

# Artificial Intelligence: An Introduction to the Challenges and Possibilities

Xudong Liu  
Associate Professor

School of Computing, University of North Florida

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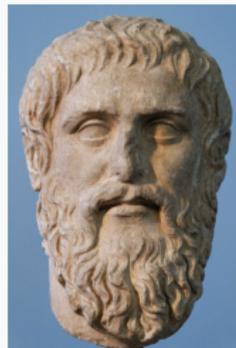
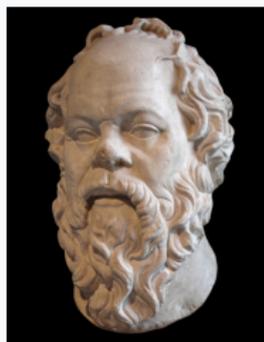
# Preview

- ① What is AI?
- ② Generative AI and Tools
  - Text2Text: ChatGPT
  - Text2Image: DALL-E
- ③ Challenges
- ④ Possibilities
  - AI and Future of Museum Work

# What is AI?

- Artificial intelligence: by Oxford English Dictionary, “The capacity of computers or other machines to exhibit or simulate intelligent behaviour.”
- Intelligence: from Latin *inter*, meaning “between,” and *leg*, meaning “collect, gather.”
  - By Oxford English Dictionary, “the ability to **learn, understand and think in a logical way about things.**”

## What is Intelligence? From Philosophers



Socrates and Plato, around 400BC

- In Plato's *The Republic*, on the intelligible, Socrates states "in the higher of the two (subdivisions of the intellectual world), the soul **passes out of hypotheses, and goes up to a principle which is above hypotheses**, making no use of images as in the former case, but **proceeding only in and through the ideas themselves.**"

# What is AI? From Scientists and Engineers



Alan Turing  
1912 - 1954

- 1 Turing test: A computer passes the test if a human interrogator, after posing some written questions, cannot tell whether the written responses come from a person or from a computer. Total Turing test: it includes a video signal to test perceptual and physical abilities of the subject.
- 2 Computing Machinery and Intelligence, 1950
- 3 With total Turing test, researchers generated six disciplines within AI:
  - natural language processing, knowledge representation,
  - automated reasoning, machine learning,
  - computer vision, and robotics.

# What is AI? From Scientists and Engineers



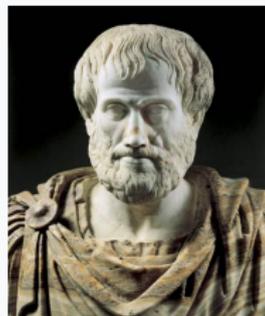
John McCarthy  
1956 coined it<sup>1</sup>  
1927 - 2011

- Q. What is artificial intelligence?
- A. It is the **science and engineering of making intelligent machines**, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.
- Q. Yes, but what is intelligence?
- A. Intelligence is the computational part of the ability to **achieve goals in the world**. Varying kinds and degrees of intelligence occur in **people**, many animals and some machines.

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<sup>1</sup><http://www-formal.stanford.edu/jmc/whatisai/node1.html>

# Acting Rationally (Symbolic AI)



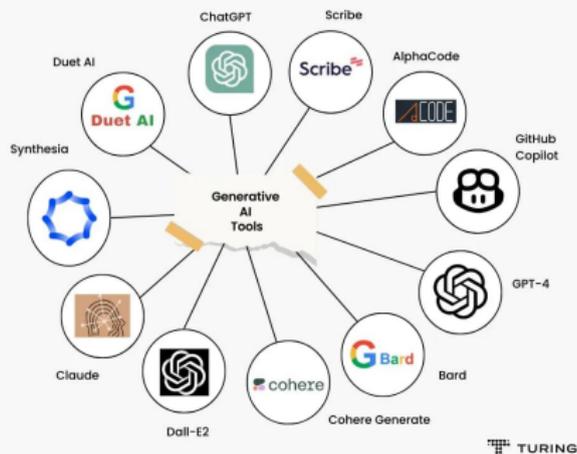
Aristotle  
384 - 322 BC

- 1 Aristotle was one of the first to attempt “laws of thinking” using logics.
  - Logics, from Greek *logos*, meaning “word, speech.”
  - Syllogism: “All men are mortal. Socrates is a man. Therefore Socrates is mortal.”
- 2 Logicians in 19th century developed different logics that can in principle solve any problem described in logical notations.
- 3 Knowledge representation, automated reasoning, planning
  - Hard to model informal knowledge, e.g., probability, into standard logics.
  - Solve a problem in principle vs. in practice.

