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Power and Prediction



The Disruptive Economics of
Artificial Intelligence

AJAY
AGRAWAL

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GANS

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Opinion | Why I Welcome Our Future AI Overlords

Who's afraid of ChatGPT?



AI/MACHINE LEARNING

Generative AI is about to become a \$23 trillion industry – and that’s not counting its dark side of scams, deepfakes and romance bots

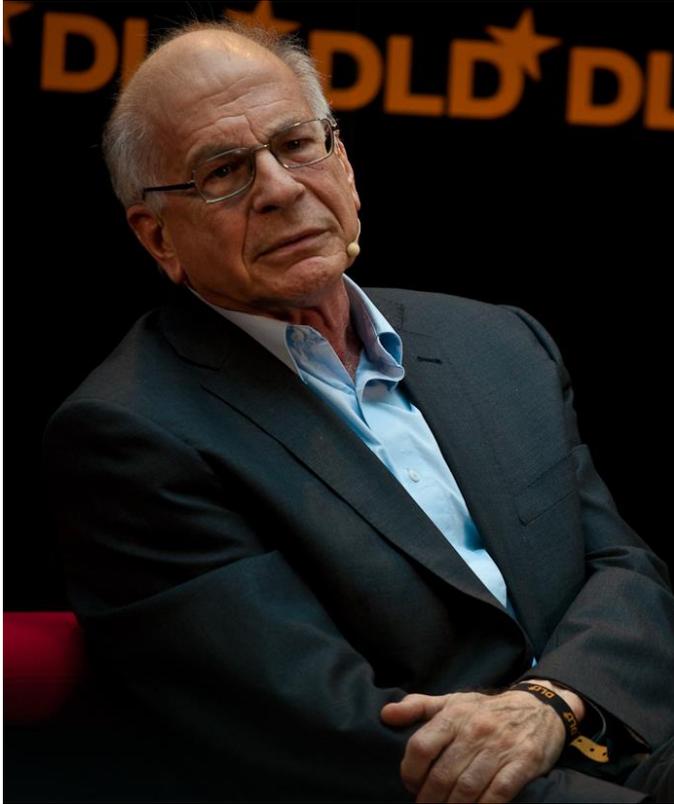


Menu Weekly edition The world in brief Search

Essay | Browsers, the printing press, Freud and AI

How AI could change computing, culture and the course of history

Expect changes in the way people access knowledge, relate to knowledge and think about themselves



“Clearly AI is going to win. How people adjust is a fascinating problem.”

Daniel Kahneman, 2021

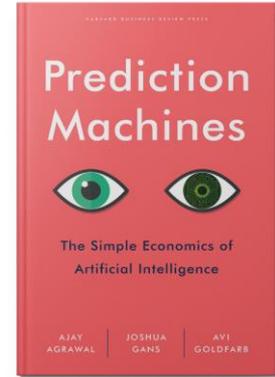
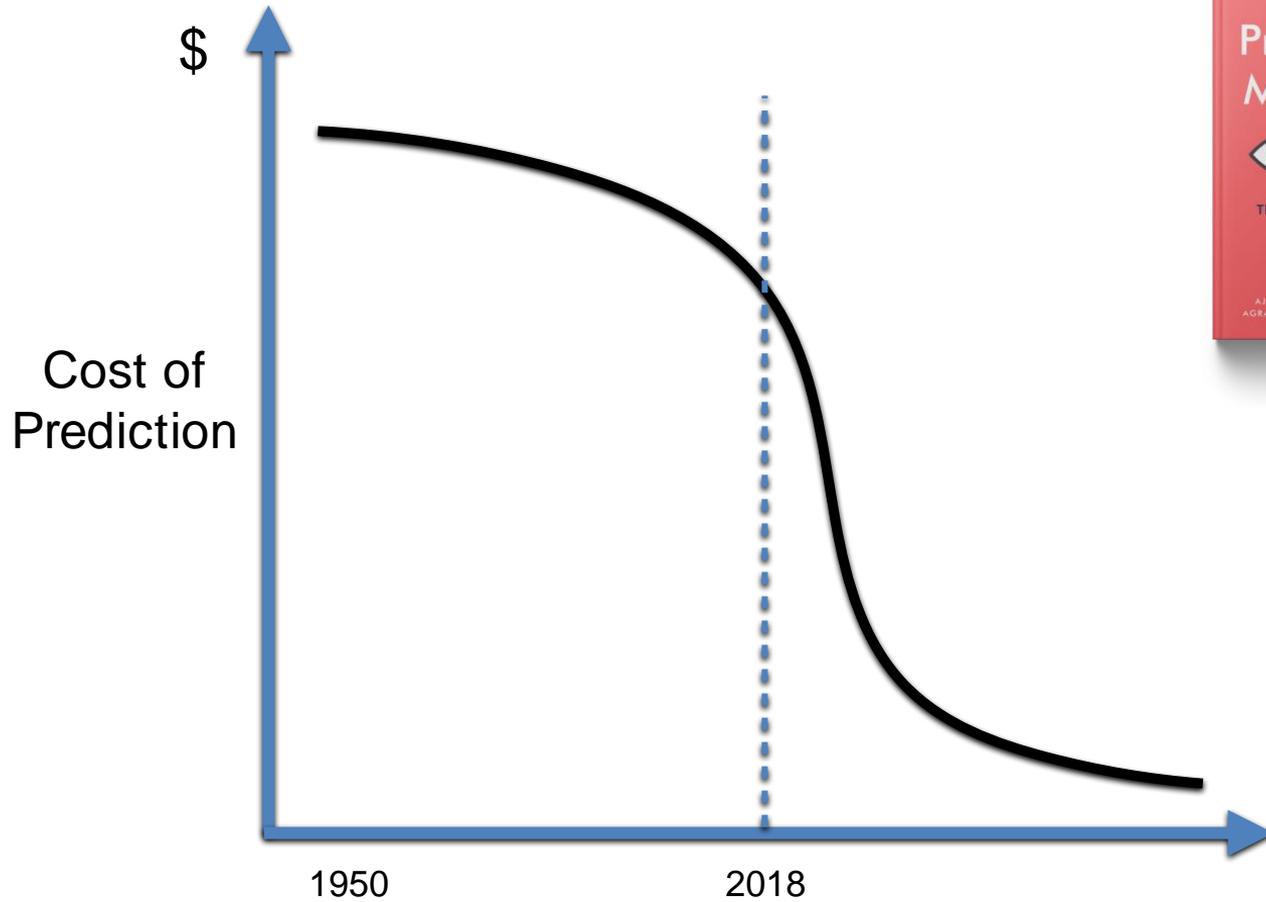
What is Artificial Intelligence?



