on courses of action.
- Communications may be to the person, to the clinician, to the emergency team, or a reporting agency.
- Real-time happenings responded to immediately.
- Best understanding of the data and quickest response.

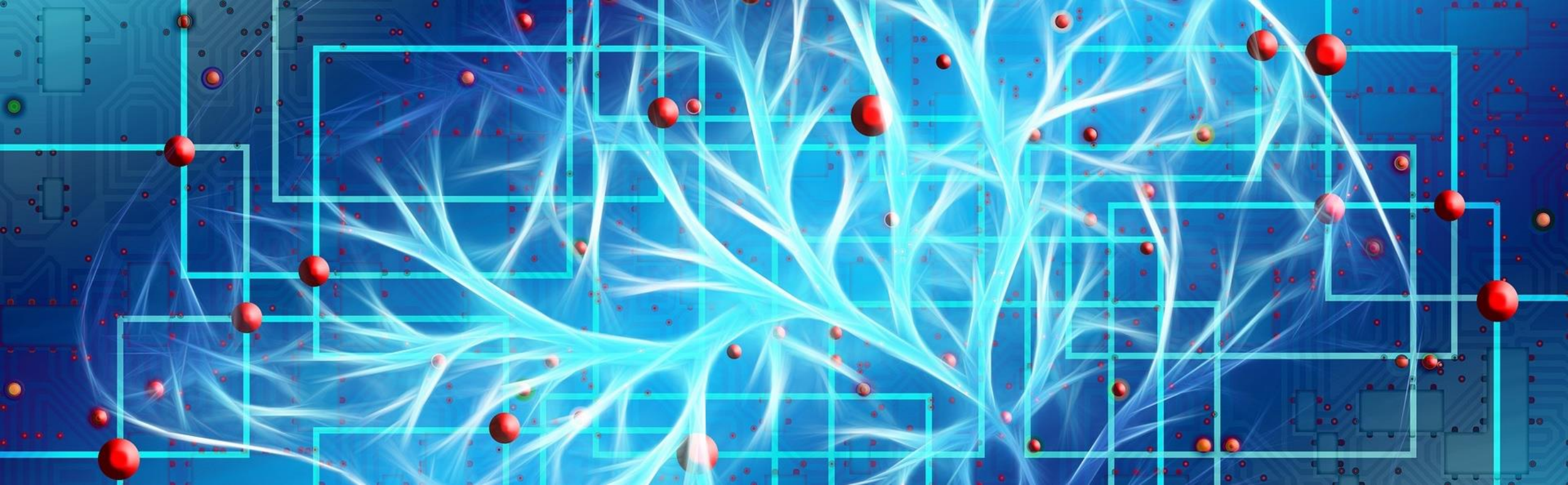
Artificial Intelligence at Duke



- Researchers at Duke use artificial intelligence tools to assist with various important societal problems, including healthcare, antibiotic and cancer resistance, criminal justice, detecting fake news, allocation of public resources to those who need them, environmental sustainability, energy reliability, and political districting. The system must satisfy certain interpretability, transparency, morality, and fairness conditions for many of these applications.

Duke AI Activities

- Autism
- Management of Opioids
- Medication Management
- Ophthalmology
- Radiology
- Exercise Physiology
- FORGE
- DCHI – Blood Pressure management
- Others



Summary

"Soon, it will be hard to imagine a doctor's visit or a hospital stay that doesn't incorporate AI in numerous ways. With healthy clinical evidence, AI will become more mainstream in various clinical settings, creating a positive feedback loop of more evidence-based research and use in the field. In addition, AI and ambient sensing technology will help re-humanize medicine by allowing doctors to focus less on paperwork and administrative functions, and more on patient care.

Pete Durlach, senior vice president for healthcare strategy and new business development at Nuance.

Thank you

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