

GENERATIVE AI IT'S HERE!

JULY 20, 2023 | PRESENTED BY: SUMEDHA AHUJA & MOLLY MOYNIHAN

Artificial Intelligence

In remarks before the Inaugural Conference on Emerging Trends in Asset Management, Chair Gensler observed that artificial intelligence technology **“already is playing a part in call centers, account openings, compliance programs, trading algorithms, sentiment analysis, robo-advisers, and brokerage apps.”**

- It's here
- It's been here
- It has the potential to change everything faster than you think

Artificial Intelligence

During the presentation, we will discuss:

- Artificial Intelligence
- The Generative AI Boom
- How Generative AI Works
- Examples of Generative AI Output
- AI in the Fund Industry
- Key Legal Considerations Related to Generative AI
- The Role of the Board and Board Considerations

Artificial Intelligence



A program that can sense, reason, act, and adapt

“[G]etting a computer to do things which, when done by people, are said to involve intelligence.” (John McCarthy)

“Software and/or hardware that can learn to solve complex problems, ... undertake tasks that require human-like ..., cognition, planning, learning, communication, or physical action” (NIST)

“At its simplest form, artificial intelligence is a field, which combines computer science and robust datasets, to enable problem-solving.” (IBM)

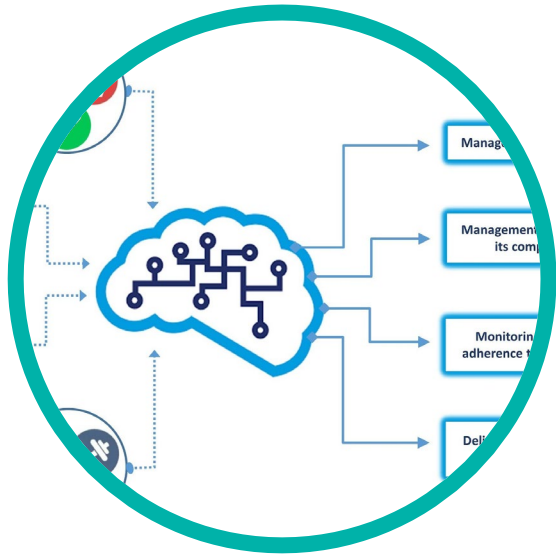
**Artificial
Intelligence**

**Machine
Learning**

**Deep
Learning**

Generative AI

Machine Learning



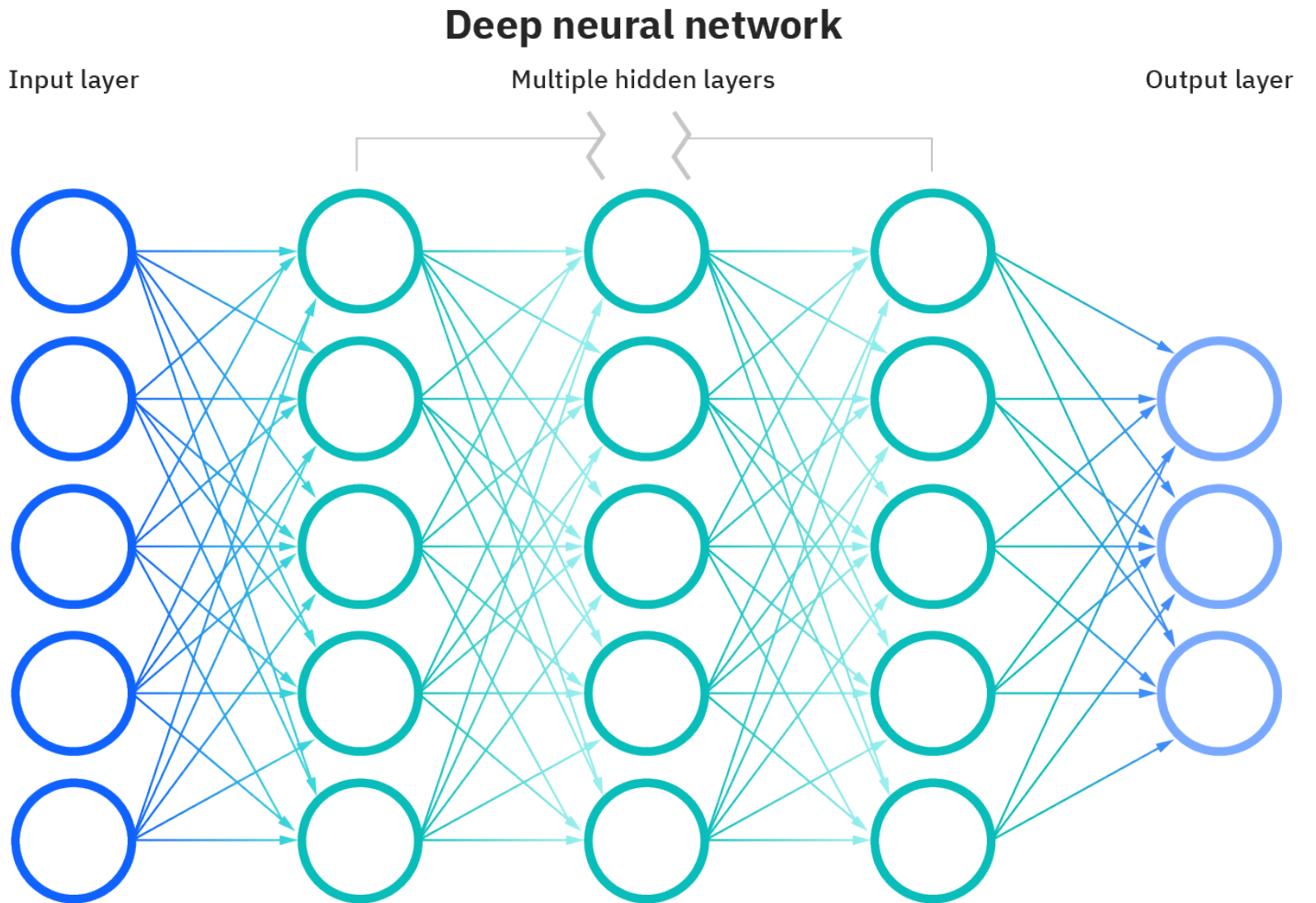
Automatically deriving useful signals from data

The use and development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyze and draw inferences from patterns in data

Deep learning

Deep Learning is a type of ML that uses **artificial neural networks** made up of many interconnected nodes to process more complex patterns than traditional ML.

