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The Business of Artificial Intelligence

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Introduction:



- technology is the primary driver of the economy.
- the most important in technology is Artificial Intelligence
- Artificial intelligence has an important role in industry

What Can AI Do Today?

1955

john McCarthy
Appearance of The
term artificial
intelligence.

1957

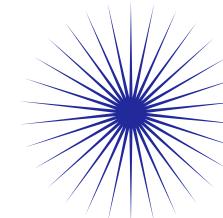
Rerbert Simon
predicted that
computers would
beat humans at chess
within 10 years.

1967

Marvin Minsky
the problem of
creating 'artificial
intelligence' will be
substantially solved.



What Can AI Do Today?



Voice recognition

A study by the Stanford computer scientist James Landay and colleagues found that speech recognition is now about three times as fast.

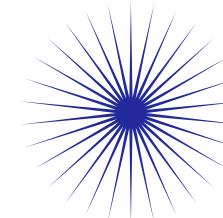
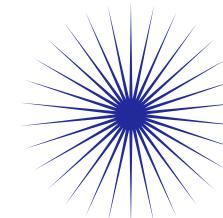


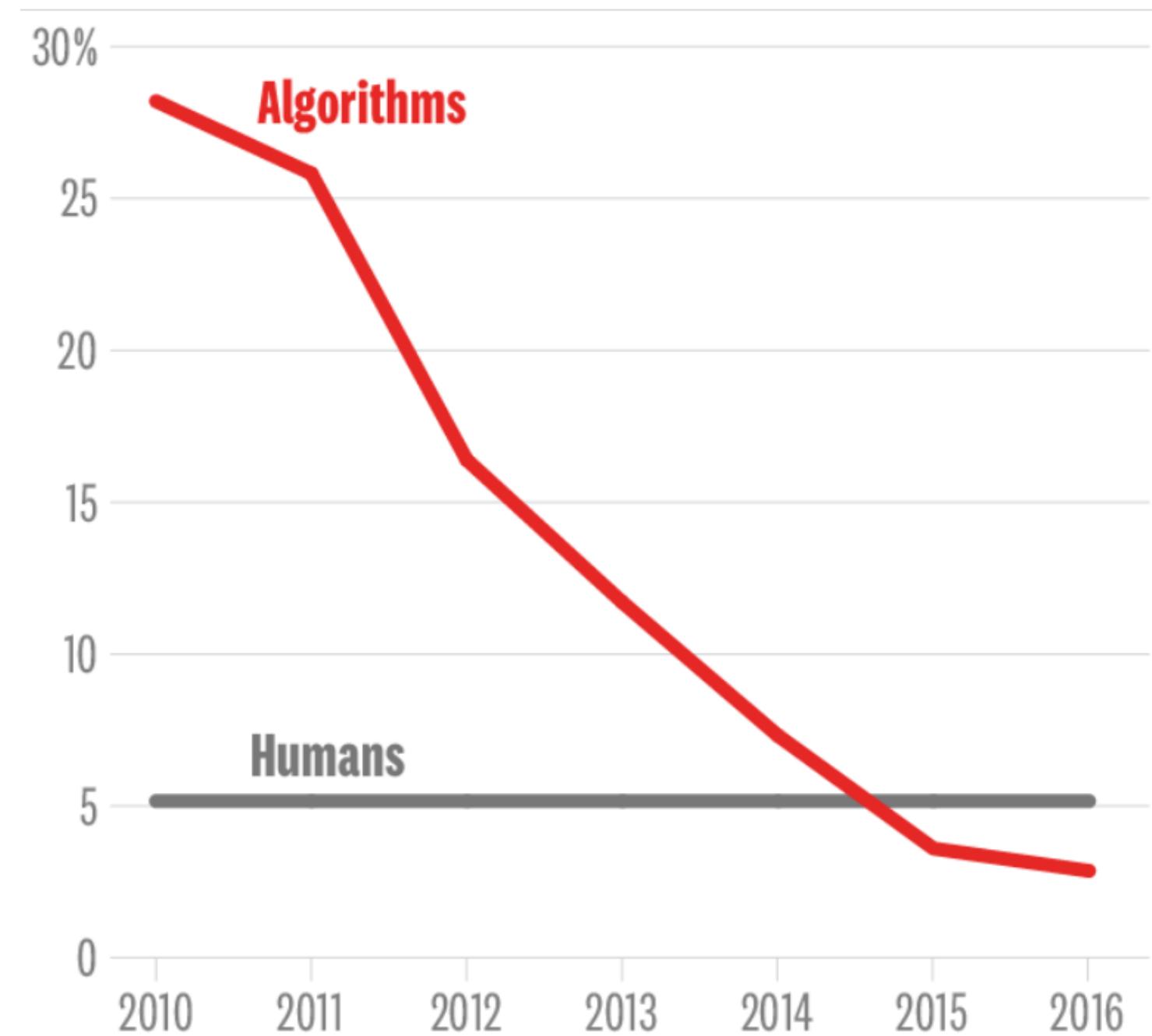
Image recognition

The error rate for recognizing images from a large database called ImageNet, with several million photographs of common, obscure, or downright weird images, fell from higher than 30% in 2010 to about 4% in 2016 for the best systems.



Problem solving

AI triumphs: from machines outsmarting poker and Go champions to Google's DeepMind boosting data center efficiency by 15%, AI was revolutionized in industries.

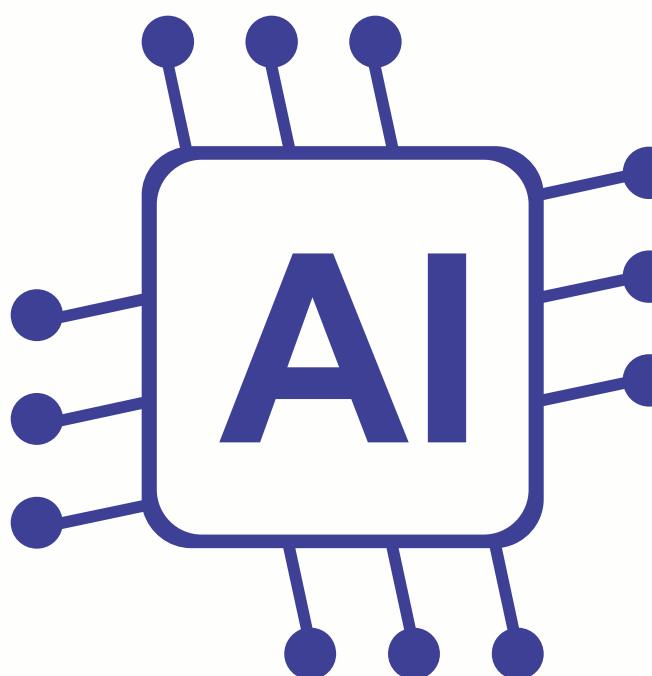


Understanding Machine Learning

- **Fundamentally Different Approach:** Machine Learning represents a fundamentally different approach to software creation. Instead of being explicitly programmed for a specific outcome, machines learn from examples.
