

An Overview of Artificial Intelligence and Its Emerging Applications

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Abstract:

Artificial intelligence (AI) has been a fascinating concept of science fiction for decades, but many researchers think AI is getting closer to reality. AI perceives its environment and takes actions that maximize its chance of successfully achieving its goals. The term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

Artificial intelligence was founded as an academic discipline in 1956. In the late 1990s and early 21st century, AI began to be used for logistics, data mining, medical diagnosis and other areas. 2015 was a landmark year for artificial intelligence.

In the year 2017, capabilities generally classified under AI were understanding human speech, competing at the highest level in strategic game systems (such as chess and Go), autonomous cars, intelligent routing in content delivery network and military simulations.

This study makes an attempt to know fields in which AI is currently applied. It also talks about the future of AI and what it will/ should mean to humanity.

Keywords: Machines, human minds, Intelligence.

Introduction:

Artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

History:

Artificial intelligence was founded as an academic discipline in 1956, The field of AI research was born at a workshop at Dartmouth College in 1956.¹ funding for AI projects was difficult the early 1980s, AI research was revived by the commercial success of expert systems AI once again fell into disrepute In the late 1990s and early 21st century, AI began to be used for logistics, data mining, medical

diagnosis and other areas. The field of AI is generally held to have started at a Conference in July 1956 at Dartmouth College when the phrase “Artificial Intelligence” was first used.

According to Bloomberg's Jack Clark, 2015 was a landmark year for artificial intelligence, with the number of software projects that use AI within Google increased from a "sporadic usage" in 2012 to more than 2,700 projects. Clark also presents factual data indicating that error rates in image processing tasks have fallen significantly since 2011. He attributes this to an increase in affordable neural networks, due to a rise in cloud computing infrastructure and to an increase in research tools and datasets. Other cited examples include Microsoft's development of a Skype system that can automatically translate from one language to another and Facebook's system that can describe images to blind people. In a 2017 survey, one in five companies reported they had "incorporated AI in some offerings or processes"

Artificial Intelligence has the potential to streamline business processes, improve customer services and leverage sensor-driven data for marketing and advertising. By 2030, the global content analytics, discovery and cognitive systems market will be worth \$ 26.50 billion.

AI has several areas of specialization:

Gaming: Back in 2011 IBM's Watson beat two of Jeopardy's greatest players. Although the computer has evolved into a sophisticated healthcare analytics system over the years, initially it was designed to simply answer questions uttered in natural language;

Expert systems: That's what Watson is today. The AI-powered computer can absorb and process data a lot quicker than humans, and that's why Watson diagnoses cancer with 90% accuracy (while well-trained human doctors are mistaken in 50% of all cases);

Speech recognition: Thanks to Apple's AI endeavors, you can ask Siri to order pizza or find the nearest flower shop—and you don't have to type anything in anymore;

Machine learning: Google search is now enhanced with machine learning algorithms providing users with relevant content—and that's one of the reasons why traditional SEO is slowly dying;

Robotics: Spread, a lettuce production company from Japan, announced plans to equip its farms with robots that will harvest 30 thousand lettuce heads every day. Robots can also monitor warehouse facilities, navigate customers in stores and take care of visitors' luggage at hotels and railway stations.

The current state of artificial intelligence

However, many of the applications of artificial intelligence we see today are considered to be ‘weak AI’ because we have yet to release their true potential. Weak AI, also known as ‘narrow AI’, is non-sentient artificial intelligence, which focuses on one task alone. The applications of artificial intelligence that are currently available need to be taught or directed in order to provide the insight a user needs.

Strong AI, on the other hand, refers to artificial intelligence applications that can readily formulate their own decisions without human input, apply intelligence to multiple problems, and function and behave more like a human. We are quite some way off strong AI.

Yet despite current AI solutions not being ‘true’ artificial intelligence, the benefits and capabilities they provide are extraordinary – and many industries have already incorporated some form of artificial intelligence into their day-to-day processes.

Artificial Intelligence in business

In some industries, AI is capable of automating business intelligence and analytics processes, providing

a holistic end-to-end solution. In others, computer vision is being deployed to map and navigate terrain, contributing to the development of smart, self-driving cars that are learning to drive as humans do. Below are just a few examples of how AI is being used to improve efficiency:

Artificial intelligence technologies are already being implemented in large retail, supply chain, and financial and technology companies. Indeed, tech companies are going all-in on artificial intelligence, with significant AI-related technology investments in recent years. Globally, tech giants spent \$20 billion to \$30 billion on AI in 2016, with 90% of this spent on research and deployment, according to a June 2017 report from McKinsey Global Institute (MGI).