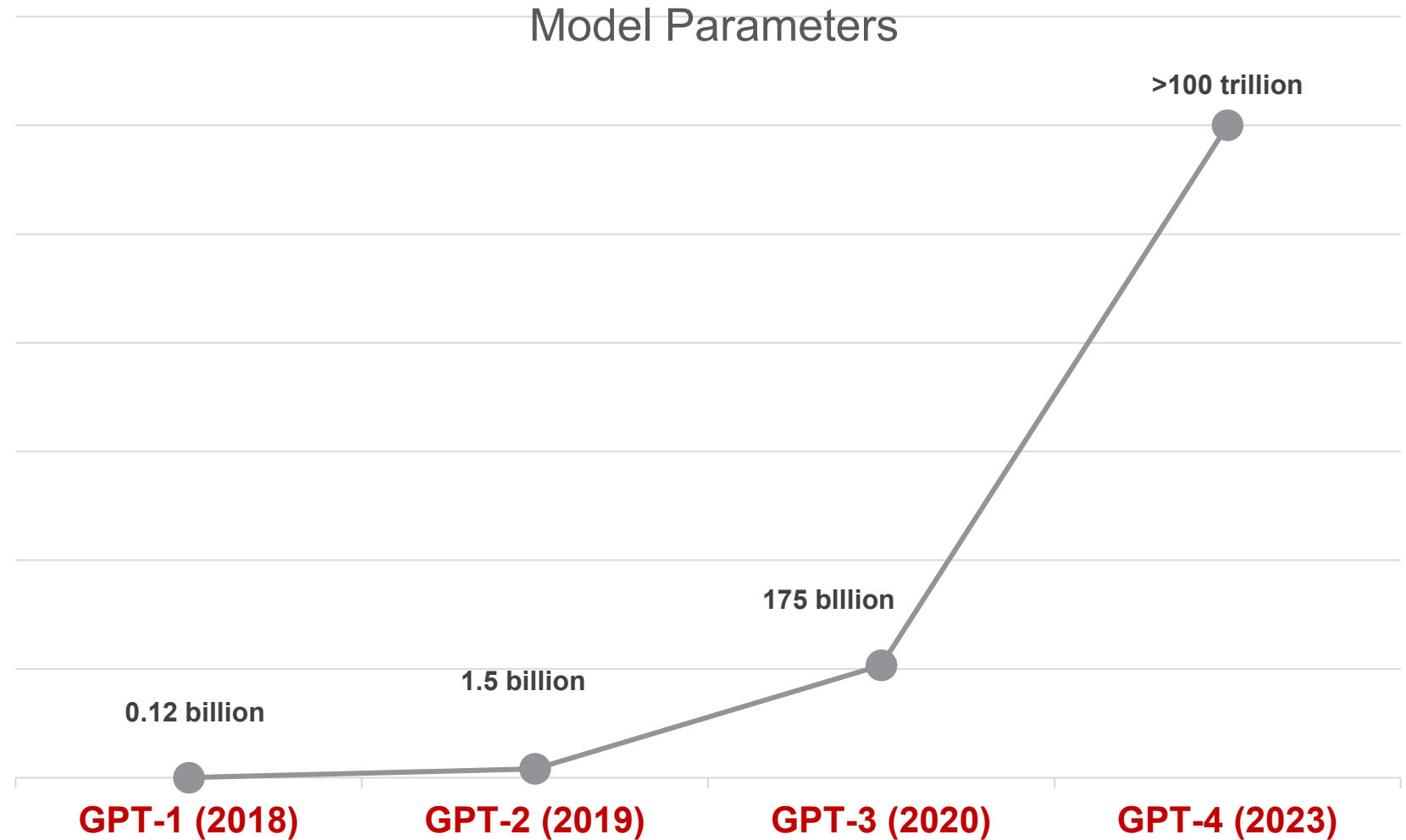
Deep Learning has been the **primary driver of AI breakthroughs** over the past decade.



Large Language models

Large language models (LLM) are very large, complex deep learning models that are trained on massively large datasets.

LLMs can “understand” text to help them summarize, generate and predict new content.



Generative AI



Generative AI is a type of artificial intelligence (AI) that uses machine learning algorithms to create new and original content like images, videos, text, and audio.

1 Forming a Database

A neural network, consisting of various information or media files like images, text, data, sounds, etc., forms the basis of artificial intelligence.



2 Inputting a Prompt

The user provides the AI with a description or sample of the desired content...



Prompts can be any user-submitted material, like words, numbers, or photos.



3 Generating Content

...and the AI uses its neural network to generate new examples that are similar to the ones it has trained from.



This image was created on MidJourney using the following text prompt:
a technical illustration of a woman sitting behind a desktop computer on a long table, isometric view, 3D rendering, realistic, 4k



ChatGPT
text generation AI



MidJourney
image generation AI



Codex
computer coding generation AI

Why Now?

DATA!

The Internet has been around since January 1, 1983. Google launched September 4, 1998. In the past 40 years greater and greater amounts of data have been generated digitally. The amount of data available today with computer processing power now roughly correlates to the amount of data needed to effectively deploy large language models.

Generative AI

The generative AI
boom

The Big Read Artificial intelligence

+ Add to myFT

Generative AI: how will the new era of machine learning affect you?

Systems like ChatGPT can produce content to order, threatening not just jobs but a surge of misinformation

**Harvard
Business
Review**

How Generative AI Is Changing Creative Work

THE WALL STREET JOURNAL.

CIO JOURNAL

Generative AI Tools Use Custom Data to Power More Business Functions

Tapping industry-specific data in areas such as financial management or marketing provides an edge in a crowded AI market, analysts say

The Washington Post
Democracy Dies in Darkness

AI isn't yet going to take your job – but you may have to work with it

Artificial intelligence is increasingly making its way across industries, changing jobs from retail to medicine to marketing

DealBook / Business & Policy

DEALBOOK NEWSLETTER

Who Owns a Song Created by A.I.?

Lawmakers are beginning to contemplate questions about authorship and ownership around creative machines. The stakes for creative businesses are high.

