STUDY OF ARTIFICIAL INTELLIGENCE - BACKGROUND MEMORANDUM

Section 44 of House Bill No. 1003 (2023) (appendix) provides for a study during the 2023-24 interim regarding the emergence of artificial intelligence (AI) and the potential impacts on the state's institutions, agencies, businesses, citizens, and youth. The study must include a review of the effect of artificial intelligence on the provision of health care, effects on student learning, potential opportunities or threats to the integrity of state services, the potential impact on electoral processes, including mitigating action to be taken leading up to the 2024 state elections, opportunities for state investment or policy changes to promote artificial intelligence businesses, and cybersecurity implications across all state institutions. The Legislative Management has assigned the responsibility for this study to the Information Technology Committee.

ARTIFICIAL INTELLIGENCE
Summary

The first use of the term "artificial intelligence" was by John McCarthy at an AI conference at Dartmouth College in 1956. The Merriam-Webster Dictionary describes AI as "a branch of computer science dealing with the simulation of intelligent behavior in computers" and "the capability of a machine to imitate intelligent human behavior."

Artificial intelligence is a field that combines computer science and large or complex datasets to enable problem solving. Artificial intelligence uses machine and deep learning and algorithms to:

1. Create new technologies and systems to make predictions or classifications based on input data;

2. Increase the productivity and efficiency of work-based or daily tasks;

3. Solve complex problems;

4. Provide for quicker decisionmaking; and

5. Automate mundane or repetitive processes, allowing individuals to focus time and resources on other topics or products.

Artificial intelligence can be summarized into four major reality-based and theoretical categories--reactive machines, limited memory, theory of mind, and self-awareness.

A reactive machine is a form of artificial narrow intelligence that follows basic AI principles and is capable of only using its intelligence to perceive and react to data provided to it. A reactive machine cannot store memory or rely on past experiences to inform decisionmaking in real time.

Limited memory is a form of artificial narrow intelligence that is more complex than a reactive machine because it has the ability to store previous data and make predictions when gathering information and weighing potential decisions.

Theory of mind is a form of AI where the device or system becomes capable of human comprehension and reflection in order to use data to make its own decisions.

Self-awareness is the final theoretical form of AI where the AI device or system becomes self-aware of its own existence and is capable of intelligent communication.

Theory of mind and self-awareness are forms of artificial general intelligence that has been theorized in concept but not developed into real world applications or systems.

Artificial Narrow Intelligence

Artificial narrow intelligence, also known as weak AI, is AI trained and focused to perform specific tasks. Common uses of artificial narrow intelligence technologies include speech recognition, online virtual customer service agents, computer vision that collects information from images, videos, and text, recommendation engines for advertisements and commerce, and automated stock trading. Common examples of artificial narrow intelligence include Apple's Siri, Amazon's Alexa, IBM Watson, and autonomous vehicles.

Machine Learning

Machine learning is a subfield of artificial narrow intelligence that requires human intervention to learn differences between data inputs, which then allows the device or system to imitate intelligent human behavior to perform complex tasks or solve human problems. A machine learning algorithm includes data that uses statistical techniques to help it "learn" how to get progressively better at a task, without being specifically programmed for that task. Instead, machine learning algorithms use historical data as inputs to predict new output values.

The three subcategories of machine learning are supervised, unsupervised, and reinforcement machine learning. Supervised machine learning models are trained with labeled data sets, which allow the models to learn and grow more accurate over time. Unsupervised machine learning involves a program that looks for patterns in unlabeled data to find patterns or trends that people are not explicitly seeking. Reinforcement machine learning trains machines through trial and error to make the best action by establishing a reward system.

Machine learning is the technology that has resulted in chatbots, predictive text, language translation applications, social media feeds and predictive suggestions, autonomous vehicles, and medical diagnostic equipment.

Deep Learning

Deep learning is a subfield of artificial narrow intelligence and a form of machine learning that refers to a neutral network comprised of more than three input, output, and hidden program layers to create an advanced algorithm to perform AI processes. Deep learning eliminates a portion of manual human intervention and is used often when working with large or complex datasets.

Artificial General Intelligence

Artificial general intelligence, also known as artificial super intelligence or strong AI, is a theoretical form of AI where a machine has human-equivalent intelligence and is capable of problem solving and planning for future work or concerns. Artificial general intelligence has been theorized by AI researchers and scientists but no artificial general intelligence devices or systems have been developed.

PROPOSED STUDY PLAN

The following is a proposed study plan for the committee's consideration in its study regarding the emergence of AI and the potential impacts on the state's institutions, agencies, businesses, citizens, and youth:

1. Receive and review information from the Information Technology Department regarding AI benefits and threats, including AI currently used by North Dakota state government agencies, future plans for the use of AI technologies, and the effect of AI on cybersecurity of North Dakota state and local government.

2. Receive and review information from the Department of Public Instruction regarding AI benefits and threats for students and teachers, including AI currently used by North Dakota schools and future plans for the use of AI technologies.

3. Receive and review information from the North Dakota University System regarding AI benefits and threats for students, professors, and higher education information technology, including AI currently used by the University System and future plans for the use of AI technologies.

4. Receive and review information from the Secretary of State regarding AI benefits and threats for North Dakota's election processes, including AI currently used for election purposes, future plans for the use of AI technologies, and any action needed for the security and integrity of the 2024 state elections.

5. Receive and review information from the Department of Health and Human Services regarding AI benefits and threats for the health care industry, including AI currently used by North Dakota health care providers and future plans for the use of AI technologies.

6. Receive and review information from the Department of Transportation regarding AI benefits and threats for the transportation infrastructure in the state, including AI currently used for transportation purposes and future plans for the use of AI technologies.

7. Receive and review information from other state and local government agencies, private sector businesses, and interested persons regarding the committee's study of AI and the potential impacts on the state's institutions, agencies, businesses, citizens, and youth.

8. Develop recommendations and any bill drafts necessary to implement the recommendations.

9. Prepare a final report for submission to the Legislative Management.

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