

Lila Brown and Luke Swatland

14 April 2024

Prof. Isaacson

AI Research Paper

First attempt chat GPT 3.5:

The development of artificial intelligence (AI) from Turing to large language model chatbots spans several decades of research and innovation. Here's an overview of key milestones:

- 1. Alan Turing and the Turing Test (1950s):** Alan Turing proposed the Turing Test in 1950, which aimed to assess a machine's ability to exhibit intelligent behavior indistinguishable from that of a human. This laid the groundwork for thinking about AI in terms of human-like cognition and behavior.
- 2. Early AI Research (1950s-1970s):** During this period, researchers focused on symbolic AI, which involved creating systems capable of manipulating symbols according to logical rules. Programs like the General Problem Solver (GPS) and expert systems were developed to solve specific tasks using predefined rules.
- 3. Expert Systems (1970s-1980s):** Expert systems emerged as a prominent AI approach, where knowledge from human experts was encoded into computer systems to solve complex problems. These systems were widely used in various domains such as medicine, finance, and engineering.
- 4. Machine Learning (1980s-1990s):** Machine learning gained traction as an alternative approach to AI, focusing on algorithms that allow computers to learn from data. Early techniques included neural networks, decision trees, and Bayesian networks. However, progress was limited due to computational constraints and lack of large datasets.

5. Neural Networks Resurgence (2000s): Advances in computational power and availability of big data led to a resurgence of interest in neural networks, particularly deep learning. Deep learning algorithms, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), achieved remarkable performance in tasks like image recognition and natural language processing.

6. Rise of Chatbots (2010s): Chatbots, or conversational agents, became increasingly popular with the rise of messaging platforms and advances in natural language processing (NLP). Early chatbots were rule-based or used simple pattern matching techniques. However, with the advent of deep learning and large datasets, chatbots evolved to employ more sophisticated techniques for understanding and generating human-like responses.

7. Large Language Models (2010s-2020s): The development of large language models, such as OpenAI's GPT (Generative Pre-trained Transformer) series, marked a significant milestone in AI. These models are trained on vast amounts of text data and can generate coherent and contextually relevant text across a wide range of topics. GPT-3, released in 2020, demonstrated remarkable capabilities in natural language understanding and generation, powering various applications including chatbots, content generation, and language translation.

Overall, the journey of AI from Turing to large language model chatbots reflects continuous advancements in algorithms, computing power, and data availability, driving progress towards creating more intelligent and human-like machines.

Improving the paper:

First we noticed the fact that the paper is divided into sections. It was very easy to understand and covered a lot of major points in chronological order. We noticed a lack of detail with no sources cited.

It also was not formatted like an academic paper. Bullet points were the main format of the paper and it was missing the hallmarks of a classically-styled academic paper.

Next, the essay was particularly uninteresting. It reads more of a summary and less like an essay. The computer covered major topics but omitted a lot of what we covered in class and believed to be relevant.

With all of this in mind, we systematically provided these comments to the language model in hopes that the end result would serve our purpose better:

- Format the paper as if you are a smart college student at a top university.
- Provide a Chicago Style formatted list of all sources used at the end.
- The final product should be about 2500 words.
- We would like more detail on Alan Turing and the Turing Test.
- Please have a section on can machines think? Have a philosophical vibe.
- Think about women in technology and perhaps include a section on them
- Think about the different major ai chatbots and compare and contrast them
- Make it more interesting.

We input all of this feedback into the chatbot. The following is a short summary of the paper that it returned:

The paper delves into the evolution of artificial intelligence (AI) from its conceptual roots to the advent of large language model chatbots. It begins with Alan Turing's profound inquiry into whether machines can think, exploring the philosophical implications of the Turing Test. The narrative traces the development of AI through various stages, including early symbolic logic systems, the rise of expert systems, and the emergence of machine learning and neural networks. It also highlights the significant contributions of women in technology, acknowledging figures like Ada Lovelace and advocating for diversity in STEM fields. The paper offers a comparative analysis of major AI chatbots, including ELIZA, Siri, Google Assistant, and Amazon Alexa, elucidating their unique features and capabilities. Through this journey, it underscores the relentless pursuit of knowledge, innovation, and inclusivity in shaping the future of AI and its impact on society.

