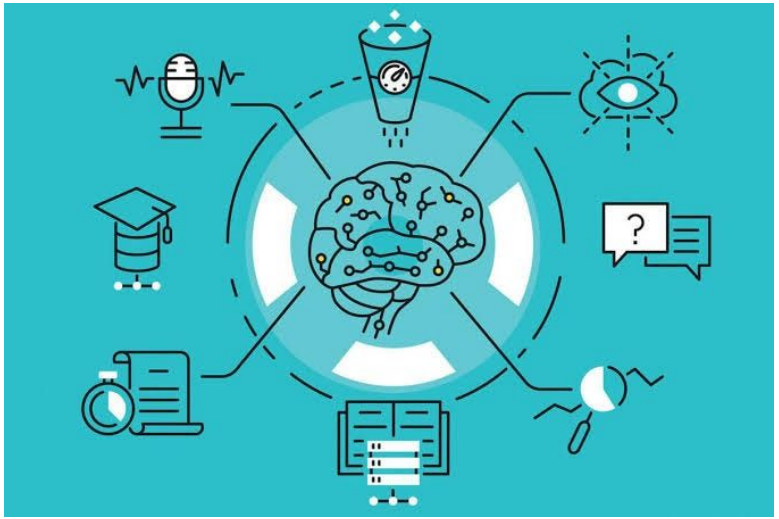
Generative AI

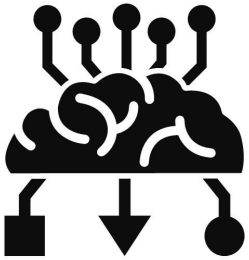
By
Shaan Malik, Jade Matzel, Arya Mazandarani, Jasmin Rutter

What is Generative AI?

- New Content is Created
- Systems learn patterns from datasets
- Able to adapt to different tasks
- Output is targeted and controlled
- Used in various fields
  - Art
  - Finance
  - Natural language
  - Data science



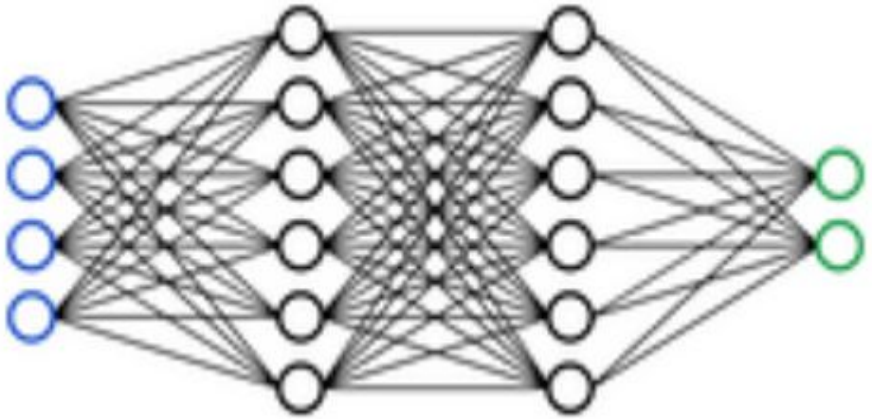
Generative AI Models



- Generative Adversarial Networks (GANS)
  - Generates data & distinguishes what's real & fake
- Variational Autoencoders (vaes)
  - Generates new samples from learned data
- Autoregressive Models
  - Predicts the probability distribution of next element
- Recurrent Neural Networks
  - Process sequential data & predicts next element in sequence
- Transformer-Based Models
  - Attention based models relationships between different elements
- Reinforcement Learning
  - Improves tasks through trial and error

How Generative AI Works

- Neural Networks
  - Input
  - Hidden
  - Output
- Training data
  - Looks for patterns
  - patterns “train” network
  - more data +larger network = better output



Applications of Generative AI

- Text generation
  - chatGPT
  - Note Taking
  - Code development
- Image generation
  - Dall-E
  - 3D Models
- Automation
  - robots learn to do “skilled tasks” based on training data
- Auditory
  - Generate music
  - Generate voices

Challenges

- One challenge that runs rampant throughout the Technology industry in general is scalability.
  - Scaling AI by giving it massive data sets can be extremely challenging
  - Not to mention EXPENSIVE
  - According to Gartner, a management consulting company, about 53% of their AI prototypes actually end up being used in production
- Another challenge is hardware limitations
  - AI can be trained for eternity
  - It is demanding and expensive to run

Potential Downsides for Humans

- With Generative A.I having so much potential to take over in many different industries, there will be a lot of jobs that will be taken by A.I. (Ex - Artist, Writer, Content Creation, programmers, repetitive tasks, etc...)
- Generative A.I has the potential to be a lot more productive than humans, this can result in a lot of layoffs from companies that realize that there is not much of a need for human workers when A.I can do much better for cheaper.