That said, the artificial intelligence in business today is typically "weak" AI -- a category which includes machine learning, natural language processing and applications such cloud-based chatbots, predictive reporting, optimizing operations and automation. However, large enterprises are experimenting with more advanced iterations of those tools, including deep learning platforms, which represent the next step toward "strong" AI, or systems that can draw conclusions entirely on their own, and ultimately surpass the performance

- **Banking and Finance – fraud detection.** Many banks use the various applications of artificial intelligence to detect fraudulent activity. The AI software is given a very large sample of data that includes fraudulent and non-fraudulent purchases and is trained to determine whether a transaction is valid based on data. Over time, the software becomes incredibly adept at spotting fraudulent transactions based on what it has learned previously.
- **Retail – online customer support.** Shopping online creates rich data footprints regarding the individual preferences, spending habits and preferred channels of individual consumers. Feeding these digital breadcrumbs into an AI-engine helps bring curated shopping journeys to mass audiences. Automated bots can create lifelike, seamless customer service experiences, addressing the consumer on their purchase history and known preferences. Many websites now offer some form of 'chat' functionality where you can talk to a customer support representative or sales representative. In most instances, it is some form of automated AI that begins these conversations. As these AI chat bots are capable of understanding natural language, i.e. human conversation, they can readily assist customers in finding out what they need to know, extracting information from the website, and directing them to the appropriate web page or person for further support.
- **Security.** As cyber-attacks increase in frequency and more sophisticated tools are used to breach cyber defenses, human operators are no longer enough. Top firms across the world are investing heavily in cyber security to ensure their data is protected. Real-time threat detection, mitigation, and ideally, prevention, are what are needed for businesses – and AI can deliver. Using learning algorithms and feeding those algorithms great quantities of data, IT and security experts can teach the AI solution to monitor behavior, detect anomalies, adapt and respond to threats and issue alerts. AI has quickly become a key component in a business' cyber security infrastructure, providing a multi-layered security strategy that is robust and sophisticated.

Finance

- Financial services companies use AI-based natural language processing tools to analyze brand sentiment from social media platforms and provide actionable advice.
- Investment companies like Aiyda and Nomura Securities use AI algorithms to conduct trading autonomously and robo-traders to conduct high-frequency trading for greater profits, respectively.

- Fintech firms like Kensho and Forward Lane use AI-powered B2C robo-advisors to augment rebalancing decisions and portfolio management performed by human analysts. Wealth front uses AI algorithms to track account activity and help financial advisors customize their advice.
- Chatbots, powered by natural language processing, can serve banking customers quickly and efficiently by answering common queries and providing information promptly.
- Fraud detection is an important application of AI in financial services. For example, MasterCard uses Decision Intelligence technology to analyze various data points to detect fraudulent transactions, improve real-time approval accuracy, and reduce false declines.

Manufacturing

- Landing.ai claims to have created machine-vision tools to **find microscopic defects** in objects like circuit boards using an ML algorithm trained using tiny volumes of sample images. In the future, self-driving robots may be created which can move finished goods around without endangering anyone or anything around.
- Robots in factories are often stationary but are still in danger of crashing into objects around it. A new concept called collaborative robots or “cobots, enabled by AI, can take instructions from humans, including instructions that the robot has not been previously exposed to, and work productively with them.
- AI algorithms can influence the **manufacturing supply chain** by detecting the patterns of demand for products across geographies, socioeconomic segments, and time, and **predicting market demand**. This, in turn, will affect inventory, raw material sourcing, financing decisions, human staffing, energy consumption, and maintenance of equipment.
- AI tools help in **predicting malfunctions and breakdown of equipment** and taking or recommending preemptive actions as well as tracking operating conditions and performance of factory tooling.

Automotive industry

- Tesla introduced **Tesla Bot**, an intelligent virtual assistant integrated with Tesla models S and X, allows users to interact with their car from their phone or desktop.
- Uber AI Labs is working on developing **self-driven cars** with the help of the best engineers and scientists. Uber has already tested a batch of self-driving cars in 2016.
- NVidia has partnered with Volkswagen to develop “**intelligent co-pilot systems**” in cars that will enable safety warnings, gesture control, and voice and facial recognition.
- Ericsson predicts that 5G technology will improve vehicle-to-vehicle communication wherein sensors will be implanted in airport runways, railways, and roads.

Artificial Intelligence in ecommerce:

- Artificial Intelligence technology provides a competitive edge to e-commerce businesses and is becoming readily available to companies of any size or budget. Leveraging machine learning, AI software automatically tags, organizes and visually searches content by labeling features of the image or video.
- AI is enabling shoppers to discover associated products whether it is size, color, shape, or even brand. The visual capabilities AI is improving every year. By first obtaining visual cues from the

uploaded imagery, the software can successfully assist the customer in finding the product they desire. Many e-commerce retailers are already becoming more sophisticated with their AI capabilities, and I only expect this to grow in the future.

- Artificial Intelligence in Logistics and Supply Chain:2
- When combined with customer data and analytics, physical artificial intelligence removes friction from the customer experience. Artificial intelligence empowers businesses to act on consumer data to drive improvements throughout many areas of supply chain operations. Mobile technology and the “Uberization” of things have made consumers hungry for AI
- Consumers demand shorter delivery waits from retailers and retailers will expect the same from manufacturers and distribution centers. Autonomous trucks and robotic picking systems allow supply chains to make fulfillment seven days a week. Within the next five years, the shipping term “business days” will become obsolete as consumers expect delivery on nights and weekends.