Timeline of Generative AI

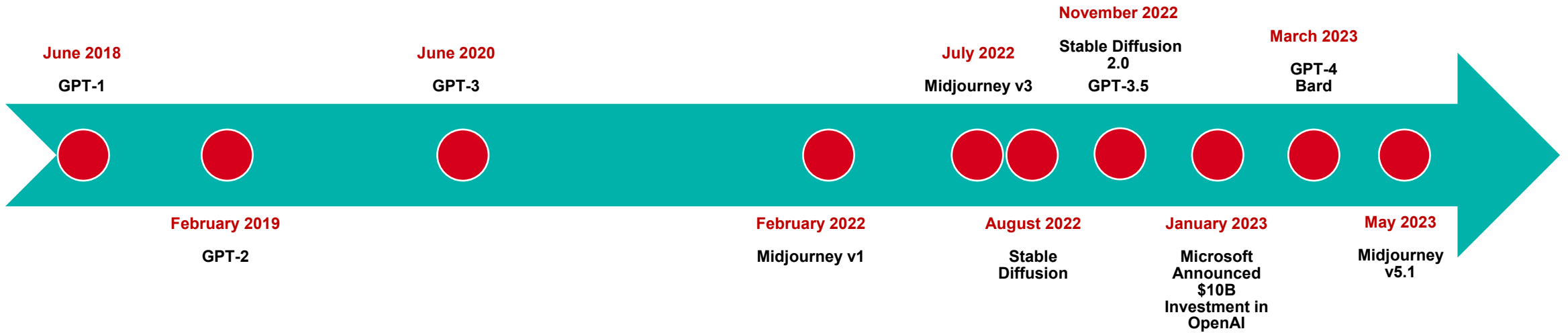
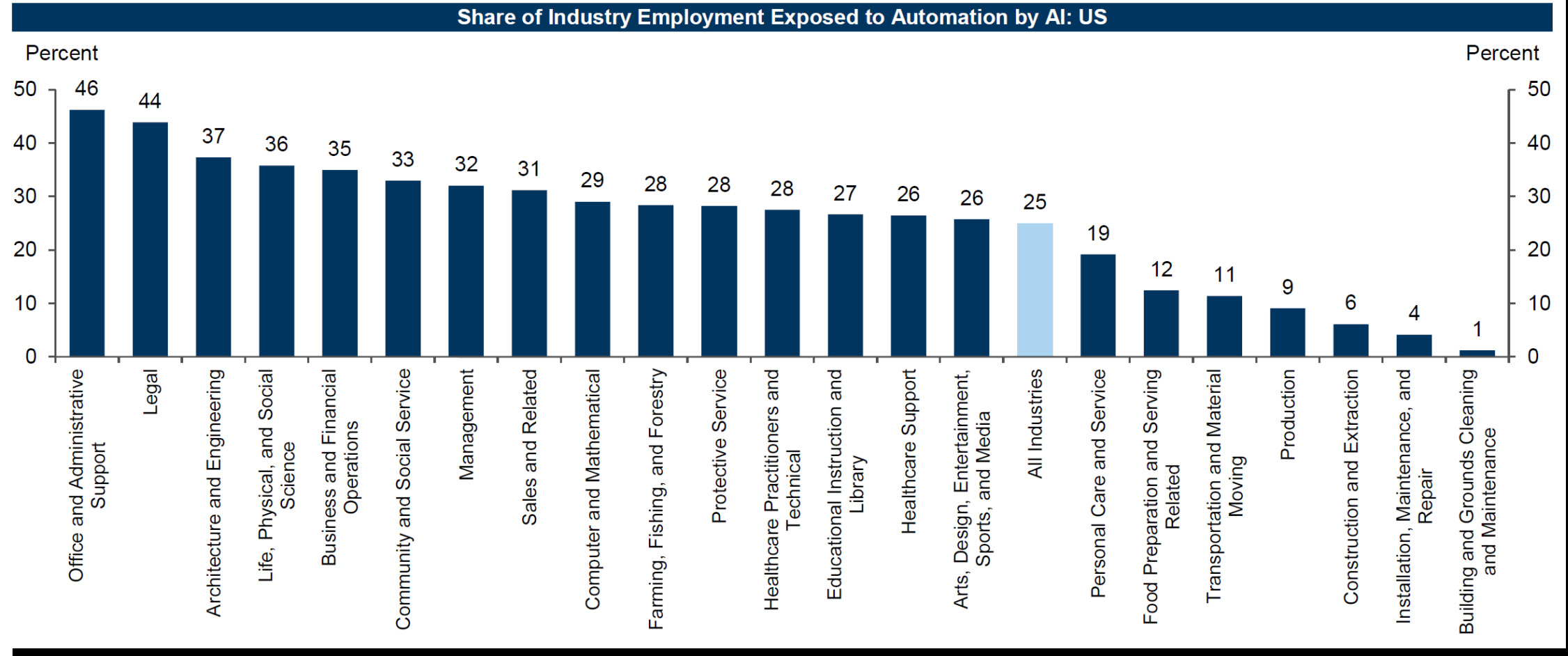
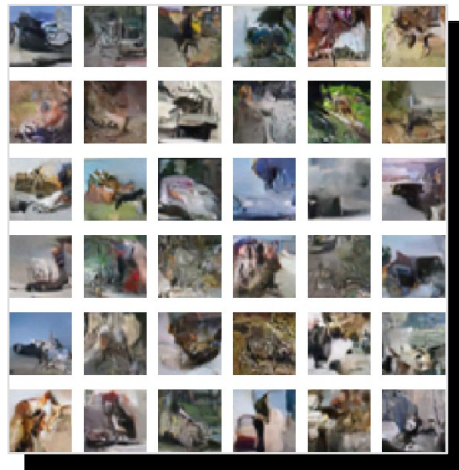


Exhibit 5: One-Fourth of Current Work Tasks Could Be Automated by AI in the US and Europe



Generating New Content – Image Generation



Training data

learns patterns

Generative Model



Output

“Teddy bears working on new AI research underwater with 1990s technology”