- **Paradigm Shift:** Unlike previous advances in information technology, which focused on codifying existing knowledge, Machine Learning disrupts this norm by learning from examples rather than explicit coded instructions.
- **Tacit Knowledge:** A fundamental weakness of the traditional approach is that much of the knowledge we possess is tacit, meaning it's difficult or impossible to fully explain. For instance, conveying how to ride a bike is challenging or impossible through written instructions.

Understanding Machine Learning

- **Overcoming Limits:** Machine Learning overcomes these limitations by enabling machines to learn from examples to solve problems autonomously
- **In summary,** Machine Learning signifies a significant leap forward by allowing machines to learn from examples rather than being explicitly programmed.



Different Flavors of Machine Learning

Supervised Learning

- Supervised Learning Systems: Involves mapping from a set of inputs to a set of outputs by training the machine with labeled examples of correct answers to specific problems.
- Often relies on deep learning using neural networks that benefit from large datasets.

| INPUT X | OUTPUT Y | APPLICATION |
|---------------------------|--------------------------------|----------------------|
| Voice recording | Transcript | Speech recognition |
| Historical market data | Future market data | Trading bots |
| Photograph | Caption | Image tagging |
| Drug chemical properties | Treatment efficacy | Pharma R&D |
| Store transaction details | Is the transaction fraudulent? | Fraud detection |
| Recipe ingredients | Customer reviews | Food recommendations |

