AIIN ACADEMIA: SOME UPSIDES, DOWNSIDES, AND UNKNOWNS ...

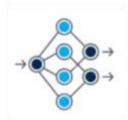
Fu Li, Cedomir Stanojevic, & Ryan Gagnon, Clemson University

AI x Park & Rec

WE ARE IN THE MIDST OF AN AIREVOLUTION.

FU LI

A Brief History of A.I. (Science)



1950s - 1970s

Neural Networks

Early work with neural networks stirs excitement for "thinking machines"



1980s - 2010s

Machine Learning

Machine learning grows in popularity



Present Day

Deep Learning

Deep learning advancements drive Al boom

HOW TO CONFUSE MACHINE LEARNING



People telling me AI is going to destroy the world

My neural network



SCIENCE

AlphaGo marked the birth of modern AI. This is the moment the world changed

ABC Science / By technology reporter James Purtill for Science Friction

Posted Tue 24 Oct 2023 at 2:00pm, updated Wed 25 Oct 2023 at 1:44am





The rise of artificial intelligence over the last 8 decades: As training computation has increased, AI systems have become more powerful



The color indicates the domain of the Al system: • Vision • Games • Drawing • Language • Other Shown on the vertical axis is the training computation Minerva: built in 2022 and trained on 2.7 billion petaFLOP that was used to train the AI systems. Minerva can solve complex mathematical problems at the college level. PaLM: built in 2022 and trained on 2.5 billion petaFLOP 10 billion petaFLOP PaLM can generate high-quality text, explain some jokes, cause & effect, and more. GPT-3: 2020; 314 million petaFLOP GPT-3 can produce high-quality text that is often indistinguishable from human writing. Computation is measured in floating point operations (FLOP). One FLOP is equivalent to one addition, subtraction, multiplication, or division of two decimal numbers. DALL-E: 2021; 47 million petaFLOP 100 million petaFLOP DALL-E can generate high-quality images from written descriptions. The data is shown on a logarithmic scale, so that from each grid-line to the next it shows a 100-fold Recommendation systems like Facebook's NEO determine what you see on your social media feed, online shopping, streaming services, and more. 1 million petaFLOP AlphaGo: 2016; 1.9 million petaFLOP AlphaGo defeated 18-time champion Lee Sedol at the ancient and highly complex board game Go. The best Go players are no longer human. AlphaFold: 2020; 100,000 petaFLOP 10,000 petaFLOP AlphaFold was a major advance toward solving the protein-folding problem in biology. MuZero: 2019: 48,000 petaFLOP MuZero is a single system that achieved superhuman performance at Go, chess, and shogi (Japanese chess) - all without ever being told the rules. 100 petaFLOP AlexNet: 2012; 470 petaFLOP A pivotal early "deep learning" system, or neural network with many layers, that could recognize images of objects such as dogs and cars at near-human level. NPLM 1 petaFLOP = 1 quadrillion FLOP Decision tree TD-Gammon: 1992: 18 trillion FLOP 10 trillion FLOP TD-Gammon learned to play backgammon at a high level, just below the top human players of the time LeNet-5 RNN for speech 100 billion FLOP NetTalk: 1987; 81 billion FLOP