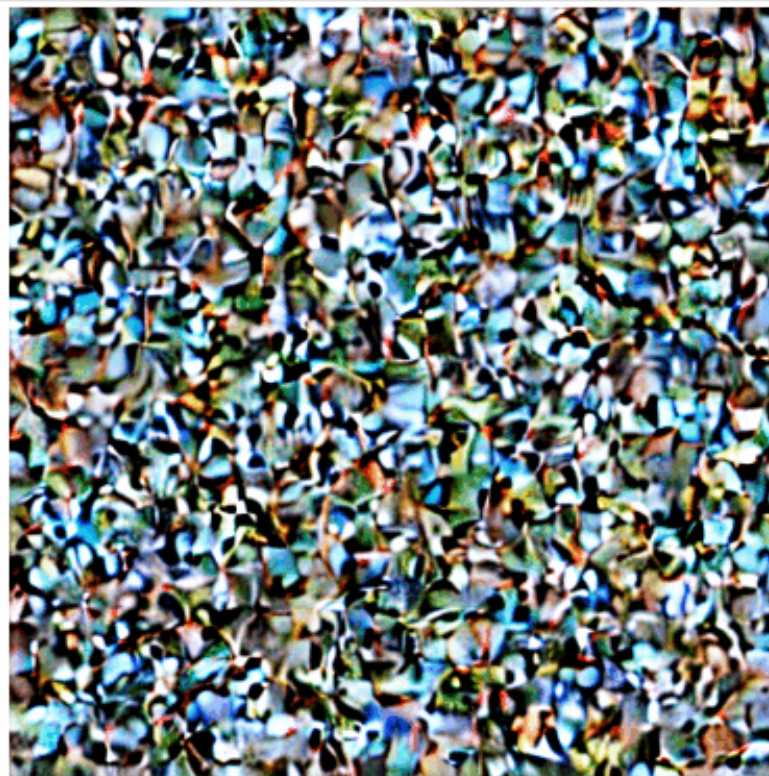
User prompt

Image Generation Diffusion Models

STABLE DIFFUSION – “A CUTE CORGI WITH THE EIFFEL TOWER IN THE BACKGROUND”



First Iteration



Final Iteration

◀ Prev

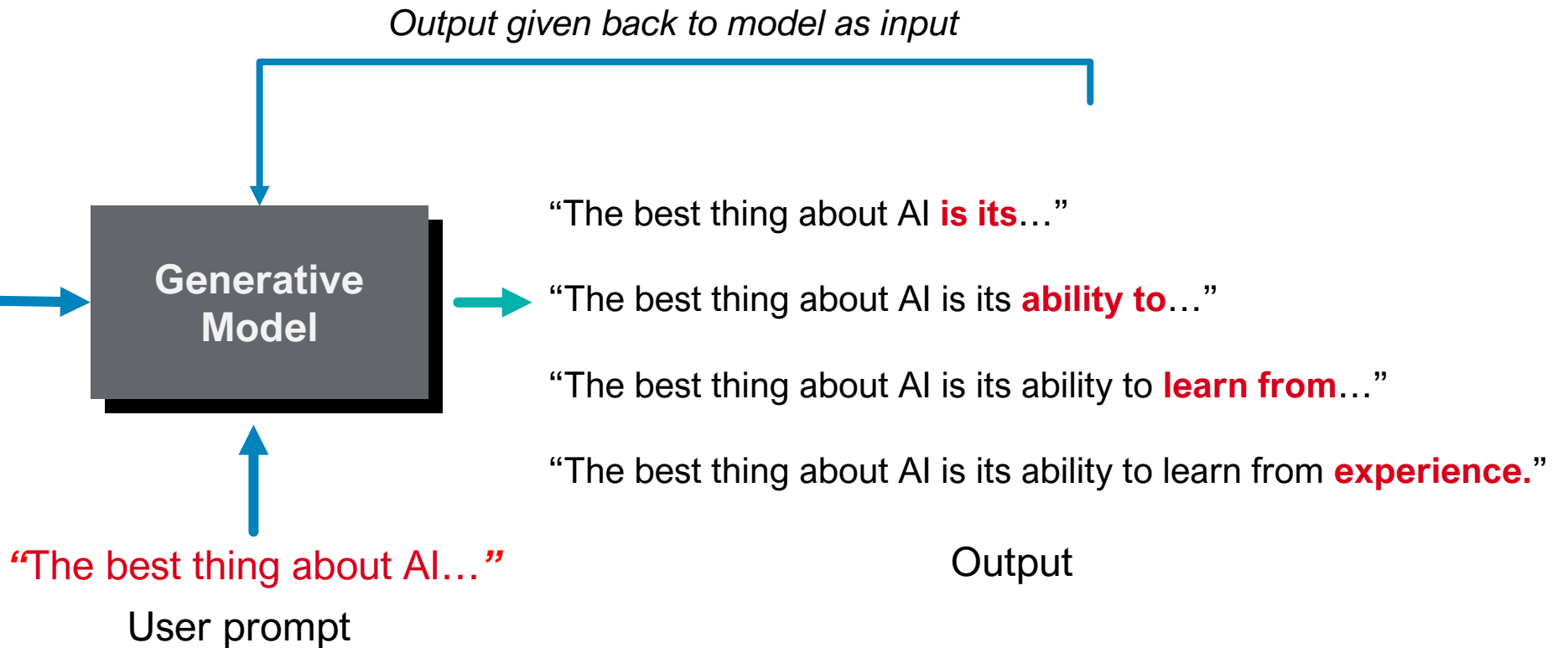
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Next ▶

