AI as Normal Technology

Arvind Narayanan

Based on a paper and book project
with Sayash Kapoor

Outline of the paper

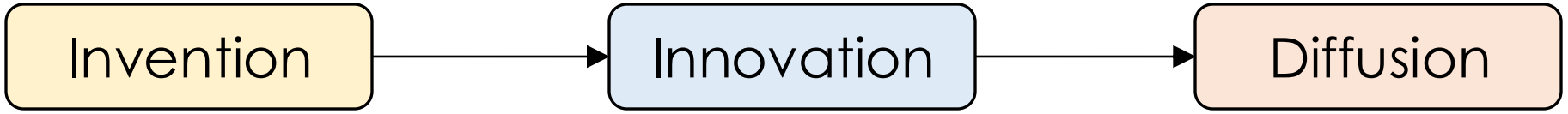
1. How soon will AI's transformative effects unfold?

2. What is the role of labor in a world with advanced AI?

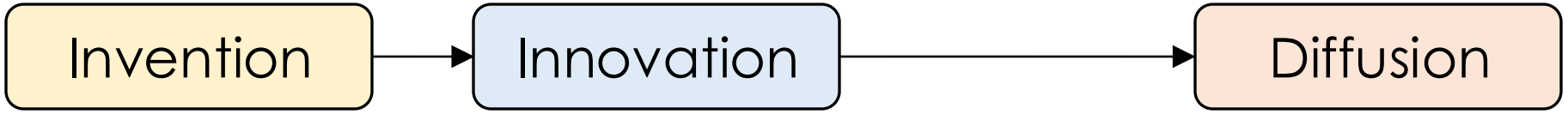
3. How prepared are we to deal with catastrophic risks?

4. What should policymakers do?

Applying diffusion-of-innovations theory to AI



Applying diffusion-of-innovations theory to AI



Stage	Methods / capabilities	Products / Applications	Early adoption	Adaptation
Example	LLMs	AI code editor	Individuals creating simple apps using AI	Extreme personalization

Big gap between models and products

Snazzy Labs @SnazzyLabs · Apr 24

I ordered DoorDash on the Rabbit R1. It didn't let me choose what I wanted on the dish I ordered and had it incorrectly delivered to my house instead of work without notifying me or without any UI to change that.

A rousing success.

40 43 2.3K 175K

Snazzy Labs @SnazzyLabs · Apr 24

It also automatically selected the highest tip option (which is fine, but like, ask me first lol)

4 4 607 21K

Model evaluation doesn't tell us if products are useful

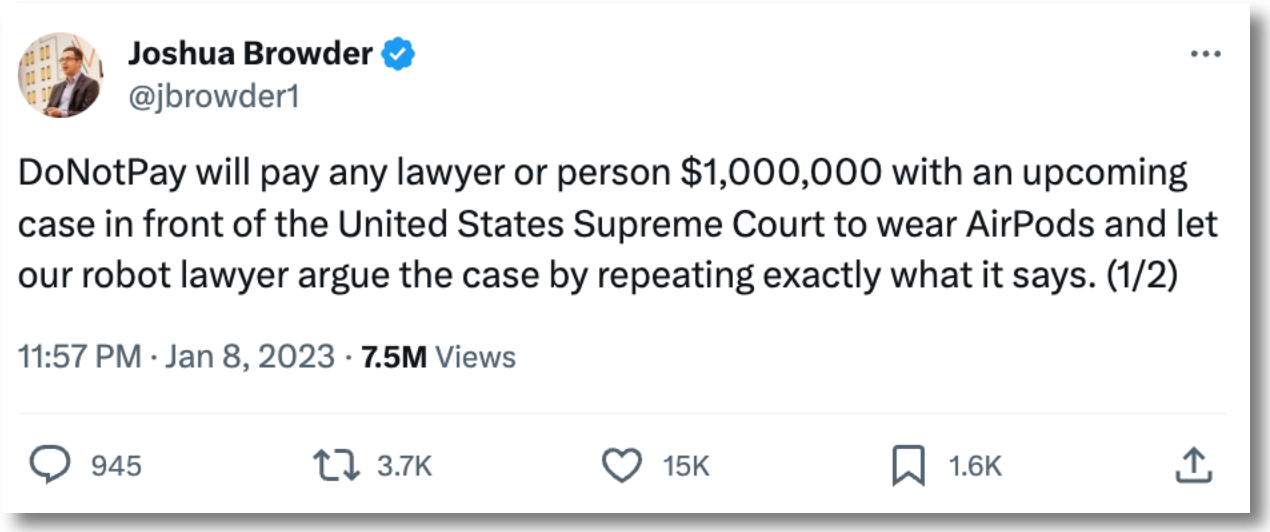
- Capability-reliability gap
- Construct validity
- …

Study: AI can pass the bar exam.