PREDICTION:

**Using information that you do have
to generate information that you
don't have**

Artificial Intelligence





CAT

Key Points

1. Today's AI is prediction technology.
2. Systems: The transformational opportunities for AI are from developing system-level solutions, not point solutions.
3. AI is useful for decision-making. It decouples prediction from the rest of the decision. This can change who has the power over the decision.
4. Look for places where the organization fails to serve its mission.



Prediction machines, also known as predictive analytics or machine learning models, are becoming increasingly popular in a wide range of industries. These powerful tools are able to analyze vast amounts of data and make accurate predictions about future events or trends.

One major reason for the growing use of prediction machines is the explosion of data that is now available to organizations. The internet and social media have created a wealth of information that can be used to gain insights and make predictions about consumer behavior, market trends, and more. Additionally, advances in technology have made it much easier to collect, store, and analyze this data, making it more accessible to organizations of all sizes.

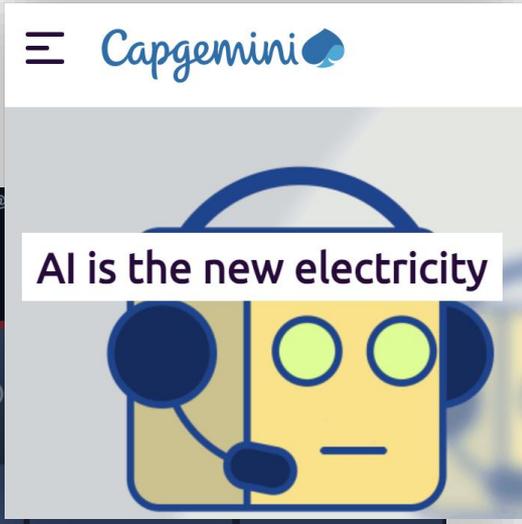
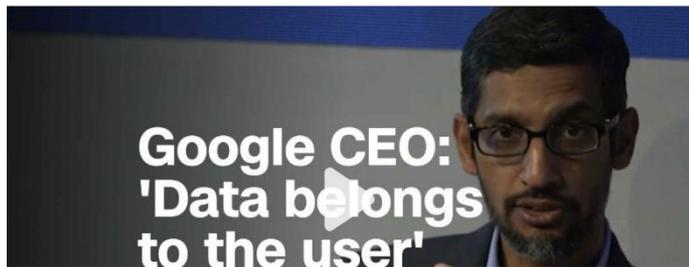


Davos

Google CEO: AI is 'more profound than electricity or fire'

by Alanna Petroff @AlannaPetroff

January 24, 2018: 2:50 PM ET



Home > About IP > WIPO Magazine > 2019 > 3/2019

WIPO MAGAZINE

Artificial intelligence: the new electricity

June 2019

By Catherine Jewell, Publications Division, WIPO





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Lowest price in 30 days

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Sonic Frontiers - Nintendo Switch

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Earth Rated Dog Poop Bag Holder with Dog Poop Bags, Durable...

★★★★★ 3,273

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Prime FREE Delivery



600 PCS. Café Express 3 oz.(88ml) Multi-Purpose Cups Paper Bath...

★★★★★ 520

\$35.93

✓prime FREE One-Day







US008615473B2

(12) **United States Patent**

(10) **Patent No.:** **US 8,615,473 B2**

(45) **Date of Patent:** **Dec. 24, 2013**

(54) **METHOD AND SYSTEM FOR ANTICIPATORY PACKAGE SHIPPING**

(US) **Girish S. Lakshman**, Issaquah,

(73) **Assignee: Amazon Technologies, Inc., Reno, NV (US)**

U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/594,195**

(22) Filed: **Aug. 24, 2012**

(65) **Prior Publication Data**
US 2012/0323645 A1 Dec. 20, 2012

Related U.S. Application Data
(62) Division of application No. 13/305,611, filed on Nov. 28, 2011, now Pat. No. 8,271,398, which is a division of application No. 11/015,288, filed on Dec. 17, 2004, now Pat. No. 8,086,546.

(51) **Int. Cl.**
G06Q 99/00 (2006.01)

(52) **U.S. Cl.**
USPC **705/332; 705/330; 705/333; 705/336; 705/337**

(58) **Field of Classification Search**
USPC 705/332, 330, 333, 336, 337
See application file for complete search history.

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		10/2009	Spiegel
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Office Action from Application No. 2007-546877, mailed Apr. 26, 2011, Amazon Technologies, Inc., 8 pages.

(Continued)

Primary Examiner — Akiba Allen

(74) *Attorney, Agent, or Firm* — Robert C. Kowert; Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C.

(57) **ABSTRACT**

A method and system for anticipatory package shipping are disclosed. According to one embodiment, a method may include packaging one or more items as a package for eventual shipment to a delivery address, selecting a destination geographical area to which to ship the package, shipping the package to the destination geographical area without completely specifying the delivery address at time of shipment, and while the package is in transit, completely specifying the delivery address for the package.

24 Claims, 11 Drawing Sheets



US008615473B2

(12) **United States Patent**
Spiegel et al.

(10) **S 8,615,473 B2**
(45)
Dec. 24, 2013

(54) **METHOD AND SYSTEM FOR
ANTICIPATORY PACKAGE SHIPPING**

(75) Inventors: **Joel R. Spiegel**, Woodinville, WA (US);
Michael T. McKenna, Bellevue, WA
(US); **Girish S. Lakshman**, Issaquah,
WA (US); **Paul G. Nordstrom**, Seattle,
WA (US)

(73) Assignee: **Amazon Technologies, Inc.**, Reno, NV
(US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

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705/337

(58) **Field of Classification Search**
USPC 705/332, 330, 333, 336, 337
See application file for complete search history.