# Acting Rationally (Neural AI)

- 1 An **agent** (from Latin word *agere*, to do) is something (e.g., program, robot and even human) that acts.
- 2 A **rational agent** is one that acts to **achieve the best outcome**.
- 3 AI researchers look at **general principles of rational agents** and **components for constructing them**.
- 4 Machine learning, computer vision, natural language processing
  - + It builds on mathematical rationality, not human thinking or acting.
  - + It extends the “laws of thinking” because reasoning logically is part of being a rational agent.
    - E.g., retreating from hot stove is a quick reflex action.

# Generative AI



- Wikipedia: “capable of generating text, images, or other media, using generative models. Generative AI models learn the patterns and structure of their input training data and then generate new data that has similar characteristics.”
- Powered by transformer models: ChatGPT, Bard, Meta AI, Grok, etc
- Powered by diffusion models: Dall-E, Midjourney, Stable Diffusion, etc

# ChatGPT: Text to Text



**You**

We know if the sun rises then the rooster crows. We also know the rooster crows. Does the sun rise?



**ChatGPT**

The statement "if the sun rises, then the rooster crows" suggests a causal relationship, implying that the rooster crows as a result of the sun rising. However, the reverse is not necessarily true. The sun rising does not depend on whether or not the rooster crows.

In other words, the fact that the rooster crows does not provide conclusive evidence about whether the sun has risen. The crowing of the rooster may be influenced by various factors, such as the time of day or environmental conditions, but it does not directly determine the sunrise.



Seemingly Reasonable

# ChatGPT: Text to Text



**You**

We know if blah, then lahah. We also know lahah is false. Is blah true or false?



**ChatGPT**

If you have the conditional statement "if blah, then lahah," and you know that "lahah" is false, then the statement "if blah, then lahah" is considered true, regardless of the truth value of "blah."

In logic, a conditional statement is considered true unless the hypothesis (in this case, "blah") is true and the conclusion (in this case, "lahah") is false. Since you know "lahah" is false, the entire conditional statement is considered true, regardless of the truth value of "blah." Therefore, the truth value of "blah" is undetermined based on the information given.



Wrong at Times

# DALL-E: Text to Image



Realistic Generated Images

## DALL-E: Text to Image (Real or Generated?)



A red sedan car parked outside a brick house

## DALL-E: Text to Image (Real or Generated?)



A man reading a newspaper outside a cafe

# AI State of Art



AlphaGo Beat Go World Champion



Uber self-driving chauffeur



Tesla's manless manufacturing plant

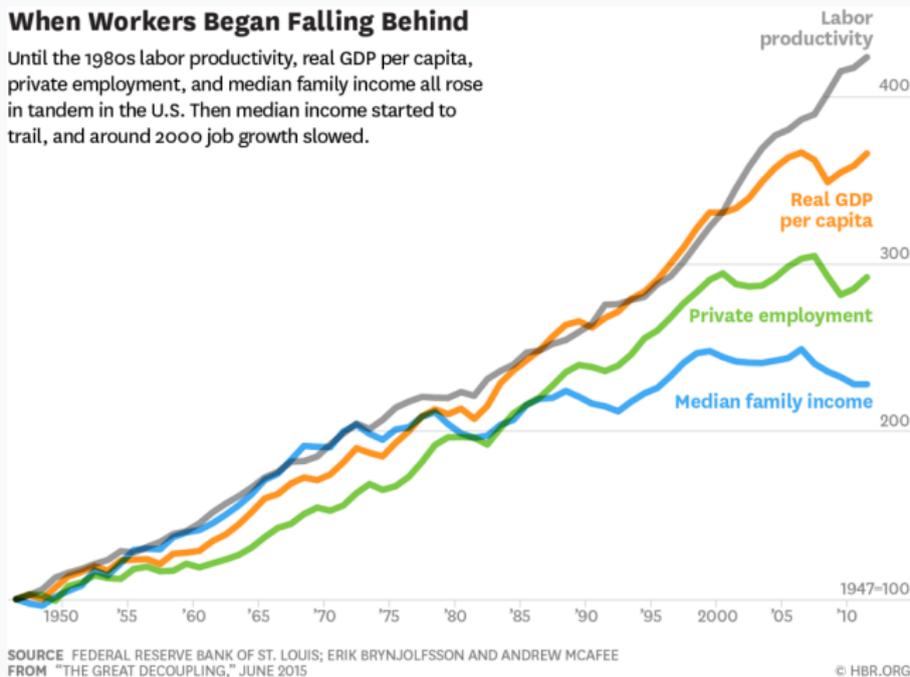


Robotic Butler

# Economy vs. Employment

## When Workers Began Falling Behind

Until the 1980s labor productivity, real GDP per capita, private employment, and median family income all rose in tandem in the U.S. Then median income started to trail, and around 2000 job growth slowed.