Generating New Content – Text Generation

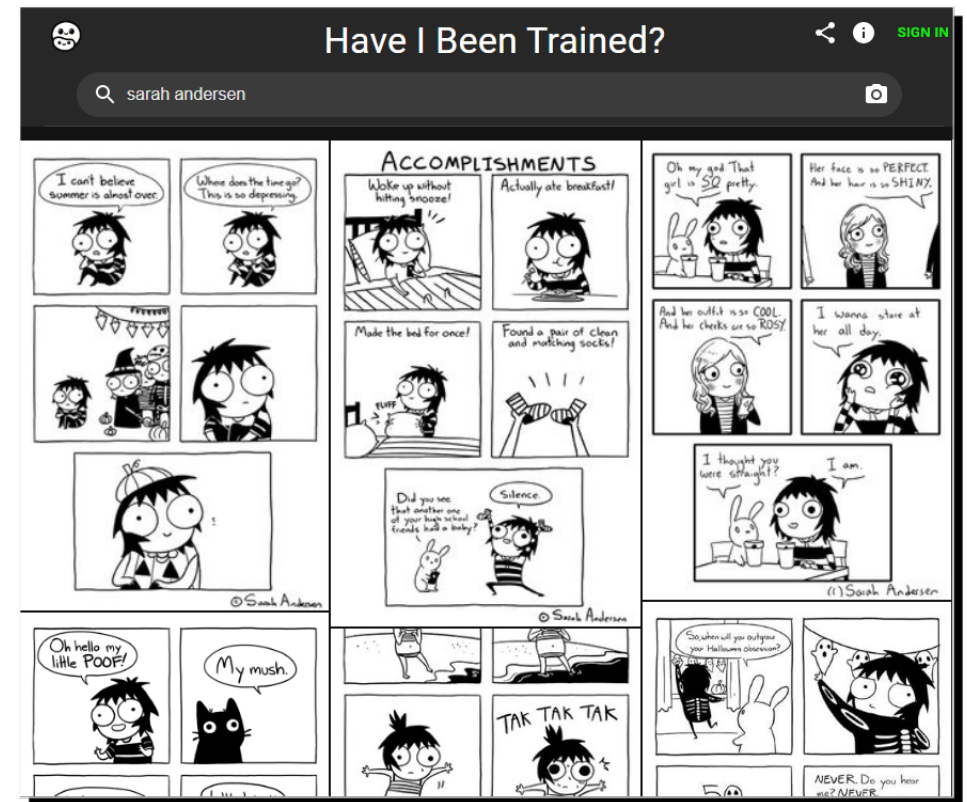
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Training data



Training Data

- Because of the large amounts of training data needed for deep learning, training data is often acquired using **web scraping** techniques
- Nearly **half of all internet traffic** in 2022 came from bots



EXAMPLES

Image Generation
Text Generation
Music Generation



IMAGE STYLE TRANSFER

Popularized in 2017

Edmond de Belamy

2018

First AI generated art auctioned
at Christie's

Sold for \$432,500





RAPID IMPROVEMENTS IN IMAGE GENERATION

Midjourney v1 (February 2022) – v5 (March 2023)



“A PHOTO OF AN ASTRONAUT RIDING A HORSE ON THE MOON”

DALLE-2 & Stable Diffusion – 2022



IMAGES OF DONALD TRUMP RESISTING ARREST

Midjourney – 2023

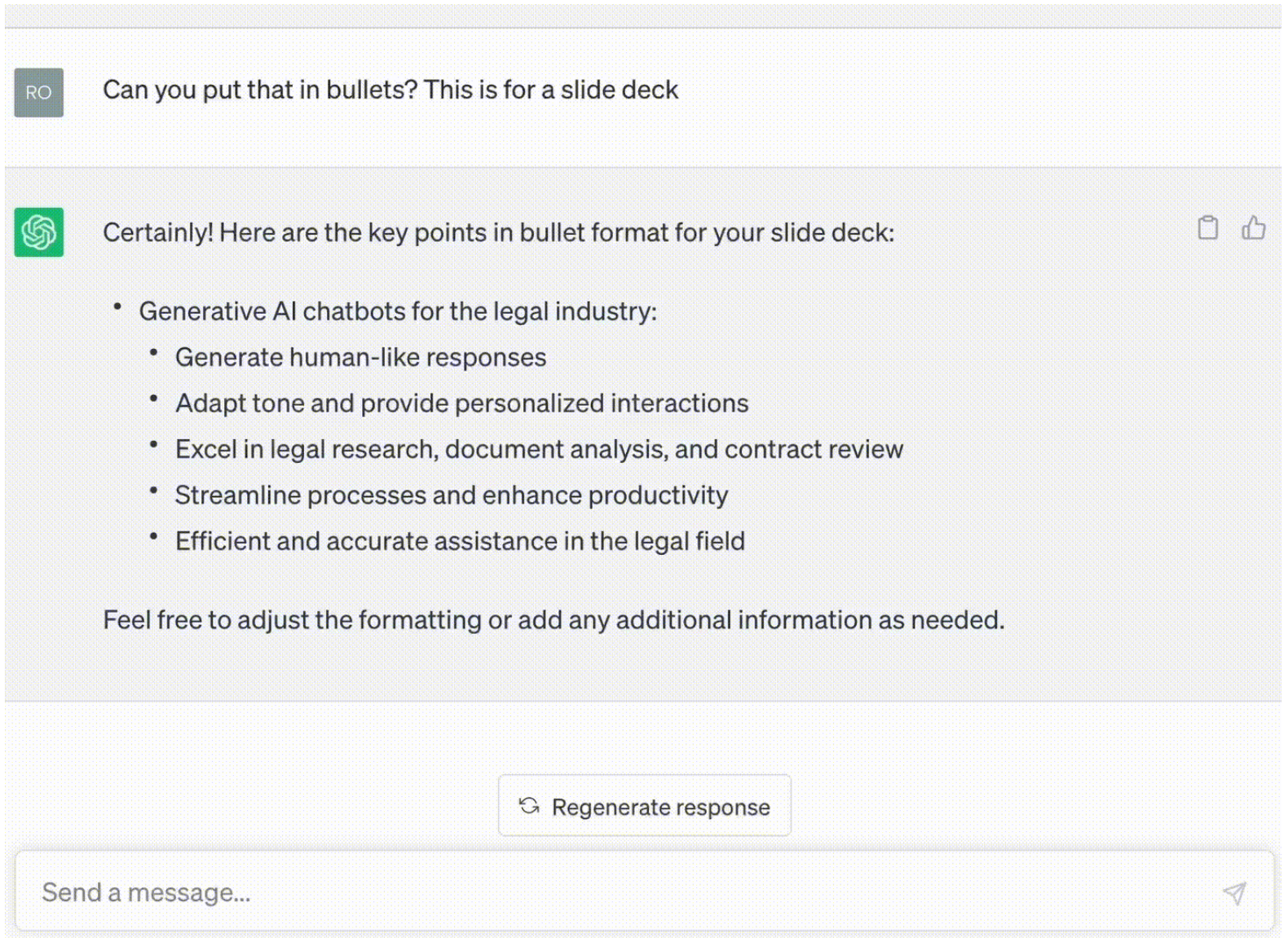

```
1 import datetime
2
3 def parse_expenses(expenses_string):
4     """Parse the list of expenses and return the list of triples (date, va
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
```

WRITING CODE




Github Copilot – 2022

GENERAL PURPOSE CHATBOTS

OpenAI's ChatGPT – 2022





RO Can you put that in bullets? This is for a slide deck

 Certainly! Here are the key points in bullet format for your slide deck:  

- Generative AI chatbots for the legal industry:
 - Generate human-like responses
 - Adapt tone and provide personalized interactions
 - Excel in legal research, document analysis, and contract review
 - Streamline processes and enhance productivity
 - Efficient and accurate assistance in the legal field

Feel free to adjust the formatting or add any additional information as needed.