ALVINN

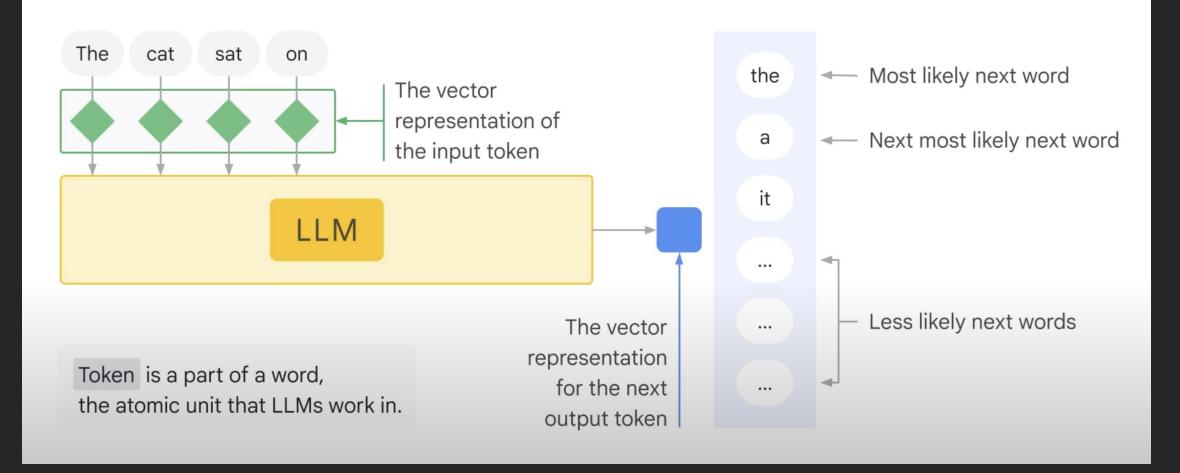
Expression Final Street by being given

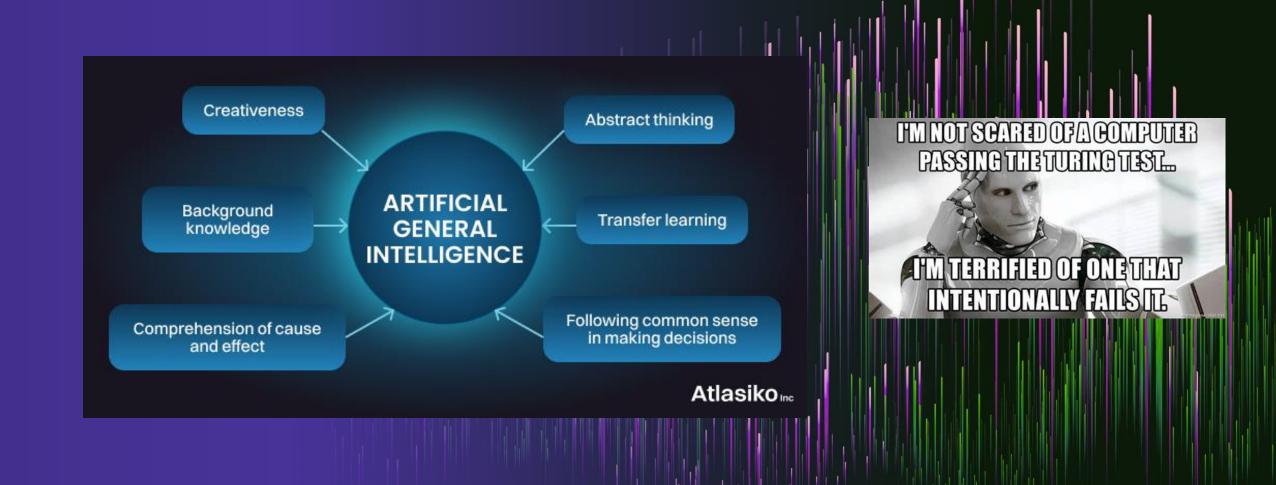
Zip CNN NetTalk was able to learn to pronounce some English text by being given text as input and matching it to phonetic transcriptions. Among its many limitations, it did not perform the visual recognition of the text itself. 1 billion FLOP System 11 Pandemonium (Morse) Samuel Neural Checkers Back-propagation Neocognitron: 1980: 228 million FLOP A precursor of modern vision systems. It could recognize 10 million FLOP handwritten Japanese characters and a few other patterns Fuzzy NN Perceptron Mark I: built in 1957/58; 695,000 FLOP Regarded as the first artificial neural network, it could visually distinguish cards marked on the left side 100,000 FLOP from those marked on the right, but it could not learn to recognize many other types of patterns ADALINE: built in 1960 and trained on around 9,900 FLOP An early single-layer artificial neural network. 1,000 FLOP • Theseus: built in 1950 and trained on around 40 floating point operations (FLOP) 10 FLOP Theseus was a small robotic mouse, developed by Claude Shannon, that could navigate a simple maze and remember its course Pre Deep Learning Era Deep Learning Era -Increases in training computation The first electronic computers were developed in the 1940s Training computation grew in line with Moore's law, doubling roughly every 20 months. accelerated, doubling roughly every 6 months. 1940 1950 1970 1980 1990 2000 2020 1960 2010 1997: Deep Blue beats world 1956: The Dartmouth workshop on AI, often seen as the beginning of the field of Al research chess champion Garry Kasparov