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(Continued)

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(Continued)

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24 Claims, 11 Drawing Sheets

Only 10% of firms report benefits from their AI spend

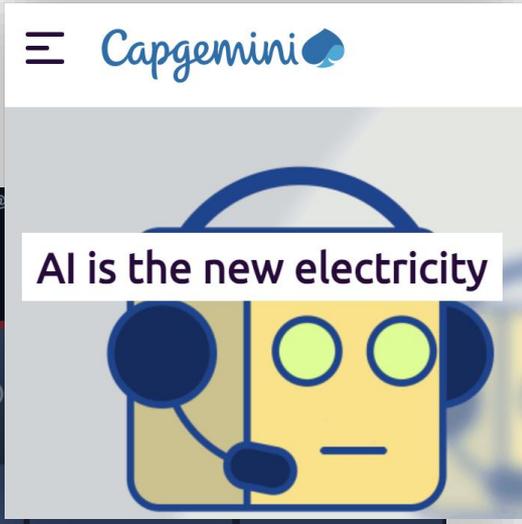
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Davos

Google CEO: AI is 'more profound than electricity or fire'

by Alanna Petroff @AlannaPetroff

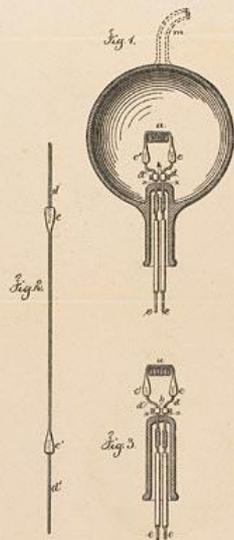
January 24, 2018: 2:50 PM ET



T. A. EDISON.
Electric-Lamp.

No. 223,898.

Patented Jan. 27, 1880.



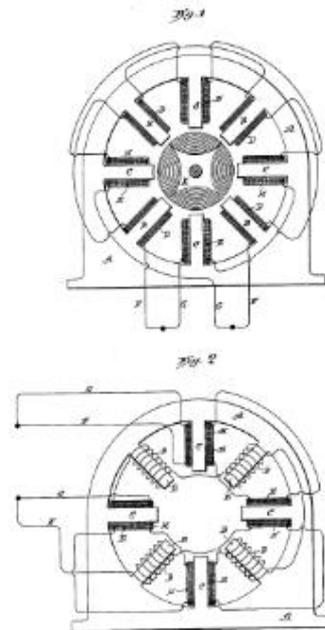
Witnesses
Chas. H. Smith
Geo. P. Mather

Inventor
Thomas A. Edison
for Lemuel W. Serrell

cut

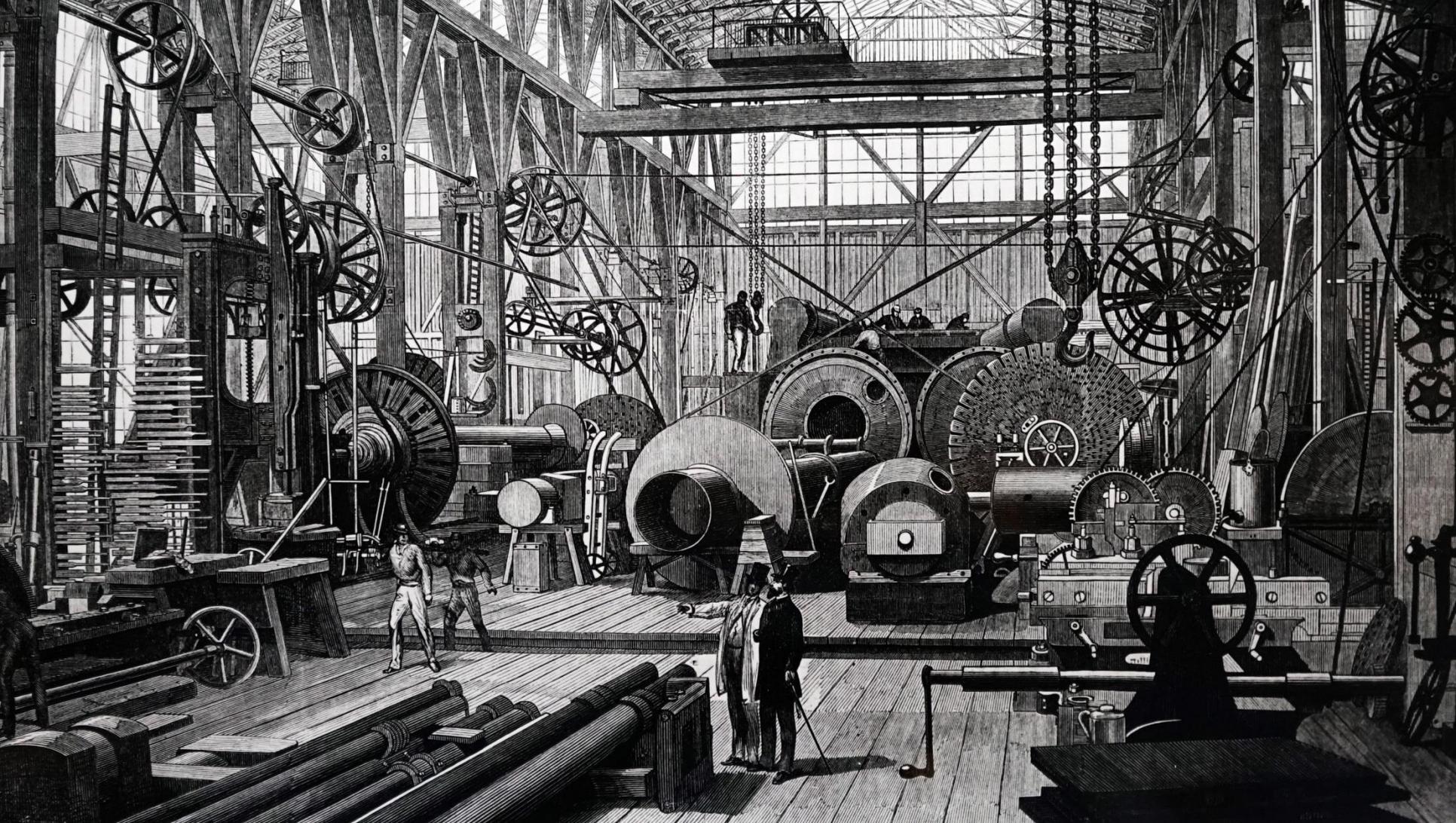
(No Model.)