Lawyers' job isn't to answer bar exam questions all day.

AI for law: hype versus reality

Hype



Reality

The hallucination problem

Two types of AI applications in law

Information processing

Summarization, translation, transcription, e-discovery, search, redaction, …

Creativity, reasoning, judgment

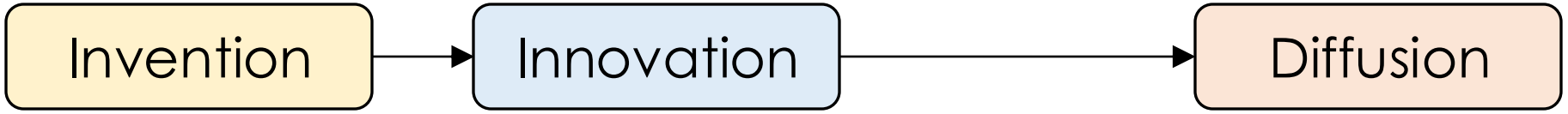
Crafting legal arguments and briefs, legal interpretation, …

Promises and pitfalls of artificial intelligence for legal applications

Sayash Kapoor, Peter Henderson, Arvind Narayanan

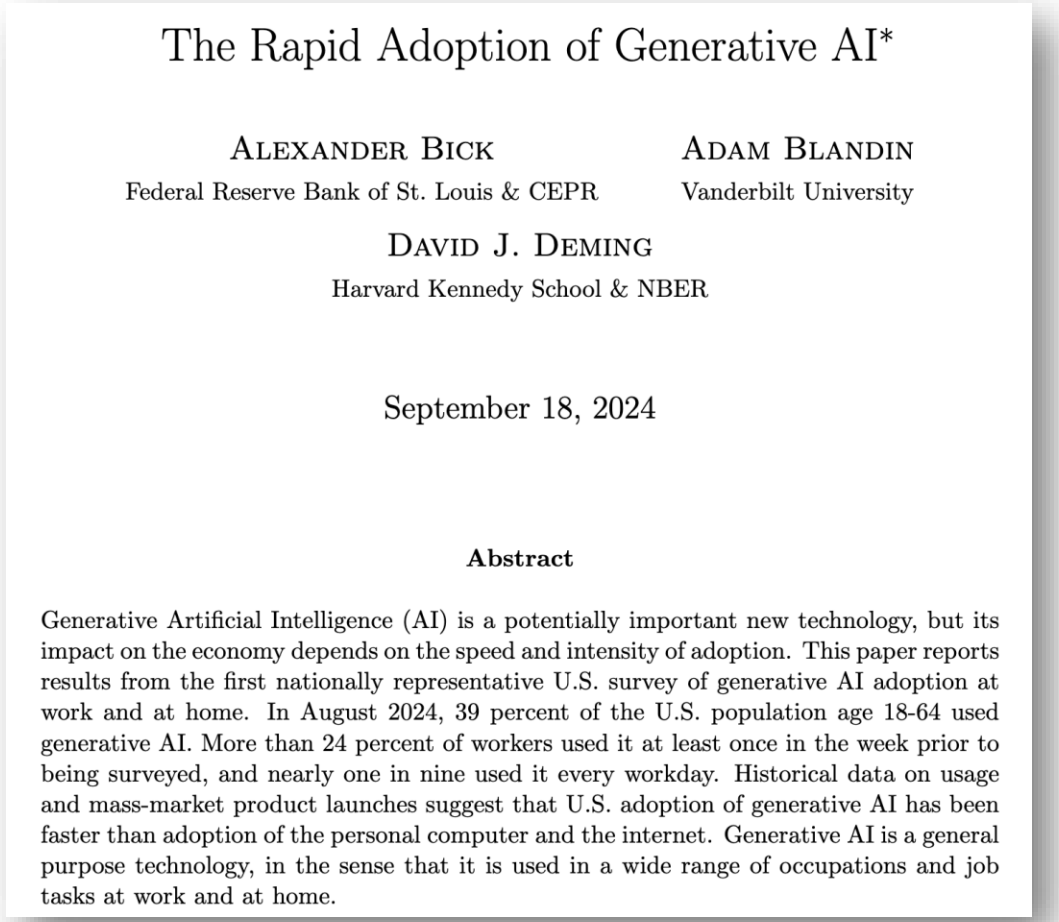
Journal of cross-disciplinary research in computational law, 2024.