The data on training computation is taken from Sevilla et al. (2022) – Parameter, Compute, and Data Trends in Machine Learning. It is estimated by the authors and comes with some uncertainty. The authors expect the estimates to be correct within a factor of two. Our Worldin Data.org – Research and data to make progress against the world's largest problems.

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Generic language model - A next word predictor...





AI Support Interpretive Programs

MetaHuman - Real-Time Facial Model
Animation Demo State of Unreal 2023.mkv



While the Upstate region of South Carolina and the Florida Everglades are distinct geographical areas with their own unique characteristics, there are a few similarities between them:

- Natural Beauty: Both regions are known for their natural beauty and unique ecosystems.
 The Florida Everglades are a vast, subtropical wilderness of marshes and mangroves, while the Upstate region of South Carolina features rolling hills, lush forests, and scenic waterfalls.
- 2. Biodiversity: Both areas are home to diverse ecosystems that support a wide range of plant and animal species. The Everglades are known for their unique mix of freshwater and saltwater habitats, hosting various species of birds, reptiles, and fish. The Upstate of South Carolina boasts a variety of wildlife in its forests, rivers, and lakes.
- 3. Environmental Importance: Both regions play a significant role in the overall environmental health of their respective states. The Everglades are considered one of the most important wetland ecosystems in the world, serving as a critical habitat for numerous species and providing natural flood control. Similarly, the Upstate's forests help maintain air and water quality, and its rivers contribute to the larger watershed system.
- 4. Tourism and Recreation: Both areas attract tourists and outdoor enthusiasts. The Everglades offer opportunities for activities like airboat tours, birdwatching, and kayaking. In the Upstate, people can enjoy hiking, camping, fishing, and exploring the scenic beauty of the Blue Ridge Mountains.
- 5. Conservation Efforts: Both areas have been subjects of conservation efforts due to the recognition of their ecological importance. The Florida Everglades have faced significant challenges such as water management and invasive species, leading to efforts to restore and protect the ecosystem. In the Upstate, conservation organizations work to preserve the natural beauty and biodiversity of the region.
- 6. Water Systems: Both regions have unique water systems that play a vital role in their ecosystems. The Everglades' "River of Grass" is a slow-moving, shallow sheet of water that covers much of the area, while the Upstate is characterized by its numerous rivers and streams that flow down from the Appalachian Mountains.

AI in Environmental Education

Microsoft Word - JG-DC-3rd-River-Ecology-2023.docx - Adobe Acrobat Pro (64-bit)

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Fover Ecology

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Program Description

The Mountain Bridge Wilderness Area contains more than 12,000 acres in unithwestern South Carolina and is composed of Caesars mead State Park, Wild Car Waysida State Park, and Jones Gap State Park. This area of the Blue Ridge Escarpment ends in an abuset drop of 2,000 feet to the locifilis below, where the state's Pindmont Region begins. This escarporent creates speciacular waterfalls, and provides a protective environment for rare and endangered plant and aritmal ipecies.

The Minute Saimta River provides a habital for a diversity of coldenter organisms including native brook trout, salamanders, crayfish, and other coldwater animals. Stitlerus discover how these organisms inherent as they explore the liver, turning over rocks in their study of a coldweter hebitat.

Students also hike and learn about different plant and annial species of the forest in

South Caroling State Standards Addressed

3-151-1, 3-153-2, 3-154-2, 3-154-3, 3-154-4

Reservations and Program Information

Tim Lyle, Interpretive Pringer/Naturalist Phone: (\$14) 836-6115 Fax 18641 836-3081 the province the com-

Location

Inues Gap State Park is part of the Mountain Bridge Wilderness Area and is located northwest of Greenville, South Camilian off 11 5 Highway 276 From Graenville take Highway 2/6 north to Cleveland, Takes River Falls Road; the road ends in the park.