 Regenerate response

Send a message... 

MORE EXAMPLES OF GENERATIVE AI OUTPUT

AI-generated Drake and The Weeknd song goes viral

© 17 April



GETTY IMAGES

The stars have genuinely collaborated on previous songs including The Ride and Live For

“Heart On My Sleeve”
generated using an unknown model



QUARTZ | Make business better.™

NICE ONE

The first pop song ever written by artificial intelligence is pretty good, actually



flowmachines

Beatles-inspired pop song
generated using Flow Machines



Grimes on AI Songs: ‘Feel Free to Use My Voice Without Penalty’

Musician says she will split 50 percent royalties, adding “I have no label or legal bindings”

BY ALTHEA LEGASPI

APRIL 23, 2023



Elf.tech
tool released by the artist Grimes for emulating her voice

FINANCIAL SERVICES EXAMPLES

The financial services industry has used AI technology for years. With the development of generative AI and its expansive capabilities, financial services companies are looking to expand the use of AI programs and expect to use AI in more end-to-end processes.

Robo-advisor chatbots

Identify trends in data

Summarize fund performance

Write basic code

Fraud detection

Use of AI in Fund Space

Trading and Portfolio Holdings

- AI systems can be used to rapidly digest and summarize market data, allowing for improved investment performance and risk management.
- The trading capabilities of AI have already been utilized for some time by both quant-based managers and active managers who use the ability of machine learning to rapidly digest market data. Some hedge funds using these technologies have achieved excellent performance. Renaissance Technologies' Medallion Fund, which uses quantitative trading techniques fed by massive data sets and rules-based algorithmic trading returned 66 percent on annualized basis before fees and 39 percent after fees from 1988 to 2018.
- Multiple asset managers are engaged in pilot programs.

Use of AI in Fund Space

Administrative

- AI is being used to increase efficiency on the administrative side of the Fund space by sifting through vast amounts of internal communications, assisting with document review for corporate trainings, creating financial literacy documents, and reviewing and approving public communications.
- AI-enhanced document generation can be used by legal and accounting departments.
- Improved speech recognition and generation can improve call center functioning.

Marketing

- AI is being used to target and streamline marketing efforts and customer engagement.

Use of AI in Fund Space

AI Products

- Kaiju ETF Advisors developed the first actively managed ETF in which the AI itself executes the trades. ETFMG's AI Powered Equity ETF (AIEQ) and the Qraft AI-Pilot US Large Cap Dynamic Beta and Income ETF (AIDB) currently use AI to make all fund investment decisions.
- Ocean Capital Advisors, in partnership with ETFMG has launched Rogers AI Global Macro ETF, a global macro ETF of ETFs, which is the first passive artificial intelligence backed ETF that uses AI to determine every investment decision and reveal the specific processes behind each decision.

Cybersecurity

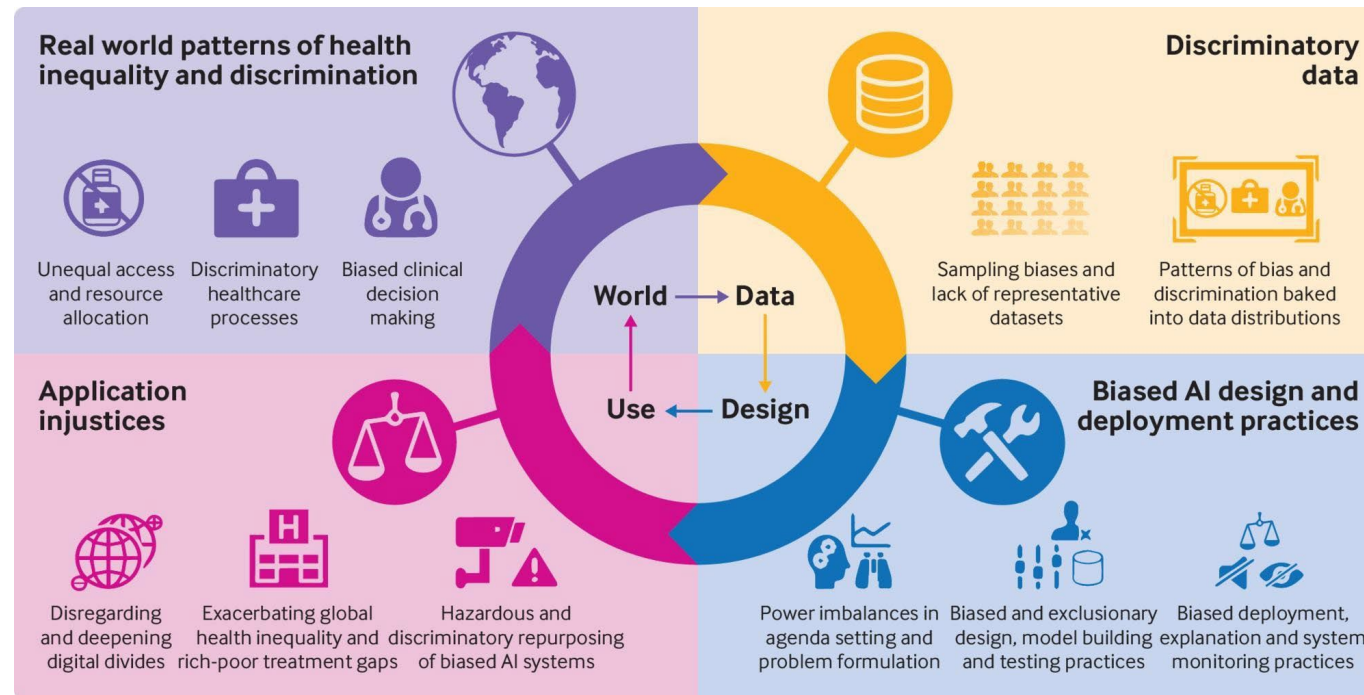
- AI's ability to adaptively learn and detect novel patterns can accelerate detection, containment, and response.