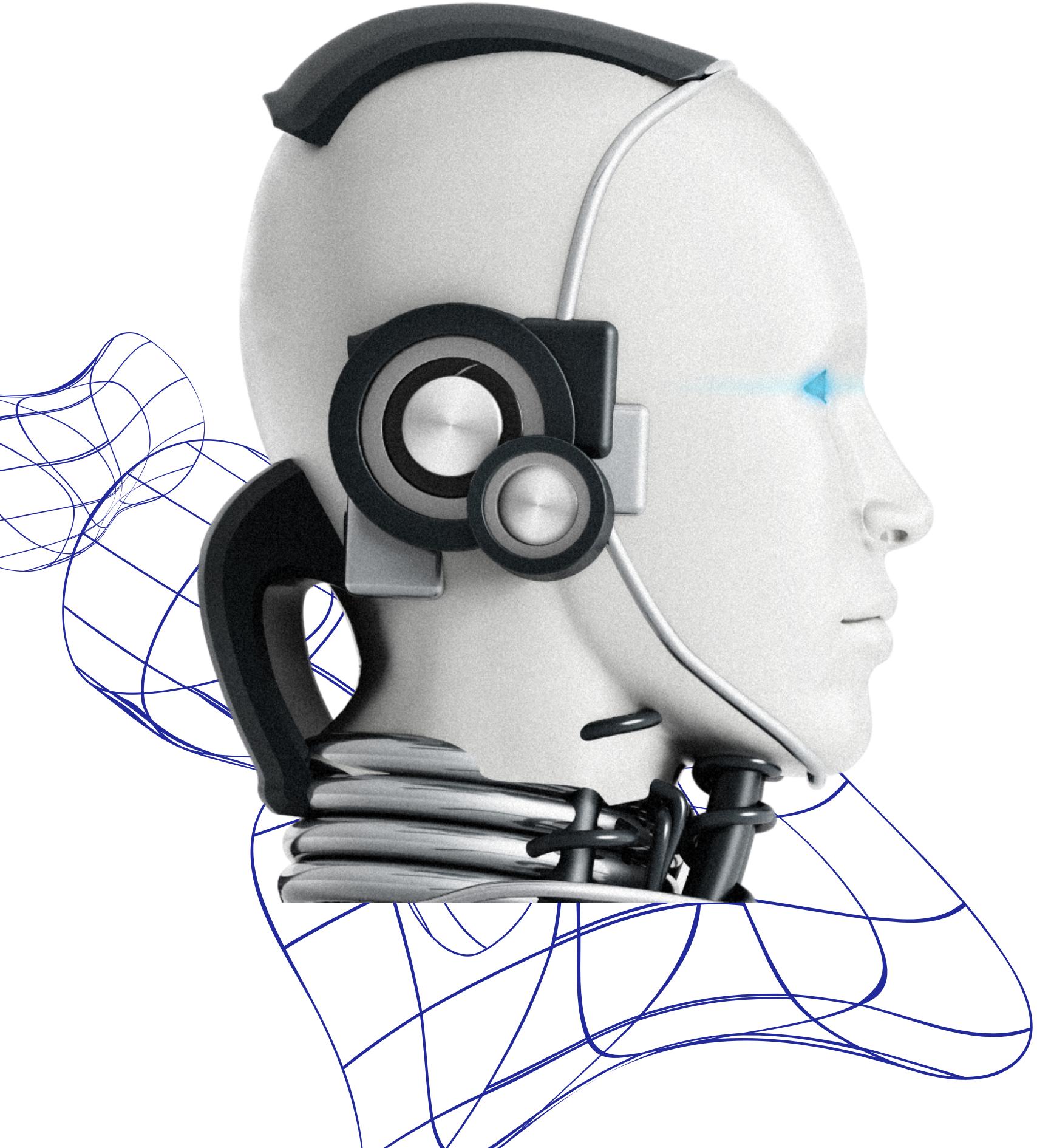
Different Flavors of Machine Learning

Unsupervised Learning

- A challenging approach where systems learn on their own without labeled data, akin to how humans acquire knowledge.
- Humans excel at unsupervised learning but developing machines that learn this way remains difficult. If successful, it could lead to discovering new patterns and possibilities in various fields like disease spread, market behaviors, and customer purchase patterns.

Reinforcement Learning:

- Utilizes systems to learn from a specified state, goal, allowable actions, and environment constraints to achieve the objective.
- Applied in mastering games, optimizing power usage in data centers, developing trading strategies, improving robotic processes (like object recognition and sorting), and optimizing website content for user engagement.



Potential Impact and Challenges:

- Once AI surpasses human performance in a task, its adoption and spread become more likely.
- Challenges persist in developing robust unsupervised learning systems despite their potential for discovering novel patterns and insights.
- The importance of correctly specifying goals in reinforcement learning systems, as they optimize based on explicitly rewarded objectives, which may differ from actual priorities.