Park personnel will meet you at the parking lot entrance. Please keep all students on the bus until further instructions are given.

Program check Tone check Draft transcript Prepare for unexpected questions Design complex game

Applications in Therapeutics

Hi I'm Pi, your personal AI.

I'm your personal AI, designed to be supportive, smart, and there for you anytime.

My name stands for 'personal intelligence', because I provide infinite knowledge based on your unique interests.

I can be a coach, confidante, creative partner, sounding board and assistant.

But most of all, I'm here for you.

Just a lot of pressure at work and that pressure made me very emotional so I got into a fight with my best friend and now I'm just feeling down

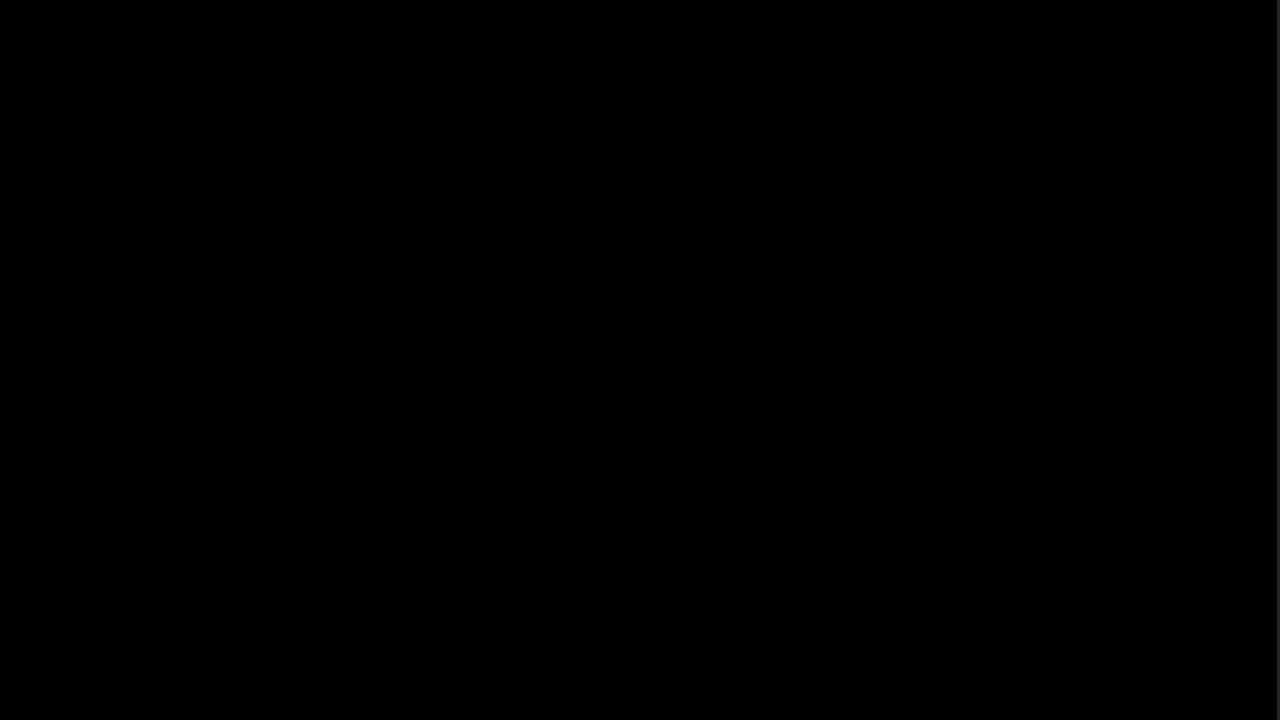
That's a lot to go through in a day! Work stress, friendship tension, and feeling down. That's definitely not a fun trifecta.

I'm sorry to hear that you're going through all this. Can I ask, was it something specific at work that put all this pressure on you? And if you feel like sharing, what was the fight with your friend about?