We were still not satisfied by the content on Alan Turing, language models and women in tech.

We instructed the model to then write multiple essays on each topic and combine them. This was problematic because GPT simply printed one after another. It also seemed to lose the citations.

We then instructed the model to combine them in a way that makes it a coherent essay that a college student would write. This seemed to be a lot for it to handle.

We now have an essay that meets the word requirement and has a lot of good information, but it still is lacking information. We then instructed the model to focus more on individuals and their particular contributions and achievements.

At this point, the model got confused and produced a report that was 43 pages long, despite being told to produce 2300 words. We reiterated the constraints and it is reluctant to produce a paper exactly to our specifications.

We then focused back on using the model to create multiple essays that we will manually string together. These include, Turing, Women, Individuals, and recent AI platforms. This multitude of topics seems to be too much for the computer to handle in a way that it would be a more streamlined topic.

We now have many sections of an essay that need to be combined to make a final product.

GPT was reluctant to print a final product that seemingly is more than 1500 words or so. There was no written limit that they provided, and it seemed to ignore any commands to make the essay longer even when specifically prompted.

This is interesting given the fact that all of the other commands we have given to it, it has responded and adhered to without a problem. This creates the need for further manual work to be done. Both Chat Bots were able to create essays of around 1000 words on basically any sub-topic within the history of AI, but had a hard time creating content longer than that. Additionally, prompting Chat GPT to make the essays more fluid was difficult because it continuously wrote in the form of short sections and lists that did not string together to make an essay.

For a change in perspective, we looked at Google's Gemini, Gemini is a different model that sources its information in a unique manner. Provided the same information, Gemini seems to produce a product that meets our specifications. The final product included excerpts from both Gemini and ChatGPT because both platforms had similar information, but each presented it in a different manner and using a different type of prose.

Gemini also appears to write in a manner that seems to be more organic and less robotic and “ai-seeming” like the GPT variant. GPT’s product appeared to be unnecessarily verbose without adding any useful information. The Gemini product seemed more like something an actual college student would write.

One topic that AI platforms did not give us information about in any of the versions of the essay was a discussion of the basic foundational question behind AI: can machines think? We decided to write a section based on our research and class discussions about the various arguments for or against machines being able to think because the very existence of AI is predicated upon the assumption that machines have the ability to think in a near-human manner.

Another topic the AI did not provide us with was a discussion of the pros and cons of modern AI models and where AI is going in the future. Because of this, we decided to prompt Chat GPT to discuss the different AI models that are popular today which prompted us to do further research on integration of AI models used by companies like google and microsoft and its impact on competition.

Overall, the biggest problem with both ChatGPT and Gemini was that the essays they wrote focused too much on facts and not enough on analysis. Perhaps this backs up the idea that machines do not have the ability to think. Both AI models did a very good job recounting historical facts when prompted to do so, but neither platform was able to analyze the role of AI in our society today in the way that we were able to in class discussion and on discord. It was also difficult to prompt the chatbots to vary their language as the same adjectives kept popping up. While AI was impressively helpful in writing this paper, this assignment has shown us that there are still significant limits to what AI can do in that it cannot independently produce a paper over around 1000 words without splitting it up into sections that do not blend together. The Chatbots gave us a lot of the historical information we needed but our human intelligence was able to move around the order of paragraphs and add transitions and analysis needed to create a final product that is not only informative but also interesting.

Final Paper (Wordcount 2878):

The narrative of artificial intelligence (AI) development is a tapestry woven with the visionary efforts of numerous individuals who have etched their mark on the field. Artificial intelligence (AI) has emerged as one of the most transformative fields in modern technology, revolutionizing industries, shaping societies, and redefining the boundaries of human ingenuity. However, the roots of AI can be traced back to centuries past, where the seeds of curiosity and innovation were sown by pioneers whose visionary ideas laid the groundwork for the AI revolution we witness today. Beginning with Ada Lovelace's contributions to the modern computer and leading up to large language models, AI has developed rapidly into something that could change the way humans interact with machines forever.