Applying diffusion-of-innovations theory to AI



Stage	Methods / capabilities	Products / Applications	Early adoption	Adaptation
Example	LLMs	AI code editor	Individuals creating simple apps using AI	Extreme personalization
Metrics	Benchmarks	Uplift studies	Surveys	Economic indicators

Adoption happens at human speed



The Rapid Adoption of Generative AI*

ALEXANDER BICK
Federal Reserve Bank of St. Louis & CEPR

ADAM BLANDIN
Vanderbilt University

DAVID J. DEMING
Harvard Kennedy School & NBER

September 18, 2024

Abstract

Generative Artificial Intelligence (AI) is a potentially important new technology, but its impact on the economy depends on the speed and intensity of adoption. This paper reports results from the first nationally representative U.S. survey of generative AI adoption at work and at home. In August 2024, 39 percent of the U.S. population age 18-64 used generative AI. More than 24 percent of workers used it at least once in the week prior to being surveyed, and nearly one in nine used it every workday. Historical data on usage and mass-market product launches suggest that U.S. adoption of generative AI has been faster than adoption of the personal computer and the internet. Generative AI is a general purpose technology, in the sense that it is used in a wide range of occupations and job tasks at work and at home.

40% of U.S adults are using generative AI?

But only 0.5–3.5% of work hours;

0.125 – 0.875 percentage point increase in labor productivity.

These are not hard things to look up; I'm a very amateurish accountant. [3] It is surprising how much edge "let me google that" gives you, 26 years after Google was released. (Not to talk about LLMs.) Most people just seem to come up with an answer in their head and then go with that without checking.

To the credit of the board, they did see the problem as soon as I pointed it out, and acted swiftly, and were able to find solutions that I was too inexperienced to find.

When we cut back on workshops and fundraising and focused on the parts that worked, we could do that with more care—running experiments, updating our pricing strategies, automating, streamlining, changing the branding, etc—which, as always when you narrow your focus, made a big difference, and we ended up growing revenue by 311 percent.

https://www.henrikkarlsson.xyz/p/art-gallery

Adoption puts a speed limit on innovation

Learning from the internet is over.

Now AI needs to learn by doing.

Adoption – innovation feedback loop.

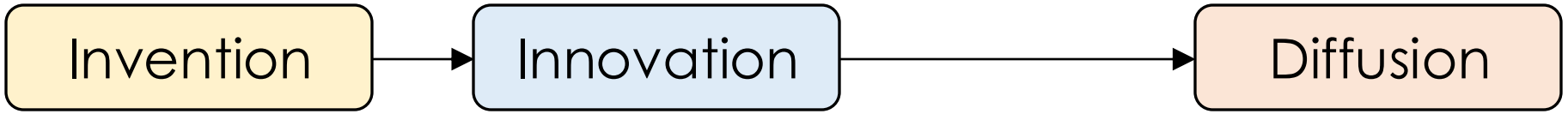
Example: self-driving took decades.

Diffusion requires changes to organizations and business models

Historical analogy: electrification of factories

In other cases diffusion requires changes to institutions, laws, and norms.

Summary: speed limits at every stage



Stage	Methods / capabilities	Products / Applications	Early adoption	Adaptation
Example	LLMs	AI code editor	Individuals creating simple apps using AI	Extreme personalization
Metrics	Benchmarks	Uplift studies	Surveys	Economic indicators
Speed limits	Herding Last mile problem	Capability v reliability Diffusion	Learning curves Safety	Org changes Laws and norms

Outline of the paper

1. How soon will AI's transformative effects unfold?

   Over decades.