N. TESLA.
ALTERNATING CURRENT ELECTRO MAGNETIC MOTOR.
No. 433,700. Patented Aug. 6, 1890.

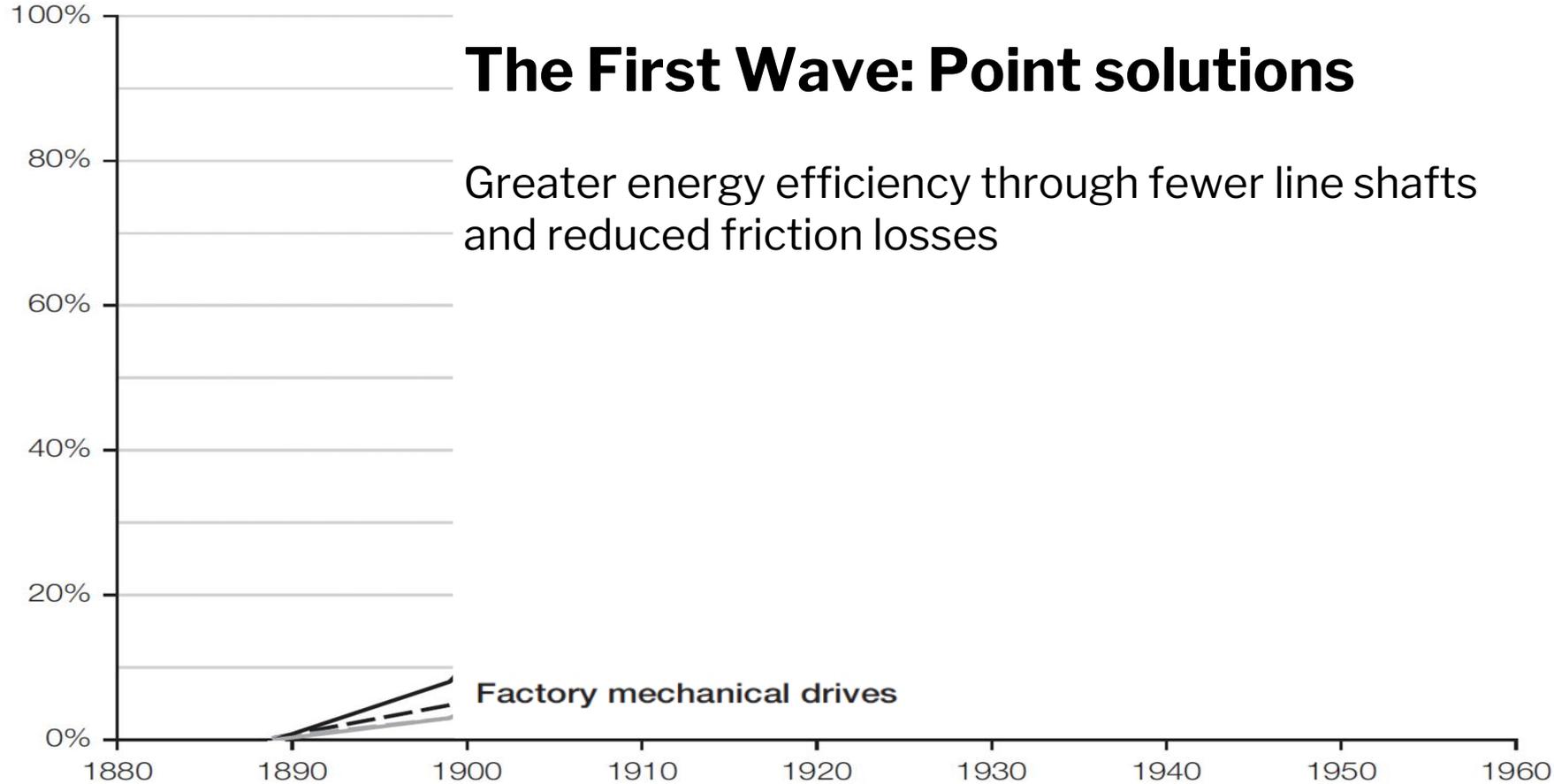


Witnesses:
Eugene A. Loomis
Conrad Tappin

Inventor
Nikola Tesla
by Owen Curtis & Page
Attorneys



Adoption of electricity in the United States



The Second Wave

Flexible machine placement

Lighter construction

Single story

Modular production





The Journal of
Economic History

Article contents

Abstract

References

From Shafts to Wires: Historical Perspective on Electrification

Published online by Cambridge University Press: 03 March 2009

Warren D. Devine Jr

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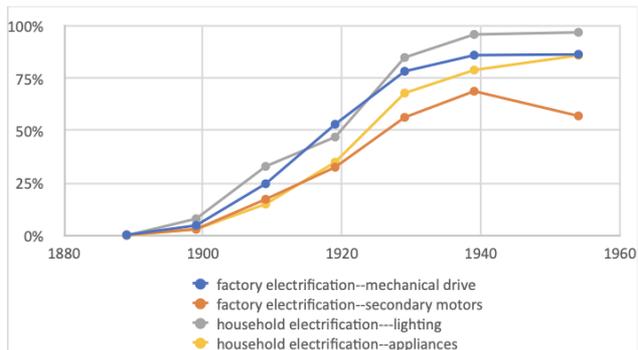
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Abstract

The shift from steam to electric power in manufacturing is recounted. Between 1880 and 1930 the production and distribution of mechanical power rapidly evolved from water and steam prime movers with shaft and belt drive systems to electric motors that drove individual machines. The use of electricity reduced the energy required to drive machinery, but more important, enabled industry to obtain greater output per unit of capital and labor input. Reduced energy needs and increased productivity in manufacturing influenced the relationship between energy consumption and gross national product in the first three decades of the twentieth century.



The Dynamo and the Computer: An Historical Perspective on the Modern Productivity Paradox

By PAUL A. DAVID*

Many observers of recent trends in the industrialized economies of the West have been perplexed by the conjecture of rapid technological innovation with disappointingly slow gains in measured productivity. A generation of economists who were brought up to identify increases in total factor productivity indexes with “technical progress” has found it quite paradoxical for the growth accountants’ residual measure of “the advance of knowledge” to have vanished at the very same time that a wave of major innovations was appearing—in microelectronics, in communications technologies based on lasers and fiber optics, in composite materials, and in biotechnology. Disappointments with “the computer revolution” and the newly dawning “information age” in this regard have been keenly felt. Indeed, the notion that there is something anomalous about the prevailing state of affairs has drawn much of its appeal from the apparent failure of the wave of innovations based on the microprocessor and the memory chip to elicit a surge of growth in productivity from the sectors of the U.S. economy that recently have been investing so heavily in electronic data processing equipment (see, for example, Stephen Roach, 1987, 1988; Martin Baily and Robert Gordon, 1988). This latter aspect of the so-called “productivity paradox” attained popular currency in the succinct formulation attributed to Robert Solow: “We see the computers everywhere but in the productivity statistics.”