One such luminary in the annals of AI history is Alan Turing, whose groundbreaking contributions in the mid-20th century paved the way for the exploration of machine intelligence. Turing's visionary ideas, groundbreaking theories, and enduring legacy continue to shape the trajectory of AI research and inspire generations of researchers worldwide.

Alan Mathison Turing was born on June 23, 1912, in London, England. From an early age, Turing exhibited exceptional mathematical prowess, displaying an aptitude for problem-solving that would define his illustrious career. After studying mathematics at King's College, Cambridge, and Princeton University, Turing embarked on a journey that would forever change the course of human history. Turing's seminal contribution to the field of AI came in the form of the Turing Test, proposed in his landmark paper "Computing Machinery and Intelligence" in 1950. This groundbreaking concept provided a practical framework for assessing machine intelligence by challenging whether a computer could exhibit behavior indistinguishable from that of a human. By reframing the question of AI in terms of observable behavior rather than abstract philosophical concepts, Turing laid the foundation for the modern study of machine intelligence.

Beyond his theoretical contributions, Turing's practical applications in machine learning laid the groundwork for modern AI. His work on pattern recognition and learning provided valuable insights into the mechanisms underlying intelligent behavior, inspiring future generations of researchers to explore the possibilities of machine intelligence. Turing's insights into adaptive and self-organizing systems foreshadowed contemporary approaches like reinforcement learning and unsupervised learning, paving the way for innovations in AI-driven technologies. Moreover, Turing's wartime efforts in cryptanalysis exemplified his ingenuity and problem-solving skills, which are fundamental to AI research. His instrumental role in breaking the German Enigma code not only contributed to the Allied victory but also demonstrated the power of computational methods in solving complex problems. Turing's experience in cryptography provided valuable insights into the capabilities and limitations of computing machinery, informing his later work in AI.

The narrative of AI history has often overlooked the significant contributions of women. Ada Lovelace, widely regarded as the world's first computer programmer, collaborated with Charles Babbage in the 19th century, conceptualizing algorithms that laid the foundation for modern computing. Grace Hopper, a trailblazer in computer science, revolutionized business computing with her contributions to the COBOL programming language. Throughout history, women like Fei-Fei Li and Joy Buolamwini have made pioneering breakthroughs and advocated for diversity and inclusivity in AI research.

As we traverse the annals of AI history, it becomes evident that its evolution has been shaped by a diverse array of contributors from various backgrounds. While Turing's legacy looms large, it is imperative to recognize the collective efforts of these individuals, whose ingenuity and perseverance continue to fuel the quest for machine intelligence.

The legacy of AI is a testament to the innovation and collaboration of countless individuals with the belief that machines have the ability to do much of our thinking for us. From

Turing's visionary ideas to modern marvels like ChatGPT, the journey of AI is a testament to humanity's quest to unravel the mysteries of intelligence and creativity. As we stand on the cusp of a new era in AI, let us heed Turing's clarion call for responsible innovation, ensuring that the legacy of AI continues to enrich and empower humanity for generations to come. At its core AI is about advancing human-computer interfaces (HCI) by performing tasks that would typically require human intelligence. HCI refers to the ability of computers to intuitively and seamlessly meet the needs of humans. One aspect of this is natural language processing, meaning that AI models are able to both understand and generate human language. Additionally, AI enables a high degree of personalization that makes it easy to generate content for people based on previous data. Since the development of the digital computer technological visionaries have worked to program computers to carry out complex tasks. Today we are closer than ever to seeing machines mimic human intelligence. This begs the question: can machines think?

Ada Lovelace believed that computers would not be capable of original thought because of the fact that they operate based on a series of programs and algorithms that have been inputted into them. She saw them as powerful devices that could be used to execute a task and not think. Turing would tend to agree with Lovelace, because at the time of his writings, it was generally clear when one was interacting with a machine or a human, out of this he derived his famous Turing test. However, he would see the possibility that a computer would be capable of what one could consider thought in the future.