Key Legal Considerations

General
SEC
Bill of Rights

Bias

AI Algorithms can be biased if the input data or underlying model, created by humans, is biased. The use of AI programs has resulted in biased hiring and healthcare practices. New York recently passed a law requiring AI hiring programs to be audited for bias before use.



Intellectual Property



Lawsuits are being filed against AI platforms by creators who claim AI is using their original works without their permission to train AI in their styles. Plaintiffs have claimed:

- Copyright Infringement
- Trademark Infringement
- Right of Publicity
Misappropriation
- Ownership of Outputs

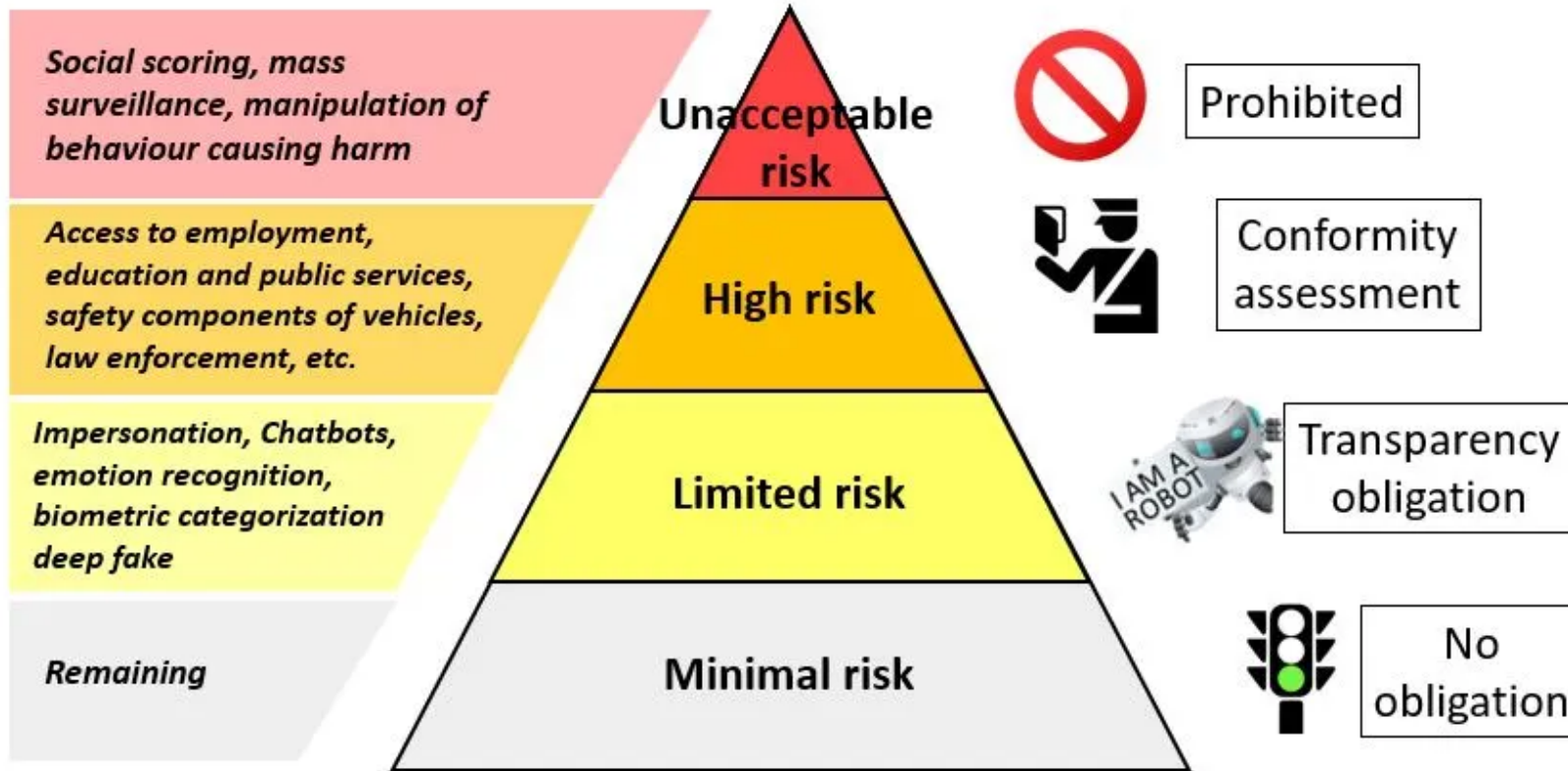
Privacy



- AI Algorithms may engage in abusive data practices because they rely on input data to learn and predict patterns. Therefore, AI algorithms may store user data without the consent of the user.
- The Federal Trade Commission has opened an investigation over whether a chatbot has harmed consumers through its collection of data and its publication of false information on individuals.

European Union AI Act

EU Artificial Intelligence Act: Risk levels



SEC Concerns

CONFLICTS OF INTEREST

- When brokers and financial advisors utilize AI to service a client, they still owe a fiduciary duty to that client.
- There is thus concern over whether the AI being used is optimizing in favor of the client's best interests, or in favor of the brokers' and financial advisors' best interests.

DIGITAL ENGAGEMENT PRACTICES

- Use of predictive data analytics, built upon artificial intelligence and machine learning, coupled with differential marketing, differential pricing, and individually tailored behavioral prompts—what the SEC calls digital engagement practices (DEPs)—raise suitability and best interest concerns.

SEC Concerns

BIAS AND MISINFORMATION

- AI developers need to be conscious in disallowing their programs from accessing data that reinforces historical inequities and reflects bias.
- There is also concern over AI's ability to enable fraud and spread misinformation.