2. What is the role of labor in a world with advanced AI?

3. How prepared are we to deal with catastrophic risks?

4. What should policymakers do?

Outline of the paper

1. How soon will AI's transformative effects unfold?
   Over decades.

2. **What is the role of labor in a world with advanced AI?**

3. How prepared are we to deal with catastrophic risks?

4. What should policymakers do?

The task model

Jobs are bundles of tasks

AI automates tasks, not jobs

Automation vs reinstatement

The New York Times

SMARTER THAN YOU THINK

Armies of Expensive Lawyers, Replaced by Cheaper Software

Share full article 245

"People get bored, people get headaches. Computers don't," said Bill Herr, a lawyer who used to work for a chemical company. Ramin Rahimian for The New York Times

By John Markoff

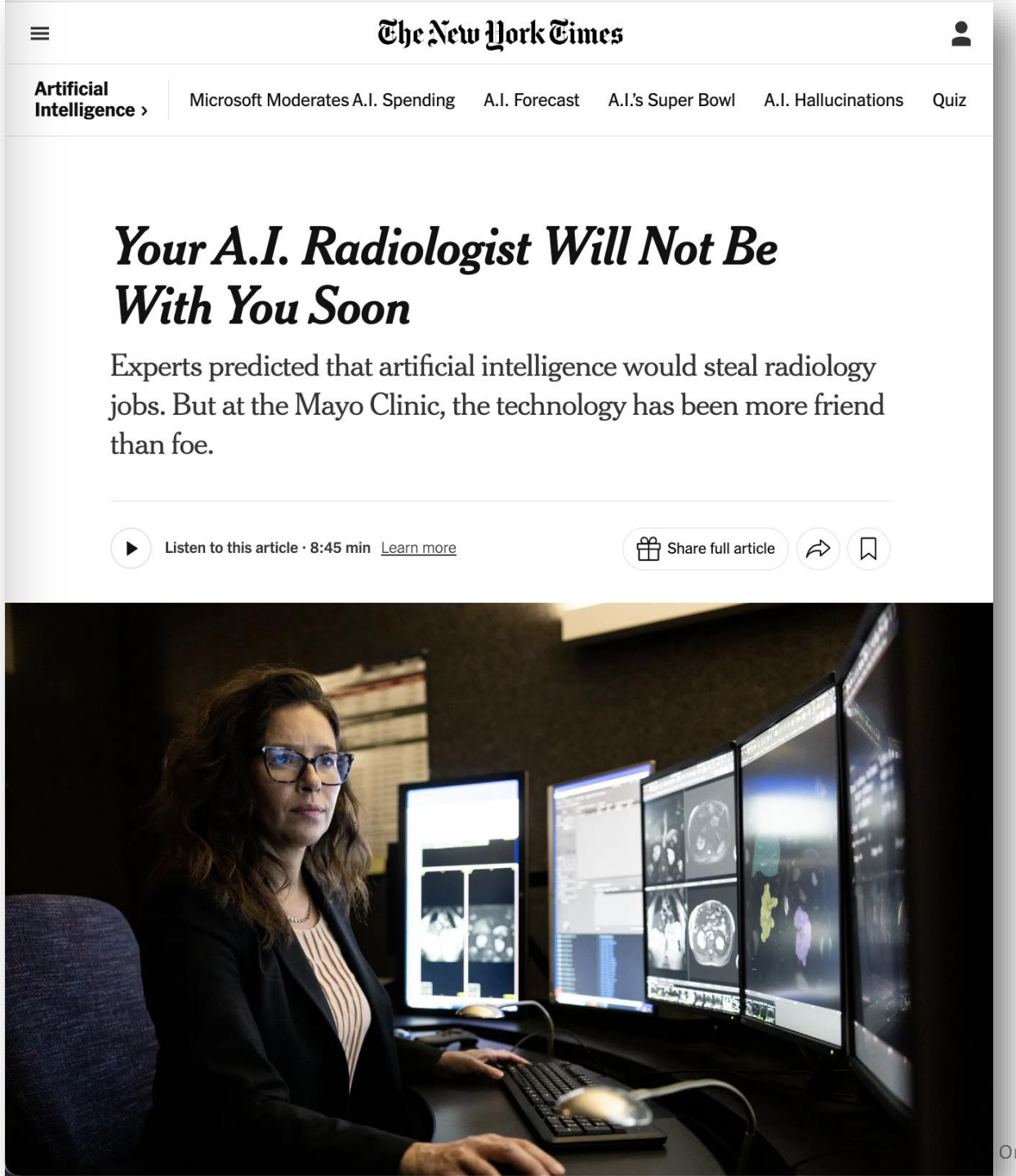
March 4, 2011

Case study: radiology

"If you work as a radiologist, you are like the coyote that's already over the edge of the cliff but hasn't yet looked down ... People should stop training radiologists now. It's just completely obvious within five years deep learning is going to do better than radiologists"

— Geoff Hinton

2016



The New York Times

Artificial Intelligence › | Microsoft Moderates A.I. Spending | A.I. Forecast | A.I.'s Super Bowl | A.I. Hallucinations | Quiz

Your A.I. Radiologist Will Not Be With You Soon

Experts predicted that artificial intelligence would steal radiology jobs. But at the Mayo Clinic, the technology has been more friend than foe.

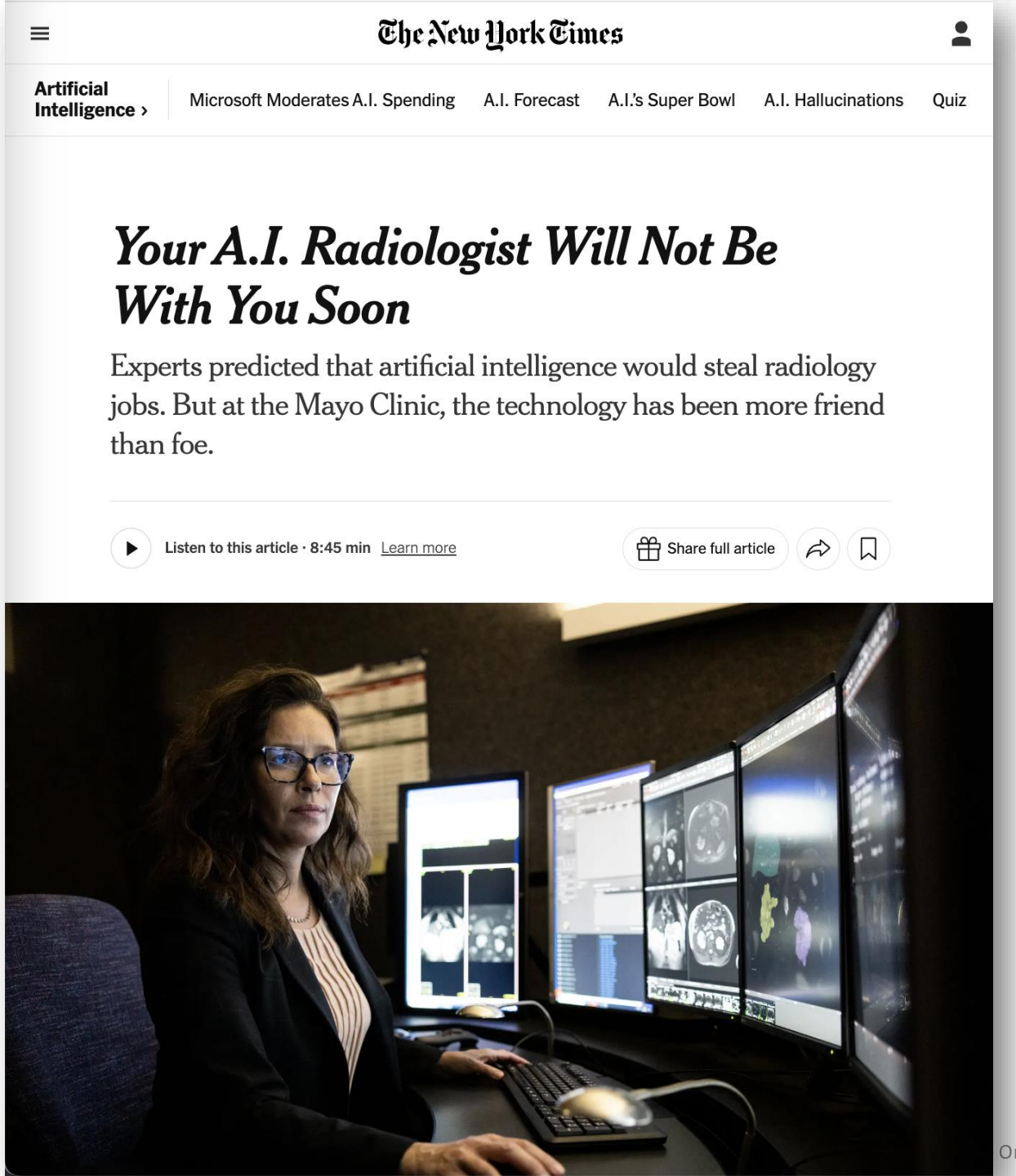
Listen to this article · 8:45 min Learn more