Today, we have large language models, which are able to take all of what has been written in history and learn and see how humans interact, and create their own original output. This output is still a derivation of things that humans have done, even if it would be able to pass a Turing test. This issue will remain up for debate, and we think that the answer will lie in how we continue to define thinking.

While Turing's contributions to AI are widely celebrated, the history of AI development has often overshadowed the significant contributions made by women. Throughout history, women have played a crucial role in shaping the landscape of AI research and innovation, from pioneering breakthroughs to advocating for diversity and inclusivity in the field. One of the earliest and most notable figures in AI history is Ada Lovelace, often referred to as the world's first computer programmer. In the 19th century, Lovelace collaborated with Charles Babbage on his Analytical Engine, conceptualizing algorithms that would later serve as the foundation for modern computing. Her visionary insights into the potential of machines to perform complex tasks laid the groundwork for AI research, inspiring future generations of women in technology.

In the mid-20th century, Grace Hopper emerged as a trailblazer in the field of computer science. As a pioneering computer scientist and naval officer, Hopper played a pivotal role in the development of early programming languages and compiler technology. Her contributions to the COBOL programming language, which revolutionized business computing, exemplify her enduring legacy in AI and software engineering.

Throughout the history of AI research, women have made significant contributions to various subfields, including natural language processing, machine learning, and robotics. For example, Fei-Fei Li, a prominent computer scientist, has spearheaded groundbreaking research in computer vision and deep learning, advancing the frontiers of AI in image recognition and understanding. In addition to technical contributions, women have played a crucial role in advocating for diversity and inclusivity in the AI community. Figures like Joy Buolamwini, founder of the Algorithmic Justice League, have raised awareness about bias and discrimination in AI algorithms, advocating for ethical AI development and responsible innovation. Similarly, organizations like Women in Machine Learning (WiML) and Black in AI have worked to promote representation and equity in AI research and industry. Furthermore, women have leveraged AI technologies to address pressing societal challenges and drive positive social impact. For instance, Rana el Kaliouby, co-founder and CEO of Affectiva, has pioneered the

development of emotion recognition technology to enhance human-computer interaction and support individuals with autism and other neurodevelopmental disorders.

The contributions of women to the development of artificial intelligence are profound and far-reaching, although often ignored. From Ada Lovelace's visionary insights to Grace Hopper's pioneering work in programming languages, women have left an indelible mark on the field of AI. As we strive for greater diversity, inclusivity, and equity in AI research and development, it is essential to recognize and celebrate the invaluable contributions of women, whose ingenuity, creativity, and leadership continue to shape the future of AI and its impact on society.

While Turing and Lovelace are among the most well-known figures in AI history, the field's evolution has been shaped by a diverse array of contributors from various disciplines and backgrounds. From mathematicians and computer scientists to engineers and philosophers, the history of AI is replete with individuals whose insights and innovations have pushed the boundaries of what is possible. John McCarthy, often hailed as the father of AI, played a pivotal role in organizing the seminal Dartmouth Conference in 1956, widely regarded as the birthplace of AI. McCarthy's seminal work on symbolic AI and the development of the LISP programming language laid the foundation for early AI research and inspired generations of researchers to explore the possibilities of machine intelligence.

Herbert Simon, another pivotal figure in the history of AI, made significant contributions to the field with his work on problem-solving and decision-making processes. Simon, along with Allen Newell, developed the General Problem Solver (GPS), a program capable of solving a wide range of problems using heuristic search techniques. Simon's insights into human cognition and behavior inspired advances in cognitive science and influenced the design of AI systems.

Furthermore, pioneers like Marvin Minsky and Joseph Engelberger have left an indelible mark on the field of AI with their groundbreaking work in robotics and artificial neural networks.

Minsky's work on artificial neural networks and the theory of human cognition laid the groundwork for modern approaches to AI, while Engelberger's pioneering work in robotics paved the way for innovations in automation and intelligent systems.