*Department of Economics, Encina Hall, Stanford University, Stanford, CA 94305. Discussions with Paul Rhode were particularly helpful early in the research. I am grateful for comments from Steve Broadberry, Jonathan Cave, Nick Crafts, among the participants in the Economic History Summer Workshop held at Warwick University, July 10–28, 1989; from Timothy Taylor; and from Shane Greenstein, Avner Greif, Edward Steinmueller, and other participants in the Technology and Productivity Workshop at Stanford, October 1989.

If, however, we are prepared to approach the matter from the perspective afforded by the economic history of the large technical systems characteristic of network industries, and to keep in mind a time-scale appropriate for thinking about transitions from established technological regimes to their respective successor regimes, many features of the so-called productivity paradox will be found to be neither so unprecedented nor so puzzling as they might otherwise appear.

I

My aim here simply is to convince modern economic analysts (whether perplexed by the productivity slowdown, or not) of the immediate relevance of historical studies that trace the evolution of techno-economic regimes formed around general purpose engines.¹ The latter, typically, are key functional components embodied in hardware that can be applied as elements or modular units of the engineering designs developed for a wide variety of specific operations or processes. Accordingly, they are found ubiquitously distributed throughout such systems when the latter have attained their mature, fully elaborated state. James Watt’s (separate condenser) steam engine design springs to mind readily as an example of an innovation that fulfilled this technological role in the first industrial revolution. My particular line of argument will be better served, however, by directing notice to the parallel between the modern computer and another general purpose engine, one that figured prominently in what sometimes is called the “second Industrial Revolution”—namely, the electric dynamo. (But, see also Herbert Simon, 1986.)

Although the analogy between information technology and electrical technology

¹This paper draws upon material developed in a longer work—my 1989 paper.

1

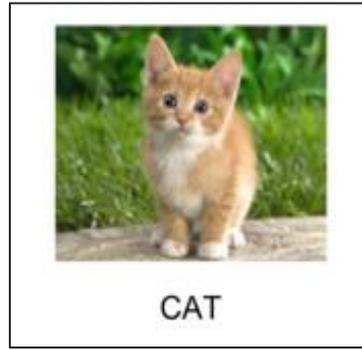
Artificial Intelligence and the Modern Productivity Paradox A Clash of Expectations and Statistics

Erik Brynjolfsson, Daniel Rock, and Chad Syverson

The discussion around the recent patterns in aggregate productivity growth highlights a seeming contradiction. On the one hand, there are astonishing examples of potentially transformative new technologies that could greatly increase productivity and economic welfare (see Brynjolfsson and McAfee 2014). There are some early concrete signs of these technologies' promise, recent leaps in artificial intelligence (AI) performance being the most prominent example. However, at the same time, measured productivity growth over the past decade has slowed significantly. This deceleration is large, cutting productivity growth by half or more in the decade preceding the slowdown. It is also widespread, having occurred throughout the Organisation for Economic Co-operation and Development (OECD) and, more recently, among many large emerging economies as well (Syverson 2017).¹

THE BETWEEN TIMES





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Ada Support



BenchSci

Only 10% of firms report benefits from their AI spend

In a survey of more than 3,000 company managers about their AI spend, only 10% reported significant financial benefits from their investment so far, the new [report](#) from MIT Sloan Management Review and Boston Consulting Group found.

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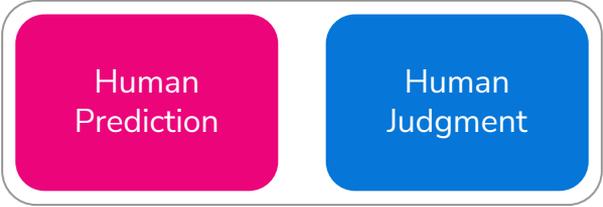


How AI Disrupts



Human
Prediction

Human
Judgment

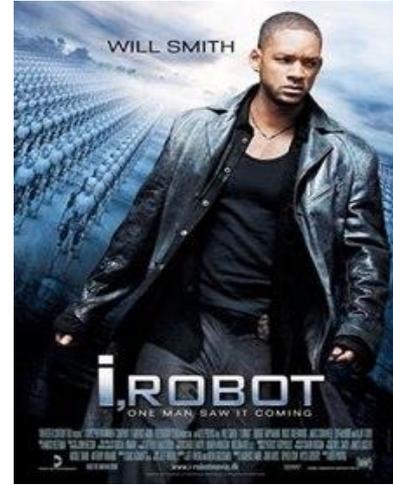


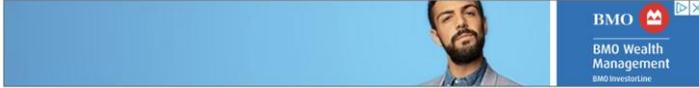
AI



Decoupling







POLICY \ REPORT \ US & WORLD

How Amazon automatically tracks and fires warehouse workers for 'productivity'

Documents show how the company tracks and terminates workers

By Colin Lecher | @colinlecher

The Washington Post
Democracy Dies in Darkness

INNOVATIONS

AI is starting to pick who gets laid off

As layoffs ravage the tech industry, algorithms once used to help hire could now be deciding who gets cut



By [Pranshu Verma](#)

February 20, 2023 at 7:00 a.m. EST



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Flint water crisis: How AI is finding thousands of hazardous pipes