Putting ML to work

three pieces of good news

- AI skills are spreading quickly
- Algorithms and Hardware components can be bought or rented as needed
- Organizations Don't Need Huge Amounts of Data



Putting ML to work



How AI Could Empower Any Business | Andrew Ng | TED

689K views • 1 year ago



TED ✓

Expensive to build and often needing highly skilled engineers to maintain, artificial intelligence systems generally only pay off for ...

CC

- **Rise of AI compared to Literacy**

Andrew Ng draws parallels between the historical rise of literacy and the current rise of AI. Just as literacy transformed society, democratizing access to AI could lead to a similarly transformative impact.

- **Current Concentration of AI**

Ng discusses how AI is currently concentrated in the hands of highly skilled engineers in big tech companies. Most people have access only to AI solutions developed by these experts.

- **Value of AI with Modest Data**

Contrary to the hype around massive datasets, Ng highlights that AI can work effectively even with modest amounts of data, using examples like a single pizza store generating valuable data.

- **Democratizing Access to AI:**

Ng envisions democratizing access to AI, shifting from a model where only high priests (skilled engineers) build AI systems to empowering individuals, accountants, store managers, etc., to build their own AI systems.

- **Introduction of AI Development Platforms**

Ng introduces AI development platforms where users can provide data for AI training without extensive coding. He illustrates this with an example of an inspector using such a platform to detect defects in fabric.



"Building AI systems has been out of reach for most people, but that does not have to be the case. In the coming era for AI, we'll empower everyone to build AI systems for themselves, and I think that will be an incredibly exciting future.."

Andrew NG

ML is driving change at 3 levels

| level | Definition | Traditional way | AI approach | Example |
|------------------------------|--|--|---|--|
| Tasks and Occupations | Involves specific job roles and responsibilities within an organization. | Relies on manual execution of tasks by human workers. | Incorporates AI systems to automate repetitive tasks, freeing humans for higher-level work. | Medical imaging using machine learning to identify potential cancer cells. |
| Business Processes | Encompasses the sequence of steps and activities to achieve organizational objectives. | Follows a linear and often time-consuming manual workflow. | Introduces AI to streamline processes, optimize efficiency, and enhance decision-making. | Amazon's fulfillment (warehouses) centers using robots and ML algorithms for inventory management. |
| Business Models | Defines how a company creates, delivers, and captures value. | Typically relies on traditional sales models and customer choices. | Adopts AI to personalize recommendations and shift towards subscription-based models. | Spotify offering personalized music recommendations through machine learning. |

Risks and limits

ML systems have Low
“interpretability”

- **Hidden Biases in ML:**
The use of biased training data can unintentionally perpetuate and even amplify societal biases, posing ethical concerns in decision-making.
- **Dealing with Statistical Truths:**
Neural network systems, in contrast to traditional logic-based systems, rely on statistical truths. This poses a challenge in providing conclusive proof of effectiveness, especially in unrepresented scenarios, raising concerns in critical applications like nuclear power plant control.
- **Diagnosing and Correcting ML Errors:**
When machine learning systems make errors, pinpointing the exact problem is difficult due to the intricate and often inscrutable (impossible to interpret) nature of their underlying structures.

Navigating Risks and Seizing Opportunities

While humans are inherently prone to biases and mistakes, the unique strength of ML lies in its continuous improvement. Unlike us, machines don't stagnate in their understanding; instead, the iterative nature of learning empowers them to **evolve, adapt**, and eventually **surpass** the limitations inherent in human decision-making.

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Is there a limit to
what AI can do?