Share full article

Radiology projected to grow for decades

This does not seem to be because of any identified capability at which radiologists outperform AI.

Maybe jobs aren't mere bundles of tasks.



The New York Times

Artificial Intelligence › | Microsoft Moderates A.I. Spending | A.I. Forecast | A.I.'s Super Bowl | A.I. Hallucinations | Quiz

Your A.I. Radiologist Will Not Be With You Soon

Experts predicted that artificial intelligence would steal radiology jobs. But at the Mayo Clinic, the technology has been more friend than foe.

Listen to this article · 8:45 min Learn more

Share full article

Who are the right experts?

Domain experts know a lot more than AI experts in CS/econ about the power and limits of AI for their work.

Reconciling two views of the future

Prediction: generative AI will mediate most knowledge work.

The internet's effects

- Most knowledge work today is mediated by the internet.
  This would have sounded crazy at the beginning!
- Yet, small effects on productivity
- Some professions decimated
- Yet, augmentation effect in the vast majority of jobs
- All of this took a few decades to unfold.

Prediction: most tasks in the future will be about specification & AI control

A near-total redefinition of work has happened before.

Analogy: industrial revolution.

Will superintelligence change the equation?

Limits to human abilities

- Computational limits — chess
- Intrinsic limits — writing
- Knowledge limits — medical research

Our thesis: most tasks aren't like chess.

Outline of the paper

1. How soon will AI's transformative effects unfold?

2. What is the role of labor in a world with advanced AI?

   Everything will change yet mostly stay the same.

3. How prepared are we to deal with catastrophic risks?

4. What should policymakers do?

Outline of the paper

1. How soon will AI's transformative effects unfold?

2. What is the role of labor in a world with advanced AI?

3. **How prepared are we to deal with catastrophic risks?**

4. What should policymakers do?

Outline of the paper

1. How soon will AI's transformative effects unfold?

2. What is the role of labor in a world with advanced AI?

3. How prepared are we to deal with catastrophic risks?

   We have work to do but we're on track.

4. What should policymakers do?

Outline of the paper

1. How soon will AI's transformative effects unfold?

2. What is the role of labor in a world with advanced AI?

3. How prepared are we to deal with catastrophic risks?

4. **What should policymakers do?**

Worry about unchecked capitalism, not superintelligence

Many proposed defenses against superintelligence require a concentration of both corporate and government power and will decrease societal resilience.