Generative AI in Healthcare

Pros:

- AI can summarize mass data and spot abnormalities
- Can also be used to automate simple and mindless tasks
    - This gives doctors and physicians more focus on more important tasks
- AI can compare data of patients with other patients to spot stark differences

Cons:

- Still in development, therefore risky
- Expensive
- Sensitive information susceptible to leaking

Natural Language Processing

- Natural Language Processing is the process of AI using a set of algorithms to process English text and interpret it into code to be able to act upon it and create a response.
  - Ex: ChatGPT uses NLP to process your question, translate it into machine language, then translate its response from machine language back to english.
- Natural Language Processing is used in:
  - Chat box responses
  - Spam detection
  - Text-to-speech and speech-to-text translation

Case Studies

- Generative A.I is being used by researchers in drug discovery. This means that the A.I can find useful properties in the molecular structure to help solve real world problems.
- It can also be used in educational institutions to help students learn and cater to their individual needs
- Generative A.I can generate legal contracts based off of each parties agreed terms.
- Generative A.I is already being used in image and text generation.

Future Trends

- Generative A.I can potentially in the future be used by animation studios like disney to help create movies or tv shows by just typing in what they would like to see
- It can also be used in the future by gaming companies to generate content for the game like animations, cutscenes, or the entire game itself.
- There will be more content that will be generated using generative A.I across all different type of social media platforms and other industries.

Policy Suggestions for Job Reduction

1. **Job Retraining Programs** - These restraining programs would help workers adjust to this rapidly changing environment and use technology related to Generative A.I.
2. **Career Counseling** - These services would be easily available for workers whose jobs have been eliminated by automation from A.I. They would help workers make decisions about their future career paths and the best option to take
3. **Educational Programs** - These programs would bring education to individuals of all ages to learn everything they need to know about A.I.

Policy Suggestions for Personal Data

1. **Ownership of Data Rights** - These rights would grant ownership of data to individuals and their personal data. This would prevent others stealing data to train A.I models.
2. **Accountability Laws** - These laws would hold companies and organizations accountable for their actions regarding their use of generative A.I and their potential misuse of data

Policy Suggestions for Industries

1. **Guidelines for Ethical A.I use** - These guidelines would make sure that A.I systems are being made and used in a responsible and ethical manner. This would include things like : avoiding bias and discrimination.
2. **Enforce Transparency** - This requirement would ensure that companies are transparent when their A.I is being used in whatever they may be showing to their users. They would have have to communicate to users publicly on what is specifically A.I Generated.
3. **Mandatory Information Sharing** - This requirement would encourage companies/organizations to share information regarding generative A.I (Ex: Lessons Learned, things to avoid, etc..)

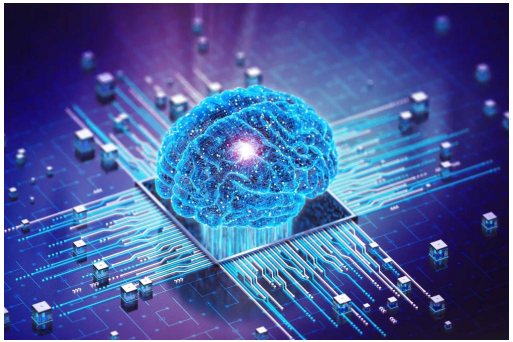
Why are these Policy Suggestions Important?

- These policy suggestions are important because they would ensure that the rapid growth of Generative AI is a benefit to society and minimizes the possible negative effects of Generative A.I

Conclusion

- All in all, Generative A.I has been shown to be extremely powerful and has a lot of potential to change the world significantly.
- Currently, Generative A.I is still a newer technology and there is still lots of room for improvement.
- You can expect a lot more industries to be using Generative A.I for their every tasks.

Questions?



References

Bhasker, Shashank, et al. “Tackling Healthcare’s Biggest Burdens with Generative AI.” McKinsey & Company, McKinsey & Company, 10 July 2023, www.mckinsey.com/industries/healthcare/our-insights/tackling-healthcares-biggest-burdens-with-generative-ai.

Data 360 Network. “Generative AI and Natural Language Processing: Applications and Challenges.” Medium, Medium, 25 Feb. 2023, data360network.medium.com/generative-ai-and-natural-language-processing-applications-and-challenges-3ae5ec254fdc.

Klubnikin, Andrei. “Top 5 AI Challenges & How to Overcome Them.” ITRex, 21 Sept. 2023, itrexgroup.com/blog/artificial-intelligence-challenges/.

Mangtani, Ashley. “Everything You Need to Know about Generative AI.” *Medium*, Medium, 18 Feb. 2022, ashley-mangtani.medium.com/everything-you-need-to-know-about-generative-ai-849ffb41e695.

Porter, Alexis. “Unveiling 6 Types of Generative AI.” *BigID*, BigID, 20 Nov. 2023, bigid.com/blog/unveiling-6-types-of-generative-ai/.

SAS. “Natural Language Processing (NLP): What It Is and Why It Matters.” SAS, 2023, www.sas.com/en_us/insights/analytics/what-is-natural-language-processing-nlp.html.

SoluLab. “Top 25 Generative AI Use Cases in 2023.” *Blockchain Technology, Mobility, AI and IoT Development Company USA, Canada*, Solulab, 9 Nov. 2023, www.solulab.com/top-generative-ai-use-cases/#Generative_AI_Use_Cases.