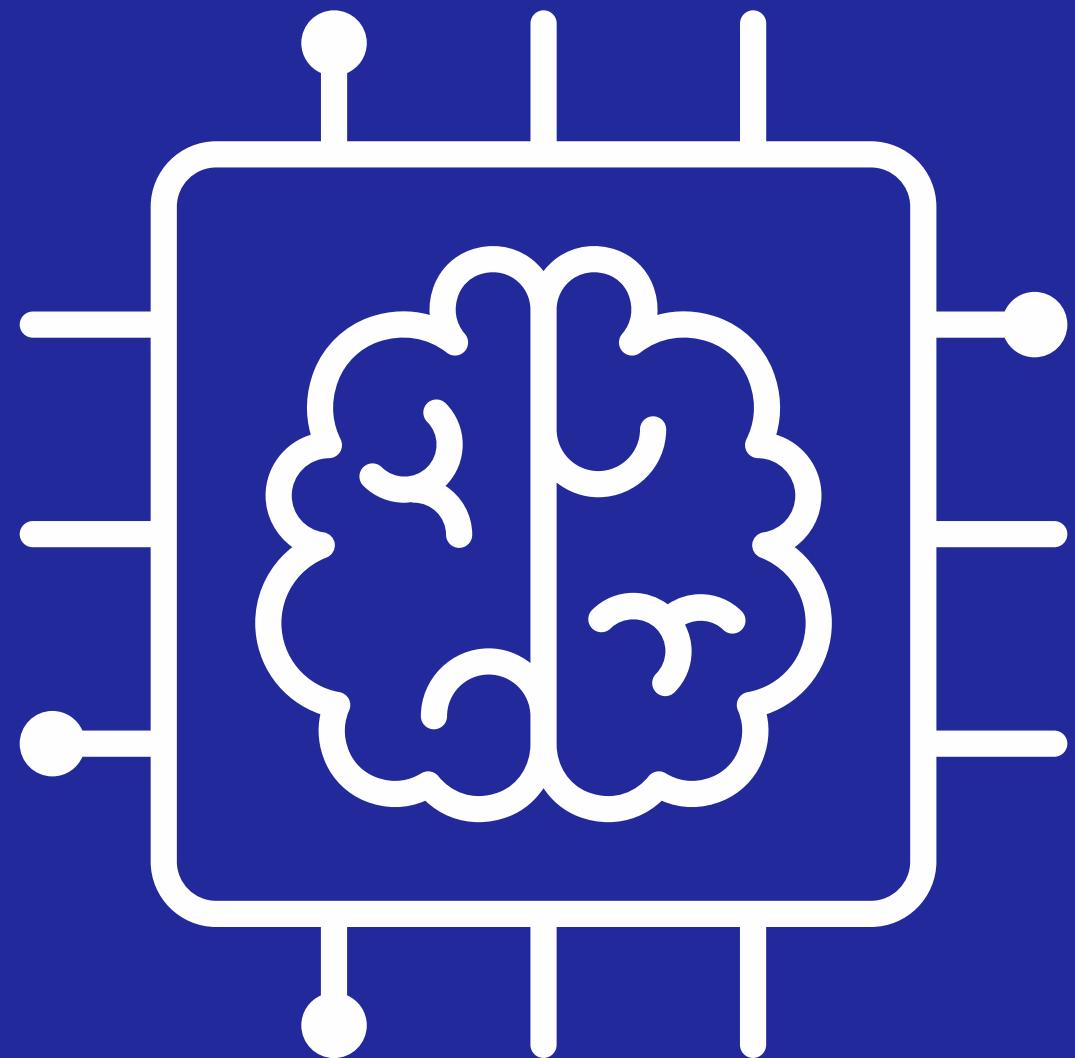
While excelling in tasks related to perception and cognition, AI faces challenges in navigating **emotional** and complex human social interactions, particularly in areas that define the very essence of human experience, such as **compassion** and **feelings**.

Adapting to the AI-Enabled Business Landscape

The business landscape is undergoing a transformative shift fueled by technological advancements, particularly the integration of AI and ML.

Companies must be willing to experiment with and learn ML quickly.

AI won't replace managers, but managers who use AI will replace those who don't.



Key Takeaways

- AI's Economic Impact: AI, particularly machine learning, is the most important general-purpose technology of our era, transforming industries and enabling new innovations.
- Current Capabilities of AI: AI has made significant advances in areas such as speech and image recognition, surpassing human performance in tasks like playing poker and Go.
- Fundamental Difference in Machine Learning: Machine learning represents a fundamentally different approach to creating software, learning from examples rather than being explicitly programmed.

Key Takeaways

- Flavors of Machine Learning: Most recent successes in AI have been in supervised learning systems, with growing areas such as reinforcement learning also contributing to its progress.
- Putting Machine Learning to Work: AI skills are spreading quickly, and necessary algorithms and hardware can be rented or bought. Companies may not need large amounts of data to start making productive use of machine learning.
- Risks and Limits: Despite significant progress, AI-based systems have narrow applicability, and the fallacy of a computer's narrow understanding implying broader understanding is a source of confusion.

**Thank you for
your attention**