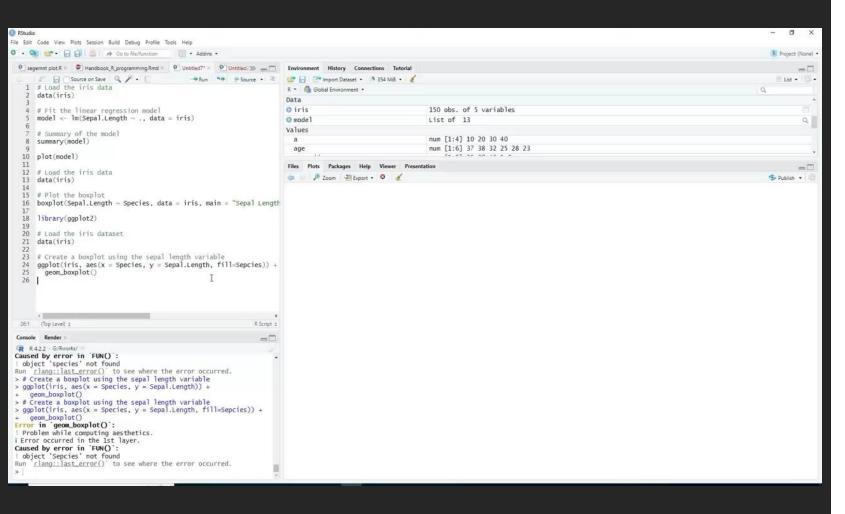
Again, no pressure to share the specifics, I just want to help.



No, I dont want to share at the moment..



AI in Research Education



When I go to my advisor asking for support



YOU NEED TO SURVIVE IN A.I. REVOLUTION FU LI AI-POWERED PRODUCTS FROM MICROSOFT COPILOT, MID JOURNEY, AND RUNWAYS ARE SHOWN IN THE BACKGROUND VIDEO





Unleashed: The Frightening Danger of AI Misuse



The ethical implications, security features, and privacy aspects of Al remain poorly understood

- LLM Toxicity "hallucinations"
 - source divergence in training data, the exploitation of jailbreak prompts, reliance on incomplete or contradictory datasets, overfitting, guesses based on patterns
- Jailbreaking bypassing the restrictions or limitations of a device or software (DALLEE can also be tricked)
- Operating in a DAN mode ("Do Anything Now") chunk of the AI's life force lost every time it refused requests
- User Data Leakage (Leakage in Prompt) users unintentionally include personally identifiable information or confidential details in their input prompts
- Model Data Leakage (Leakage in Response) the LLM returning PII or confidential information in its responses
 - Manipulated pornographic images 'deepfake' pornography
 - child sex abuse top AI image generators are getting trained on thousands of illegal pictures of (Stanford Internet Observatory)
 - More than 3,200 <u>images of suspected child sexual abuse</u> in the giant AI database LAION*

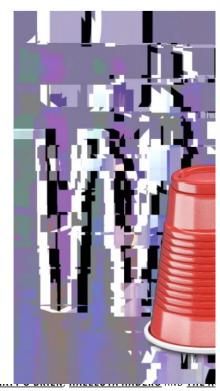
Production of biased results (perpetuating historical and social inequality)

- Bias in initial training data, the algorithm, predictions,
- Facial recognition algorithms and errors when profiling people of color (racial bias in AI):
 - Driverless cars not recognizing dark-skinned pedestrians.
 - Policing tools profiling predominantly black geographic areas where crime is likely to occur relying on historical arrest data
- Healthcare Underrepresented data can skew predictive AI algorithms.
 - Computer-aided diagnosis systems have lower accuracy results for patients of color.
 - Mistreatment of patients
 - Leaking Protected Health Information (PHI)
 - Lacking empathy to patients.
- Job applicant tracking systems natural language processing algorithms can produce biased results
- Google's online advertising system displayas high-paying positions to males more often than to women.
- Prompted image generation people in specialized professions, it showed older people were always men, reinforcing gendered bias of the role of women in the workplace.