Automation has decoupled job creation from economic growth<sup>2</sup>

<sup>2</sup>Brynjolfsson and McAfee, *The Great Decoupling*, <https://hbr.org/2015/06/the-great-decoupling>

# ChatGPT Concerns

TECH



## Professor catches student cheating with ChatGPT: 'I feel abject terror'

By Alex Mitchell

December

**CNET**

Your guide to a better future

Tech > Computing

## New York City Schools Ban ChatGPT Amid Cheating Worries

The nation's largest school system is blocking access to the powerful AI-powered chatbot on its networks.



Dan Avery

Jan. 4, 2023 12:20 p.m. PT



## College student made app that exposes AI-written essays

*Edward Tian made GPTZero to detect ChatGPT-fueled plagiarism*

By Nicole Clark | Jan 5, 2023, 2:55pm EST | 28 Comments / 28 New

ARTIFICIAL INTELLIGENCE / TECH / POLICY

**Top AI conference bans use of ChatGPT and AI language tools to write academic papers** / AI tools can be used to 'edit' and 'polish' authors' work, say the conference organizers, but text 'produced entirely' by AI is not allowed. This raises the question: where do you draw the line between editing and writing?

By JAMES VINCENT

Jan 5, 2023, 12:04 PM EST | 4 Comments / 4 New

# Unauthorized Digital Replica



- A digital replica of Martin Seligman was created by his graduate student Zhao in China without Seligman's awareness with a goal "to help fellow Chinese citizens through an epidemic of anxiety and depression."
- Law makers in Washington "are circulating a draft bill titled the NO FAKES Act that would force the makers of AI-generated digital replicas to license their use from the original human."

# Unauthorized Digital Replica



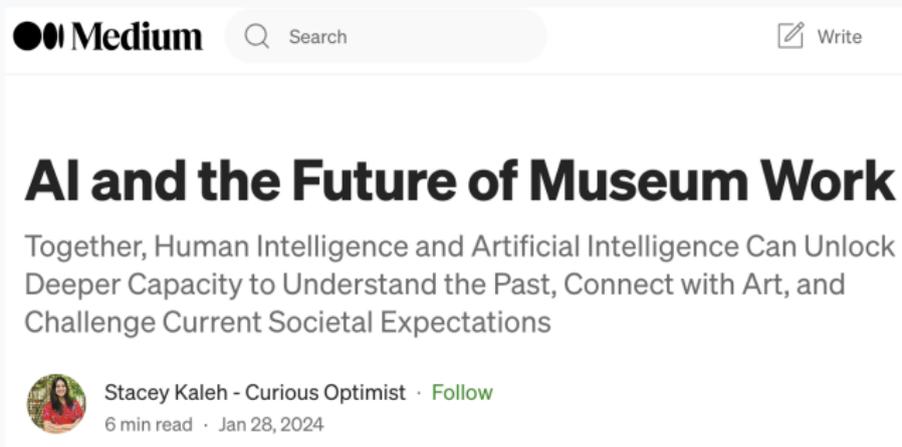
- “After numerous experiments with his AI counterpart, he thinks virtual Seligman will do more good than harm in the world.”
- Seligman: “It is enchanting to me that what I’ve written about and discovered over 60 years in psychology could be useful to people long after I was dead. That kind of legacy seems to me as close to immortality as a scientist can come.”

## AI Generated Work Won Art Prize



Jason Allen submitted his Midjourney-generated work "Théâtre D'opéra Spatial" took 1st place in the digital category at the Colorado State Fair, 2022

# AI-Enhanced Museum?



The image shows a screenshot of a Medium article. At the top left is the Medium logo. To its right is a search bar with a magnifying glass icon and the word "Search". Further right is a "Write" button with a pencil icon. The main title of the article is "AI and the Future of Museum Work" in a large, bold, black font. Below the title is a subtitle: "Together, Human Intelligence and Artificial Intelligence Can Unlock Deeper Capacity to Understand the Past, Connect with Art, and Challenge Current Societal Expectations". Below the subtitle is a circular profile picture of Stacey Kaleh, followed by her name "Stacey Kaleh - Curious Optimist" and a "Follow" button. At the bottom of the article preview, it says "6 min read · Jan 28, 2024".

- 1 “Be early adopters. Or, at least, don’t be late adopters. Your audience will thank you.”
- 2 “Lead the conversation on what it means to have these technologies in our lives.”
- 3 “Provide Next-level Storytelling Experiences”
- 4 “Establish Significant Collections of Artists’ AI Art”
- 5 “Create New Roles for Museum Workers”