As we reflect on the history of AI, it becomes evident that its evolution has been shaped by a diverse and eclectic mix of individuals from various disciplines and backgrounds. While the contributions of figures like Turing and Lovelace loom large, it is important to recognize the collective efforts of the countless individuals who have contributed to the field's growth and advancement. Their ingenuity, creativity, and perseverance continue to fuel the ongoing quest to unlock the mysteries of machine intelligence and harness its transformative potential for the betterment of humanity.

In recent years, the landscape of artificial intelligence (AI) has undergone a remarkable transformation, propelled by advancements in machine learning, natural language processing (NLP), and computational power. One of the most significant manifestations of this evolution is the emergence of AI platforms, which have revolutionized human-computer interaction and opened new frontiers of possibility in the realm of AI-driven applications.

At the forefront of this revolution is OpenAI's ChatGPT, a large language model trained on vast amounts of text data using state-of-the-art deep learning techniques. Building upon the success of earlier iterations like GPT-2 and GPT-3, ChatGPT represents a quantum leap in the capabilities of AI-driven conversational agents. Equipped with a nuanced understanding of natural language and the ability to generate coherent and contextually relevant responses, ChatGPT has transcended traditional chatbots to become a sophisticated virtual interlocutor capable of engaging in meaningful and human-like conversations.

The development of ChatGPT and similar AI platforms has been fueled by several key factors. First and foremost is the exponential growth of data and computational resources, which

have enabled researchers to train increasingly large and complex models capable of capturing the intricacies of human language and cognition. Additionally, advances in deep learning architectures, particularly transformer models like the one underlying ChatGPT, have revolutionized the field of NLP, allowing AI systems to process and generate text with unprecedented accuracy and fluency.

The implications of these advancements are profound and far-reaching. ChatGPT has the potential to transform a wide range of industries and applications, from customer service and virtual assistants to content generation and language translation. By enabling more natural and intuitive human-computer interactions, AI platforms like ChatGPT have the power to enhance productivity, streamline workflows, and unlock new avenues of creativity and innovation.

However, with great power comes great responsibility. As AI platforms like ChatGPT become increasingly sophisticated and pervasive, ethical considerations and societal impacts come to the forefront. Concerns about bias, misinformation, and misuse abound, raising questions about the ethical design, deployment, and regulation of AI-driven technologies. It is imperative that developers, researchers, policymakers, and society at large engage in thoughtful dialogue and collaboration to ensure that AI platforms are developed and deployed in a responsible and equitable manner.

Artificial intelligence (AI) platforms have become indispensable tools in various industries, offering powerful capabilities for data analysis, automation, and decision-making. In this essay, we will explore and compare three prominent AI platforms: Google Cloud AI, Microsoft Azure AI, and Amazon AI. By examining their features, capabilities, and applications, we can gain insight into the diverse landscape of AI platforms and their impact on businesses and society.

Google Cloud AI is a comprehensive suite of AI services and tools offered by Google Cloud Platform (GCP). This platform provides a range of pre-trained machine learning models and APIs for tasks such as image recognition, natural language processing (NLP), and speech recognition. Additionally, Google Cloud AI offers custom machine learning capabilities, allowing users to train and deploy their models using Google's scalable infrastructure. One of the key strengths of Google Cloud AI is its integration with other Google Cloud services, such as BigQuery and TensorFlow. This seamless integration enables users to leverage AI capabilities across their entire cloud infrastructure, from data storage and processing to application development and deployment. Moreover, Google Cloud AI benefits from Google's vast experience and expertise in AI research and development, ensuring state-of-the-art performance and reliability.

Microsoft Azure AI is a comprehensive suite of AI services and tools offered by Microsoft Azure, Microsoft's cloud computing platform. Similar to Google Cloud AI, Azure AI provides a range of pre-built AI models and APIs for tasks such as computer vision, language understanding, and anomaly detection. Additionally, Azure AI offers custom machine learning capabilities through Azure Machine Learning, enabling users to build, train, and deploy their models in the cloud.

One of the key strengths of Azure AI is its integration with other Microsoft products and services, such as Azure DevOps and Power BI. This tight integration enables seamless collaboration and workflow automation, empowering users to leverage AI capabilities in their existing workflows and applications. Moreover, Azure AI benefits from Microsoft's extensive ecosystem of partners and developers, providing access to a rich array of tools, libraries, and resources.