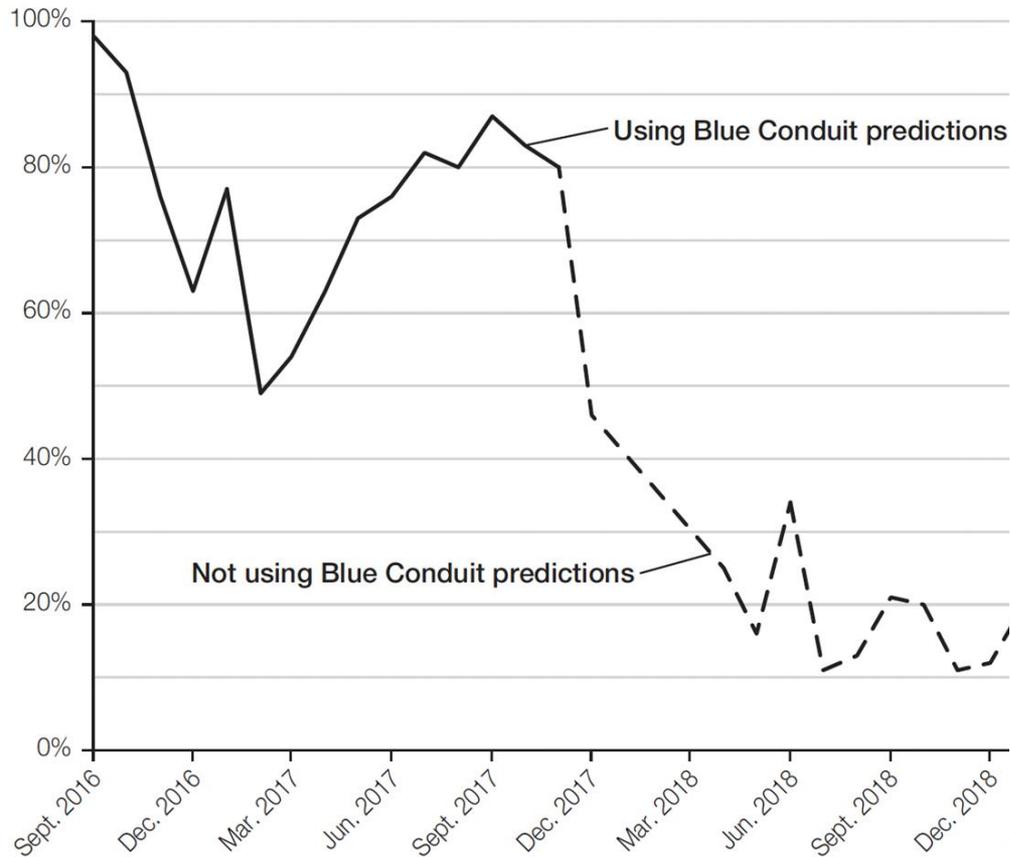


TECHNOLOGY 22 August 2018

By [Frank Swain](#)

FIGURE 15-1

Prediction accuracy for finding lead pipes in Flint



Flint

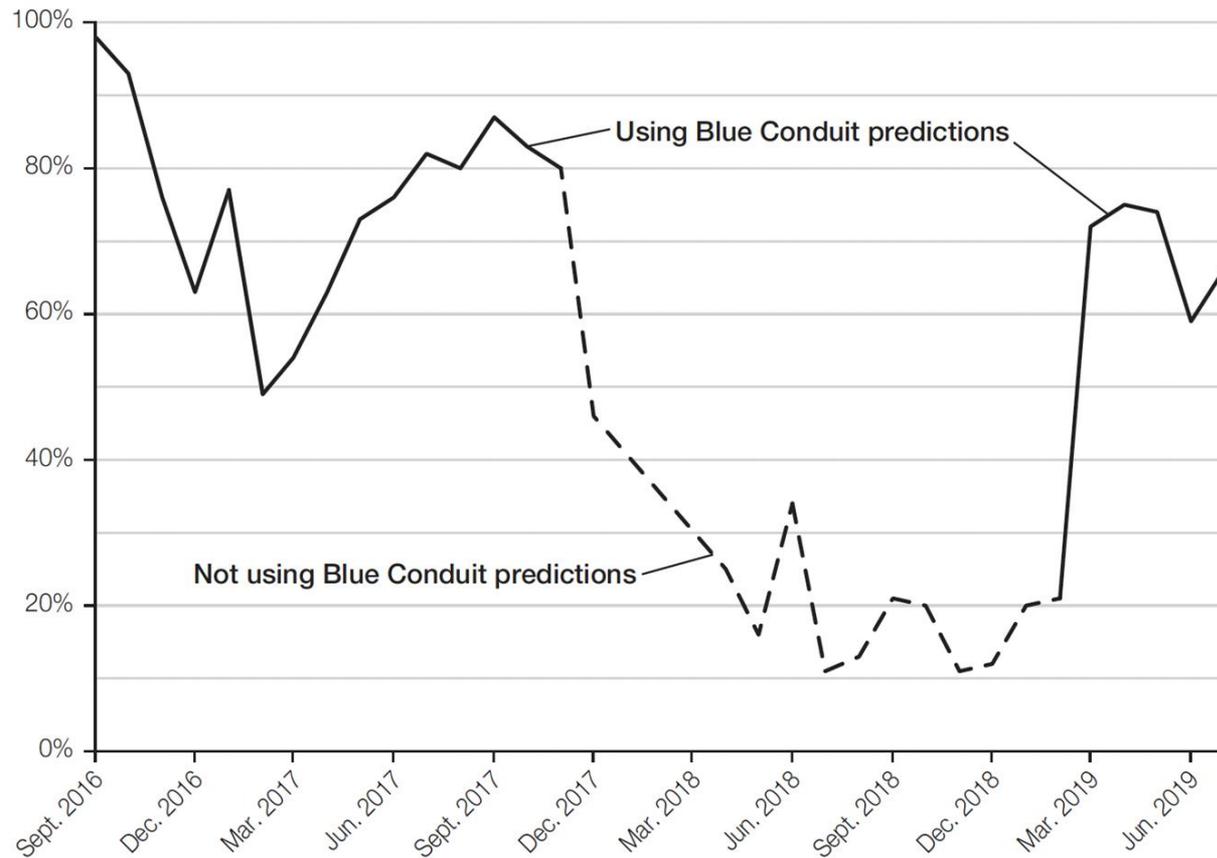
Flint homes at highest risk of having lead in water will get their pipes replaced this year

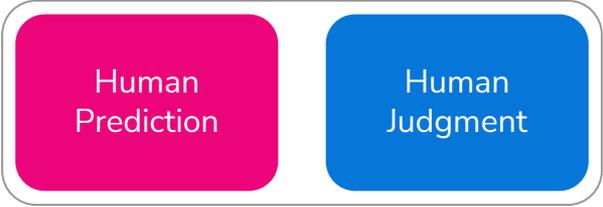
Updated: Mar. 29, 2019, 12:39 p.m. | Published: Mar. 29, 2019, 12:32 p.m.

