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Department of Computer Science and Engineering
Data Science



the infamous "Turing test."

- Year 2018: The "Project Debater" from IBM debated on complex topics with two master debaters and also performed extremely well.
- Google has demonstrated an AI program "Duplex" which was a virtual assistant and which had taken hairdresser appointment on call, and lady on other side didn't notice that she was talking with the machine.

- **Applications of AI**

AI algorithms have attracted close attention of researchers and have also been applied successfully to solve problems in engineering. Nevertheless, for large and complex problems, AI algorithms consume considerable computation time due to stochastic feature of the search approaches

- 1) Business; financial strategies
- 2) Engineering: check design, offer suggestions to create new product, expert systems for all engineering problems
- 3) Manufacturing: assembly, inspection and maintenance
- 4) Medicine: monitoring, diagnosing
- 5) Education: in teaching
- 6) Fraud detection
- 7) Object identification
- 8) Information retrieval
- 9) Space shuttle scheduling

- **The present state of AI**

Artificial Intelligence has made remarkable strides in recent years, transforming various industries and aspects of our daily lives. Here's an overview of its current status:

- Machine Learning Advancements: AI's backbone, machine learning, has seen



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significant advancements. Algorithms like deep learning and reinforcement learning have enabled AI systems to process vast amounts of data and improve their performance over time. These improvements have led to breakthroughs in image recognition, natural language processing, and autonomous vehicles.

- **Natural Language Processing (NLP) Milestones:** NLP, a subset of AI, has achieved impressive milestones. Models like GPT-4 (Generative Pre-trained Transformer 4) can generate human-like text, making chatbots, content creation, and language translation more efficient and natural.
- **Autonomous Systems:** AI-powered autonomous systems have made strides in fields like self-driving cars and drones. Companies like Tesla and Waymo are testing self-driving cars on public roads, showcasing the potential of AI to revolutionize transportation.
- **Healthcare Revolution:** AI is playing a pivotal role in healthcare. From disease detection to drug discovery, AI algorithms are helping doctors diagnose illnesses more accurately and speeding up drug development processes.
- **Personalized Experiences:** AI is enhancing user experiences by personalizing content and recommendations. Streaming services, social media platforms, and e-commerce sites use AI algorithms to tailor suggestions based on user's preferences and behaviors.
- **Ethical and Bias Concerns:** As AI becomes more prevalent, concerns about ethics and bias have come to the forefront. Ensuring that AI systems are fair, transparent, and free from discriminatory biases remains a challenge that the industry is actively addressing.
- **Limitations and Challenges:** While AI has made significant progress, it still faces challenges. AI systems can struggle in situations they haven't been specifically trained for and might lack common-sense reasoning abilities. Additionally, the energy consumption of training large AI models is a growing concern.
- **AI in Creativity:** AI is even making strides in creative fields. AI-generated art, music, and literature are gaining attention, blurring the lines between human and machine creativity.
- **Business Integration:** AI is being integrated into various industries, from finance



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to retail. Businesses are using AI for tasks like predictive analytics, fraud detection, and supply chain optimization.

- Research and Innovation: Research in AI is ongoing, with scientists and engineers continuously pushing the boundaries of what AI can achieve. As technology evolves, new breakthroughs are expected in the near future.

- **Ethics in AI**

AI is a technology designed by humans to replicate, augment or replace human intelligence. These tools typically rely on large volumes of various types of data to develop insights. Poorly designed projects built on data that is faulty, inadequate or biased can have unintended, potentially harmful, consequences. Moreover, the rapid advancement in algorithmic systems means that in some cases it is not clear to us how the AI reached its conclusions, so we are essentially relying on systems we can't explain to make decisions that could affect society.

An AI ethics framework is important because it shines a light on the risks and benefits of AI tools and establishes guidelines for their responsible use. Coming up with a system of moral tenets and techniques for using AI responsibly requires the industry and interested parties to examine major social issues and ultimately the question of what makes us human.

Enterprises face several ethical challenges in their use of AI technologies.

- Explainability. When AI systems go awry, teams need to be able to trace through a complex chain of algorithmic systems and data processes to find out why. Organizations using AI should be able to explain the source data, resulting data, what their algorithms do and why they are doing that. "AI needs to have a strong degree of traceability to ensure that if harms arise, they can be traced back to the cause," said Adam Wisniewski, CTO and co-founder of AI Clearing.
- Responsibility. Society is still sorting out responsibility when decisions made by AI systems have catastrophic consequences, including loss of capital, health or life. The process of addressing accountability for the consequences of AI-based decisions should involve a range of stakeholders, including lawyers, regulators, AI developers, ethics bodies and citizens. One challenge is finding the appropriate balance in cases where an AI system may be safer than the human activity it is duplicating but still causes problems, such as weighing the merits of autonomous