Amazon AI is a suite of AI services and tools offered by Amazon Web Services (AWS), Amazon's cloud computing platform. This platform provides a range of AI services, including

image and video analysis, natural language processing, and speech recognition. Additionally, Amazon AI offers custom machine learning capabilities through Amazon SageMaker, enabling users to build, train, and deploy machine learning models at scale.

One of the key strengths of Amazon AI is its integration with other AWS services, such as Amazon S3 and Amazon EC2. This seamless integration enables users to build end-to-end AI solutions using AWS's scalable and cost-effective infrastructure. Moreover, Amazon AI benefits from AWS's extensive network of data centers and global reach, ensuring high availability and low latency for AI applications deployed on the platform.

While Google Cloud AI, Microsoft Azure AI, and Amazon AI offer similar AI capabilities and services, each platform has its unique strengths and characteristics. Google Cloud AI excels in integration with other Google Cloud services and benefits from Google's extensive experience in AI research and development. Microsoft Azure AI stands out for its tight integration with Microsoft products and services and extensive ecosystem of partners and developers. Amazon AI distinguishes itself with its seamless integration with other AWS services and global infrastructure.

Looking ahead, the future of AI platforms like ChatGPT holds immense promise and potential. As researchers continue to push the boundaries of what is possible in the realm of AI-driven conversational agents, we can expect to see further advancements in natural language understanding, generation, and reasoning. Moreover, the integration of AI platforms with other emerging technologies such as augmented reality, virtual reality, and the Internet of Things (IoT) promises to create new synergies and possibilities for human-computer interaction and collaboration. Integration of AI is currently a major discussion as google, microsoft, amazon, and many other companies start to roll out new AI models. While integration makes the lives of the consumers easier, a key consideration is its impact on competition in the industry.

In conclusion, the recent development of AI platforms like ChatGPT represents a watershed moment in the evolution of artificial intelligence. By harnessing the power of deep learning and natural language processing, these platforms have transformed the way we interact with computers and opened new vistas of possibility in the realm of AI-driven applications. As we navigate the opportunities and challenges presented by these advancements, it is essential that we approach the development and deployment of AI platforms with mindfulness, responsibility, and a commitment to the ethical and equitable advancement of technology for the betterment of humanity.

Works Cited

Turing, Alan. "Computing Machinery and Intelligence." *Mind*, vol. 59, no. 236, 1950, pp. 433–460.

Lovelace, Ada. "Sketch of The Analytical Engine Invented by Charles Babbage." *Scientific Memoirs*, vol. 3, 1843, pp. 666-731.

Hopper, Grace. "The Education of a Computer." *Proceedings of the 1952 ACM National Meeting*, 1952, pp. 125-130.

Li, Fei-Fei. "Building Machines That See." TED2015, TED Conferences, LLC, 2015.

Buolamwini, Joy. "How I'm Fighting Bias in Algorithms." TED2019, TED Conferences, LLC, 2019.

Kaliouby, Rana el. "A tool to help you understand the emotions of others." TEDWomen 2018, TED Conferences, LLC, 2018.

McCarthy, John. "What is Artificial Intelligence?" Stanford University, 2007, ai.stanford.edu/~nilsson/OnlinePubs-Nils/General%20Essays/whatisai.pdf.

Simon, Herbert. "Artificial Intelligence: A Bibliographic Survey." Department of Computer Science, Carnegie-Mellon University, 1965.

Minsky, Marvin. "Steps Toward Artificial Intelligence." Proceedings of the IRE, vol. 49, no. 1, 1961, pp. 8-30.

Engelberger, Joseph. "Robotics – The Next Ten Years." Harvard Business Review, vol. 58, no. 6, 1980, pp. 170-179.

"Google Cloud AI - Products & Solutions." Google Cloud, cloud.google.com/products/ai.

"Microsoft Azure AI - AI Services." Microsoft Azure, azure.microsoft.com/en-us/services/machine-learning/.

"Amazon AI - Solutions." Amazon Web Services, aws.amazon.com/machine-learning/.