Through a court-approved amendment, [signed by Judge U.S. District Judge David Lawson on March 26](#), Flint is now required to use the data-driven model to find lead service pipes [using a \\$97 million Concerned Pastors Settlement](#).

FIGURE 15-1

Prediction accuracy for finding lead pipes in Flint





AI



Decoupling





“Humans are inscrutable in a way that algorithms are not.”

“Changing people’s hearts and minds is no simple matter....
Changing algorithms is easier than changing people.”

Sendhil Mullainathan New York Times column, Dec. 6, 2019

Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination

By MARIANNE BERTRAND AND SENDHIL MULLAINATHAN*

We study race in the labor market by sending fictitious resumes to help-wanted ads in Boston and Chicago newspapers. To manipulate perceived race, resumes are randomly assigned African-American- or White-sounding names. White names receive 50 percent more callbacks for interviews. Callbacks are also more responsive to resume quality for White names than for African-American ones. The racial gap is uniform across occupation, industry, and employer size. We also find little evidence that employers are inferring social class from the names. Differential treatment by race still appears to still be prominent in the U.S. labor market. (JEL J71, J64).

Every measure of economic success reveals significant racial inequality in the U.S. labor market. Compared to Whites, African-American

dates, employers might favor the African-American one.¹ Data limitations make it difficult to empirically test these views. Since

ARTICLES

<https://doi.org/10.1038/s41591-020-01192-7>

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An algorithmic approach to reducing unexplained pain disparities in underserved populations

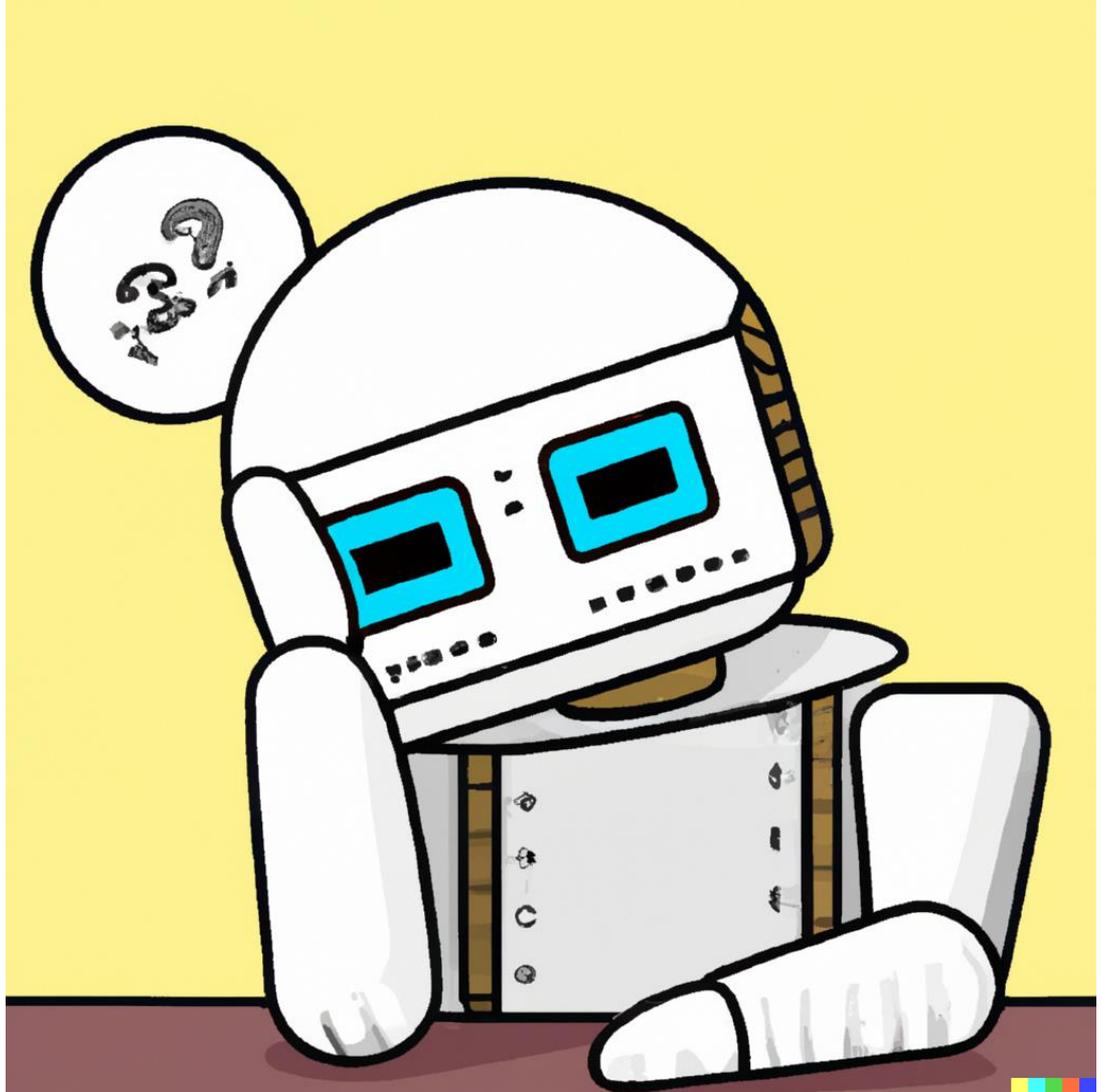
Emma Pierson^{1,2}, David M. Cutler³, Jure Leskovec⁴, Sendhil Mullainathan^{5,6} and Ziad Obermeyer⁶

Underserved populations experience higher levels of pain. These disparities persist even after controlling for the objective severity of diseases like osteoarthritis, as graded by human physicians using medical images, raising the possibility that underserved patients’ pain stems from factors external to the knee, such as stress. Here we use a deep learning approach to measure the severity of osteoarthritis, by using knee X-rays to predict patients’ experienced pain. We show that this approach dramatically reduces unexplained racial disparities in pain. Relative to standard measures of severity graded by radiologists, which accounted for only 9% (95% confidence interval (CI), 3–16%) of racial disparities in pain, algorithmic predictions accounted for 43% of disparities, or 4.7x more (95% CI, 3.2–11.8x), with similar results for lower-income and less-educated patients. This suggests that much of underserved patients’ pain stems from factors within the knee not reflected in standard radiographic measures of severity. We show that the algorithm’s ability to reduce unexplained disparities is rooted in the racial and socioeconomic diversity of the training set. Because algorithmic severity measures better capture underserved patients’ pain, and severity measures influence treatment decisions, algorithmic predictions could potentially redress disparities in access to treatments like arthroplasty.