AI DEPLOYMENTS ACROSS INDUSTRIES

- These AI deployments demonstrate that businesses across industries can maximize their AI investment and improve customer perception:
- **ABB Ability Ellipse platform:** The ABB Ability Ellipse platform with AI optimises asset management across the enterprise. It has alerts to detect anomalies to minimize maintenance costs across the enterprise.
- **Aylesbury Vale District Council:** The Aylesbury Vale District Council has used AI in its residents' services team to save costs. It developed and launched a 'skill' in Amazon Echo's Alexa to access its services, working with suppliers including Amazon itself to ensure the skill fit in the Alexa skill set family. Its service team's response rate improved by 50 percent with 90-percent accuracy, reducing costs from £2.20 to £0.10 to £0.12 per query.
- **eBay:** eBay acquired Expert maker for its AI platform for optimization and automation. It expects to apply the technology across its platform, to improve shipping and delivery times, pricing, and improve customer trust.
- **KLM Dutch Airlines:** KLM Dutch Airlines uses AI for social media management. It adds automated answers to general questions from customers without the need for an intervention of a human service agent. Over 50 percent of its 130,000 social media mentions are handled with 95-percent accuracy. The AI system learns from the service agent's actions and gets smarter over time.
- **IBM and Local Motors:** Local Motors co-reacted and produced a vehicle, Olli, enhanced by IBM's Watson Natural Language API and Internet of Things (IoT) for Automotive. Olli converses with passengers using natural language, taking them to requested destinations, providing recommendations on where to go, and answering questions about the vehicle, the journey, and the surrounding environment.
- **Lufthansa:** Lufthansa uses AI to personalize customer experiences. It uses machine learning to personalize offers such as lounge access to people who have connecting flights. If customers do not accept the offer, after repeated notifications, Lufthansa changes its algorithm to improve the customer experience.
- **Magoosh:** Tools for student tests provider Magoosh added AI to its Zendesk agent interface to increase efficiency for community support and its distributed teams of remote tutors. Over 83 percent of tickets are supported by AI, which provides 92 percent accuracy in tagging predictions.

- **Toyota:** At CeMat 2018, Toyota envisaged how its horizontal transporters might communicate directly with high-level machines using AI. Its idea is that all movement should be optimized, with exactly the right type of handling machines being deployed for each task, passing loads between machines as required.
- **Travel Bird:** Travel Bird used AI to manage incoming customer enquiries. After three months, it could cover over 65 percent of the 900,000 incoming queries. Pre-filling accuracy by the AI reached 95 percent, and customer satisfaction score reached 90 percent, while average handling time went down by 30 percent.
- **Uber:** The car hailing service Uber has a core team providing pre-packaged machine learning algorithms 'as-a-service' to its team of mobile app developers, map experts and autonomous driving teams. Head of machine learning at Uber, Danny Lange told Computerworld UK: "We have really had machine learning for a while but it is something that can be really hard for software engineers to get. So we have created machine learning-as-a-service inside the company as a cloud service." Uber uses these capabilities to better predict your travelling habits within its core mobile application improves its maps using computer vision and create algorithms for its autonomous vehicles.

Conclusion

Jack Ma, the founder of Alibaba, warned the audience at the World Economic Forum 2018 at Davos that AI and big data were a threat to humans and would disable people instead of empowering them. However, given the sweeping real-world applications of AI and ML and the constant advancements in the field, it is more likely that the technology will transform the way we work enabling faster, more informed decisions, increasing operational efficiency, and innovating new products.

So AI if and when it comes - will start small, and we'll see some small intelligence being programmed inside some virtual simulation of the real world. This will be necessary if the AI is ever to understand concepts such as self, or movement, time passing, cause and effect and so on. An AI cannot possibly be given access to our physical world, because we don't yet have the capabilities to simulate our senses into a program fast enough to do that.

The general opinion with regard to AI can be summed up in the following phrases

- Artificial Intelligence as the name suggests is "Artificial".
- No Hardware or Software can replace the human mind and its IQ - which makes it the "Roof of God's Creation".
- For example - Is there not a big difference between getting your chart interpreted by software as opposed to by a human being?
- Machines do not have feelings. Hence they cannot understand the real intention of any action.
- More over this technology and its source code will be written by humans - and hence will have the slant of the programmer.
- Right now we 'have to' listen and obey to our boss at work - but AI will make us all listen and obey to invisible programmers.
- AI if successful globally will make the world a heartless place.
- It will not be successful in India, as we are emotional and spiritual people.
- At best we the great people of India will be exposed to it via low level mediums like Gmail, Facebook etc.

- The lower level worker, who just follows procedures, could be replaced by a machine doing the same monotonous job but you cannot do away with the people who make the procedures and use their mind.
- The rich could become richer and the poor poorer as a result of this sweeping technology.

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