SYSTEMIC RISK

- Too much concentration among AI programs could leave the financial system vulnerable.
- Specifically, the programs could pose a systemic risk if there is too much concentration among AI data aggregators and generative AI and one of the programs makes an error.

SEC Concerns

ACCOUNTABILITY

- As algorithms learn and move farther from their initial programming, who should be held accountable if it makes an error?
- This is a rapidly growing concern that AI developers and providers will need to address.

EXPLAINABILITY

- Explainability is the ability to express why an AI system reached a particular decision, recommendation, or prediction. Developing this capability requires understanding how the AI model operates and the types of data used to train it, which may become difficult as the model iterates.

SEC Concerns

MARKET RISK

- Have already seen flash crashes and other impacts of increasingly sophisticated algorithmic trading.
- The ability to generate deep fakes can impact markets. In May, a fake image of an explosion near the Pentagon was shared on Twitter leading to a brief dip in the stock market.

- As discussed elsewhere, reliance on a small number of vendors in the generative AI level of a tech stack with multiple fintech applications built on top of that level could result in cascading failures

Biden Administration AI Bill of Rights

The Biden Administration released five principles that developers and users of AI technology should abide by when deploying automated systems:

1. **Safe and Effective Systems**—systems should be designed to proactively protect users from harms stemming from unintended, yet foreseeable, uses or impacts of automated systems
2. **Algorithmic Discrimination Protections**—algorithms should be free from discrimination and systems should be used and designed in an equitable way
3. **Data Privacy**—users should have agency over how their data is used and systems should have built-in protections against abusive data practices
4. **Notice and Explanation**—developers should provide a plain language, easily understandable description of the system
5. **Human Alternatives, Consideration, and Fallback**—users should be able to opt out and have access to a person who can remedy problems

Thought Experiment

Thought experiment (compliments of Chair Gensler):

As a thought experiment, imagine if the grocery store were a virtual experience. Imagine if the store rearranged its inventory, shelving, and pricing for each shopper who visited the store, each time they visited that store, down to the impulse items by the register. The precision with which the store could nudge you toward certain purchases—and the algorithms behind those nudges—could be powerful and profitable.

That thought experiment may not have fully come to finance yet. Through using DEPs, however, robo-advisers, brokerage apps, and wealth management apps increasingly can narrowly target each consumer with specific marketing, pricing, and nudges.

This raises a number of questions. In the case of online investment platforms, when they use certain DEPs, what are they optimizing for? Are they optimizing for the investor's benefits, including risk appetite and returns? Or are they prioritizing other factors, including the platform's revenue or performance?

[Note that these same techniques are already being utilized in fund distribution.]

"Investor Protection in a Digital Age," Remarks Before the 2022 NASAA Spring Meeting & Public Policy Symposium

Board Considerations

Board Oversight
Role

Board Considerations

Oversight Framework

Initial inquiries that a fund board might make regarding AI are:

- What is the adviser's strategy for the use of AI with respect to portfolio management, digital engagement processes and other applications?
- Has the adviser mapped the areas within its organization where it is currently or could deploy AI applications and identified related gating items and codependencies?
- Has the adviser assessed risks and threats associated with the use of AI?
- Has the adviser developed a thoughtful governance and accountability program covering its AI applications and related risks and threats?
 - The more an AI system learns, the further it gets from its initial programming.
 - Robust testing before launch and continuous testing.

“Build the brakes when you while build the engine!”

Board Considerations

Same Questions—New Answers.

Fund boards should understand that use of AI may impact familiar oversight functions:

- **Cybersecurity**—Threat actors using AI may pose new and more complex threats. The ability of AI agents to mimic human communication and the low cost of scaling AI agents increase opportunities for fraud, phishing and other cyber threats. AI may also be used defensively.
- **Outsourcing and vendor management**—Does the adviser understand the use and AI capabilities of existing vendors? Fund advisers should also be identifying and vetting vendors that offer AI-based products. For example, law and accounting firms are increasingly relying on AI enhanced products and specialized AI products have been developed for multiple industries. Advisers should have a full understanding of where AI is being employed in their vendor ecosystem and related risks and opportunities.

Board Considerations

Same Questions—New Answers.

- **Concentration risk**—The asset management industry is already subject to risk from its concentration of key vendors. As Chair Gensler has pointed out, there may be overreliance “on one base level, what’s called [the] generative AI level,” with multiple fintech applications built on top of that level. Failure at the generative AI level could then cause cascading failure. As an example, today there are multiple front-end brokerage apps, but close to 90% of the dollar volume of trading is executed by three wholesalers. Reliance on base-level technology is not always apparent.
- **Supervision and systems controls**—Many fund advisers may choose to ban or limit use of AI tools within their firms. How is the use of AI monitored within the adviser’s operations?
- **Data privacy**—Collecting and using proprietary data or customer data for AI applications should be closely monitored for compliance with privacy laws. FTC has recently brought an action.

Board Considerations

New Questions

Some aspects of AI raise novel questions

- Enterprise-level risks, in that a flawed application can result in embedded and repeating instances of failure. Fund boards should seek to understand how these risks are mitigated.
- Ensuring that the technology is transparent and explainable. As noted above, this has been an area of particular regulatory scrutiny.
- Avoiding biases and discriminatory outputs, especially in employment and interactions with clients. Where DEPs are utilized, this raises particular concerns.
- The deployment of AI raises ethical and commercial issues for workforce management. Fund boards should seek to understand the fund adviser's strategy with respect to whether the use of AI will enhance employee skills, productivity and career opportunities or result in job displacements.

Board Considerations

Model Risk

Like all model-based or algorithmic activities AI can create Model Risk. Directors should seek to understand the governance and controls framework covering the development and use of AI based models. For example, elements of “model governance” can include :

- Ensuring that algorithms operate as intended and in compliance with applicable laws and regulations, with rigorous testing of the coding and underlying assumptions both initially and on an ongoing basis.
- Ensuring explainability of an algorithm’s core operations.
- Understanding and disclosing material limitations or risks associated with the use of an algorithm.
- An oversight framework that draws on expertise across the enterprise to ensure that the firm’s internal and external governance bodies (including senior management, boards, compliance and control functions and regulators) have a sufficient understanding of the technology involved.

Questions?