Pain is widespread and unequally distributed in society. Like many other causes of pain, knee osteoarthritis, which affects with structural damage on X-ray or even magnetic resonance imaging (MRI) experience no or very little pain^{1–6}. Standard radio-

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Mission:
“To ensure
smooth air
transportation”



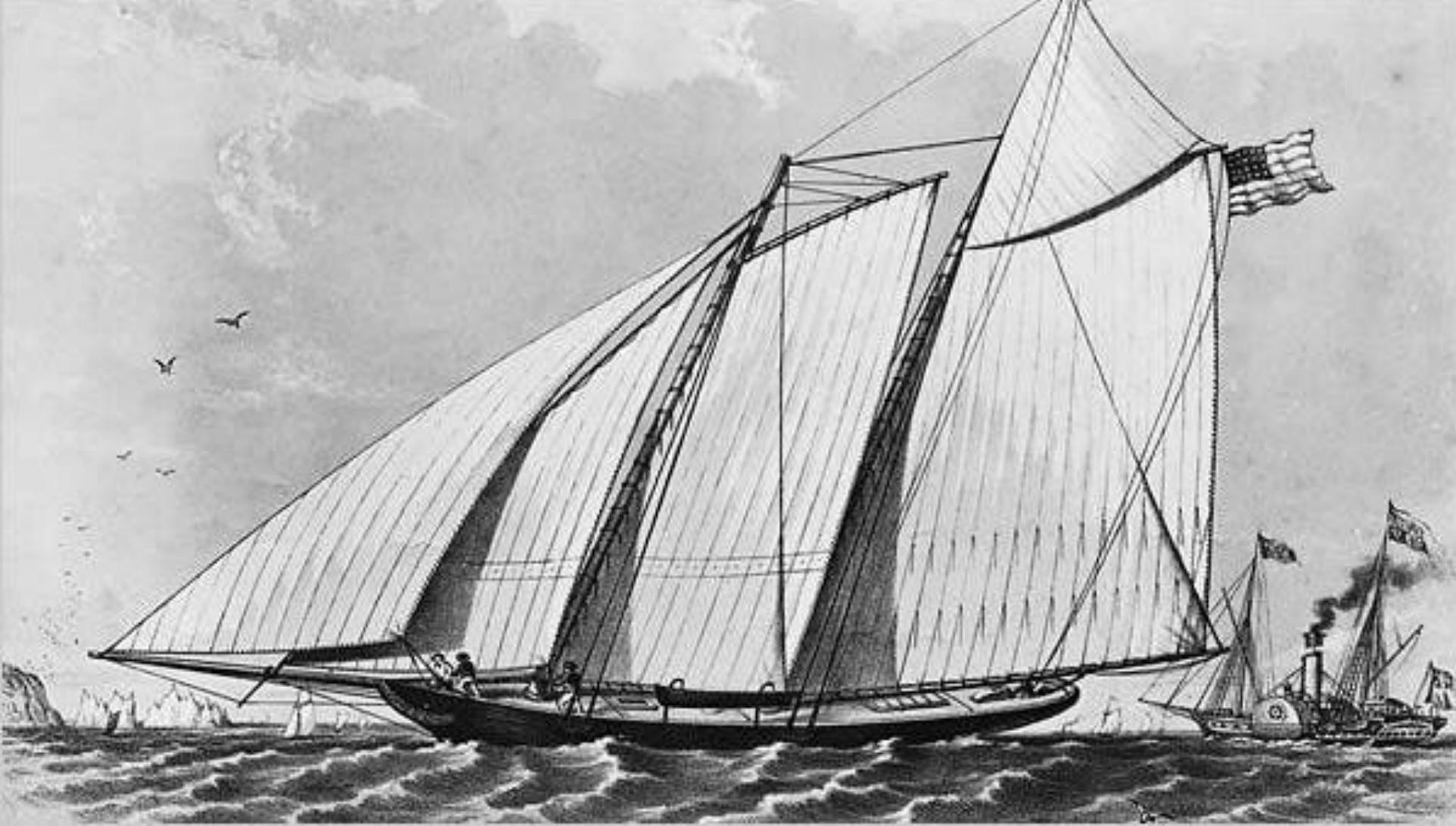
Mission: To provide homeowners with peace of mind against catastrophic loss of what is for many the most valuable asset they own.



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Emirates

OMEGA

CAMPER

Fly Emirates



OMEGA

SKYY VODKA

NESPRESSO

NESPRESSO NEW ZEALAND

CAMPER

OMEGA

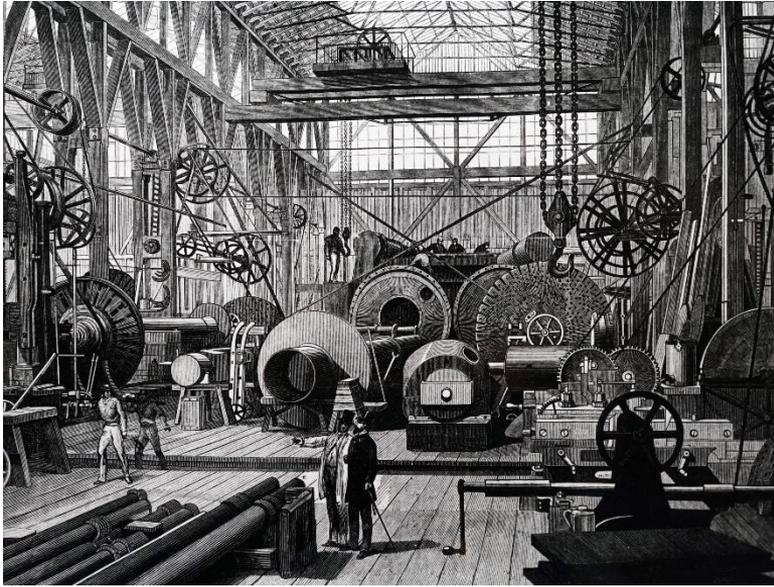
NESPRESSO

NEW ZEALAND

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1. Today's AI is prediction technology.
2. Systems: The transformational opportunities for AI are from developing system-level solutions, not point solutions.
3. AI is useful for decision-making. It decouples prediction from the rest of the decision. This can change who has the power over the decision.
4. Look for places where the organization fails to serve its mission.