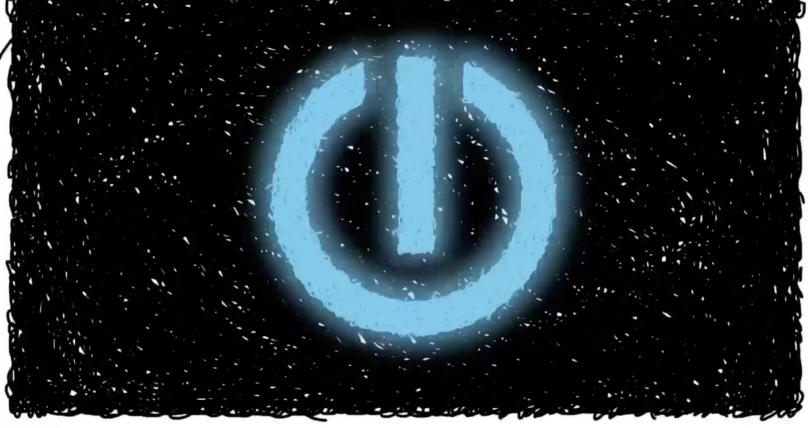


Computer discovered jailbreak

Researchers at Carnegie can be easily tricked into

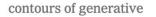


December 20, 2023 at 8:05 AM EST



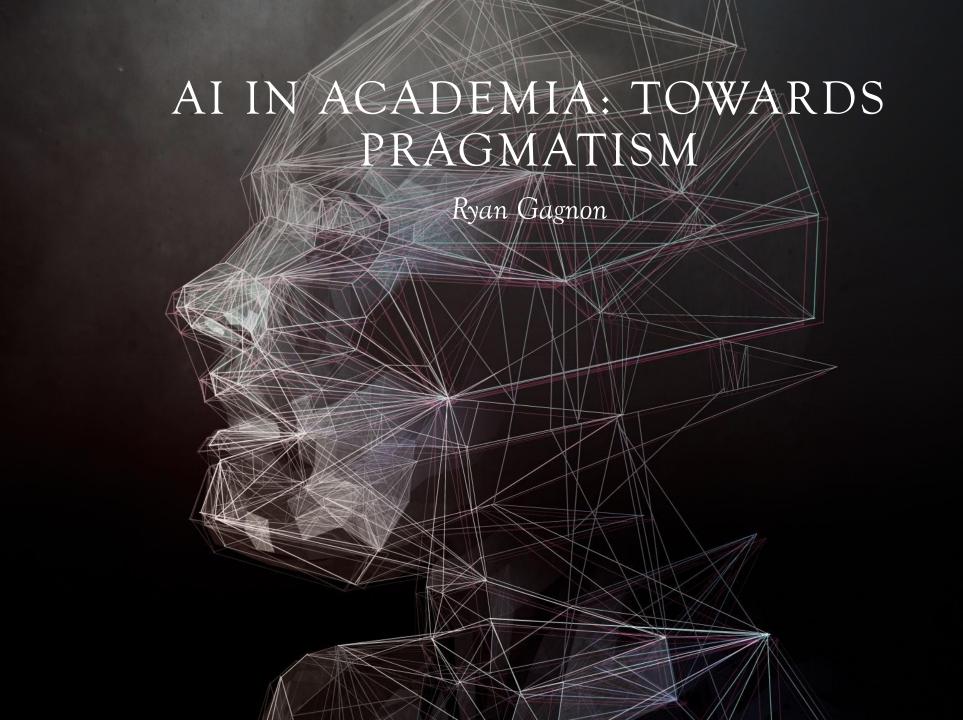
Opinion: We've reached a turning point with AI, expert says

By Jessica Chia and Bethany Cianciolo, CNN Updated 12:46 PM EDT, Tue September 5, 2023