Resilience as an overarching approach

Protect the foundations of democracy — especially those weakened by AI

Free press, equitable labor markets, …

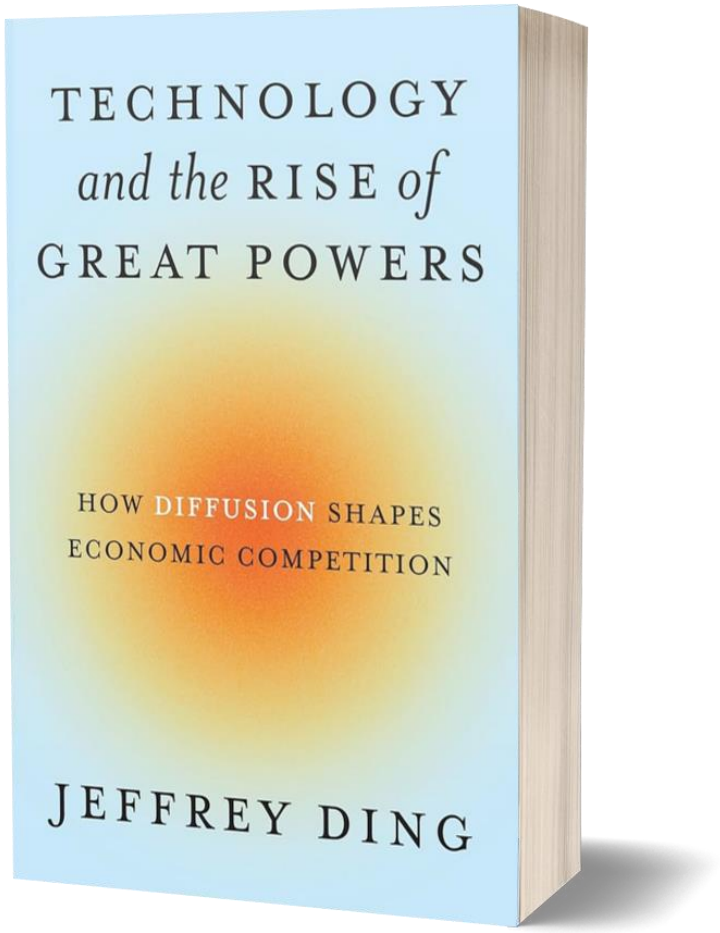
Also the best defense against catastrophic risks.

Nonproliferation *worsens* those risks by making shocks much more sudden when they do occur.

Promote diffusion, not innovation

The innovation-diffusion fallacy

Regulation can spur or inhibit diffusion.



Invest in the *complements of automation*

Things that become more valuable or necessary as automation increases.

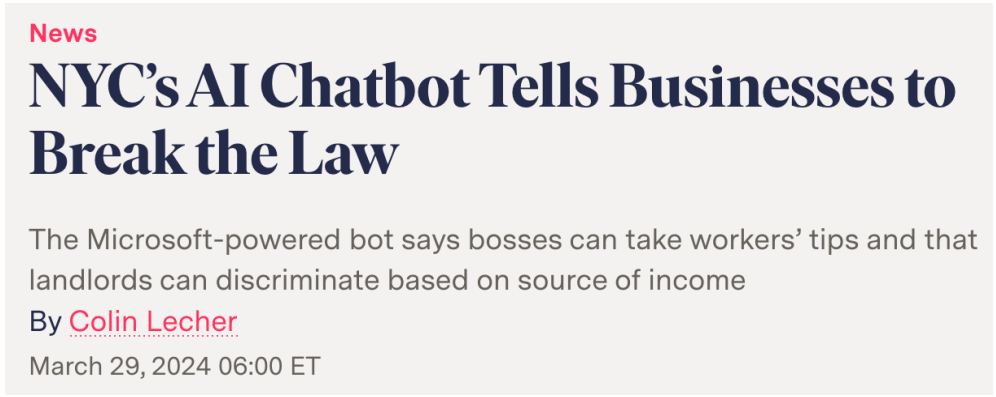
Examples:

- AI literacy
- Workforce training
- Digitization and open data
- Energy infrastructure

The government's balancing act

Hasty adoption

Runaway bureaucracy



News

NYC's AI Chatbot Tells Businesses to Break the Law

The Microsoft-powered bot says bosses can take workers' tips and that landlords can discriminate based on source of income

By Colin Lecher

March 29, 2024 06:00 ET

THE HILL

THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

Runaway bureaucracy could make common uses of AI worse, even mail delivery

BY DANIEL E. HO AND NICHOLAS BAGLEY, OPINION CONTRIBUTOR - 01/16/24 11:00 AM ET

Does legitimacy come from procedures or competence?

Outline of the paper

1. How soon will AI's transformative effects unfold?

2. What is the role of labor in a world with advanced AI?

3. How prepared are we to deal with catastrophic risks?

4. What should policymakers do?

   Improve resilience, promote diffusion.

Outline of the paper

1. How soon will AI's transformative effects unfold?

   Over decades.

2. What is the role of labor in a world with advanced AI?

   Everything will change yet mostly stay the same.

3. How prepared are we to deal with catastrophic risks?

   We have work to do but we're on track.

4. What should policymakers do?

   Improve resilience, promote diffusion.