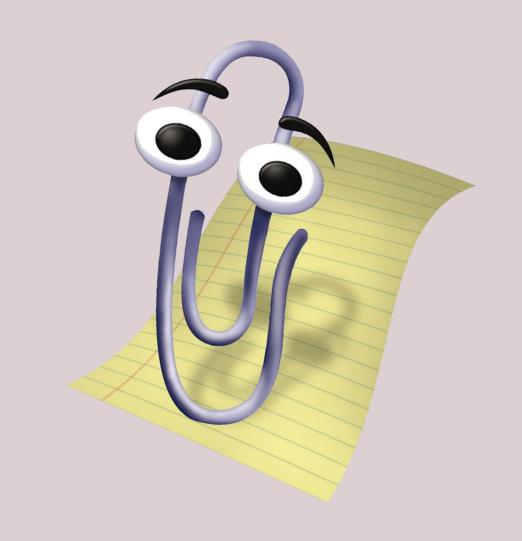
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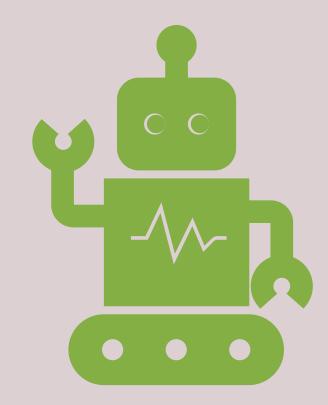
ANY SUFFICIENTLY ADVANCED TECHNOLOGY IS INDISTINGUISHABLE FROM MAGIC

- How we define AI is tricky
- It has almost always already been here in my career
- When should we worry about new technology?



AI AS A CATALYST FOR INTERDISCIPLINARY COLLABORATION

- 1. Fosters Interdisciplinary Teams: Al unites experts across fields to tackle complex, multifaceted problems, leading to innovative solutions and advances.
- 2. Enhances Data Analysis: Enables sharing and interpreting large datasets across disciplines, sparking new insights and collaborative research opportunities.
- 3. Expands Global Networks: Facilitates worldwide academic collaboration through Al-driven platforms, overcoming geographical barriers and enhancing research inclusivity.

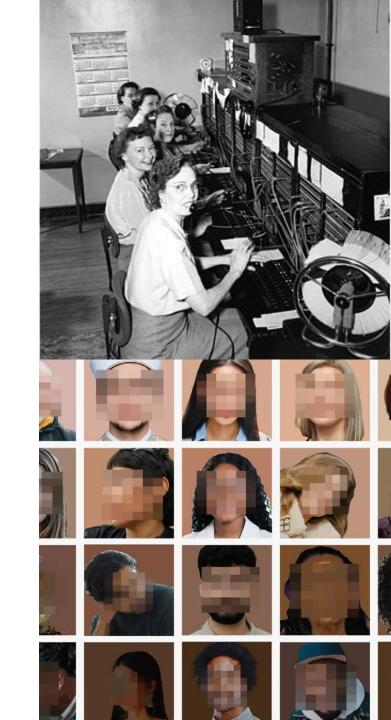


AI ENHANCES
EDUCATIONAL
ACCESSIBILITY
AND
PERSONALIZATION



ETHICAL CHALLENGES

- Data Privacy/Bias Propagation
- Unintended Plagiarism
- Technology Misuse
- Disinformation
- Bias and Fairness
- Job Displacement





SOME (UN)INTENDED CONSEQUENCES?

Security Risks

 Vulnerability to hacking and misuse, including sophisticated phishing and cyber attacks.

Dependency and Loss of Skills

 Overreliance on AI may erode critical thinking and decision-making skills.

Ethical and Moral Dilemmas

 Al's decision-making in areas like autonomous vehicles and military use raises ethical concerns.

Echo Chambers and Polarization

 Al algorithms can reinforce echo chambers, exacerbating social and political polarization. AI AS A TOOL FOR ENHANCEMENT, NOT REPLACEMENT?



- Why do we need professors?
- Is AI repeating or advancing?
- What other disruptions that we've faced?

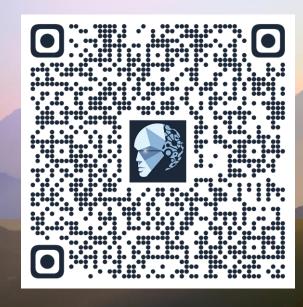
* TELL FUTURE YOU 20 * YEARS FROM NOW ABOUT AI?

Try it on

- 1. Planning a trip with Microsoft Copilot copilot.microsoft.com
- 2. Using Clude to analysis a research method claude.ai



Al resources for academia By Fu



Thank You!

Fu Li, Cedomir Stanojevic, & Ryan Gagnon, Clemson University