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## AI Term Paper

### Initial AI Response

Prompt: Describe the development of artificial intelligence from Turing to large language model chatbots.

Response (ChatGPT 4.0):

The development of artificial intelligence (AI) from the era of Alan Turing to the era of large language model chatbots encompasses a broad and complex history, marked by significant technological advances, theoretical insights, and evolving computational capabilities. Here's a condensed overview of this journey:

#### The Turing Era (1950s)

- **Theoretical Foundations:** Alan Turing, a British mathematician and logician, laid the foundational theoretical work for modern computing and AI. In 1950, he published a seminal paper titled "Computing Machinery and Intelligence," where he proposed the Turing Test as a criterion of intelligence. This test evaluates a machine's ability to exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human.

#### The Birth of AI (1950s-1970s)

- **Early Experiments:** The 1950s and 1960s saw the first experiments in AI, including the development of simple algorithms and the creation of the first AI programs. These included the Logic Theorist and ELIZA, which could mimic the language patterns of a psychotherapist.
- **Symbolic AI:** The era was characterized by an emphasis on symbolic AI, where intelligence was approached through the manipulation of symbols and the creation of rule-based systems.

#### The AI Winters (1970s-1990s)

- **First AI Winter:** The first AI winter occurred in the 1970s due to inflated expectations and subsequent disappointment in AI's capabilities, leading to reduced funding and interest.
- **Second AI Winter:** A second period of disillusionment in the late 1980s and early 1990s was due to limitations in the technology of the time, including the inability of AI systems to scale or handle ambiguous or incomplete information.

## The Rise of Machine Learning (1980s-2000s)

- **Machine Learning:** The focus shifted towards machine learning, a subset of AI that involves the development of algorithms that can learn from and make predictions or decisions based on data. This shift was facilitated by improvements in computational power and the availability of large datasets.
- **Neural Networks:** Interest in neural networks (inspired by the structure and function of the human brain) resurged, leading to developments in deep learning.

## The Era of Large Language Models (2010s-Present)

- **Advancements in Deep Learning:** Breakthroughs in deep learning, particularly in neural network architectures like convolutional neural networks (CNNs) and recurrent neural networks (RNNs), set the stage for the development of large language models.
- **Introduction of Transformers:** The introduction of the transformer model in 2017, with its novel attention mechanism, significantly advanced the field of natural language processing (NLP), enabling more effective handling of sequential data like text.
- **Large Language Models:** Models such as GPT (Generative Pre-trained Transformer) by OpenAI and BERT (Bidirectional Encoder Representations from Transformers) by Google demonstrated unprecedented capabilities in understanding and generating human-like text, leading to the development of sophisticated chatbots and AI assistants capable of engaging in complex conversations, writing coherent passages, and more.

This overview simplifies a rich and intricate history, where each advancement built upon previous discoveries. The development of AI from Turing's theoretical work to today's large language models showcases the exponential growth in computational power, algorithmic sophistication, and our understanding of both artificial and natural intelligence.

## Process

Evaluating the ChatGPT 4.0 initial response to prompt, the most obvious issue to me was the organization and structure. I spent a lot of time playing around on ChatGPT 4.0 prompting it to elaborate on certain parts, refine sentences, and change tone; however, the paper was not moving in the direction I wanted. Not only was the tone of the paper unauthentic, but I became frustrated that the AI couldn't reference my writing style and draw from *The Innovators*.

Around the time I was becoming frustrated, Google AI employee, Arthur Soroken spoke to our class about Notebook LM. I pivoted and decided to try and train the large language model

with my past writing samples and uploaded *The Innovators* to be referenced. I was surprised that Notebook LM, with the input material, slightly mimicked my tone and utilized the text from *The Innovators*. However, I realized that an important part of my lens comes from my learning in my minor of Social Innovation and Social Entrepreneurship (SISE), which Tulane says, “provides students with skills to create a more just and equitable society”. The foundation for my learning in SISE is the idea of self-focus and understanding your personal identity, culture, and theory of change. How do I manipulate AI to write from a place of understanding my identity, culture, and overall worldview? Is that possible? Is that the next development in AI?

With these questions in mind, I began adding important personal reflections, from SISE classes, about myself, and my view on the intersectionality of systems, leadership, and social change into Notebook LM. I then prompted: “Describe the development of artificial intelligence from Turing to large language model chatbots. Answer the prompt in Kenna Brickman's writing style, considering her world view, and using systems thinking. Use information from *The Innovators*.” Unlike in its initial response, Notebook LM discussed Ada Lovelace, writing “she recognized that machines could not replace human innovation but instead complement it”. It also wrote about the threat of lack of diversity in AI models and language. It impressed me that, without specific instruction, it inferred that these were points that relate to topics I care about. Notebook LM made some progress in mimicking my perspective and writing style; however, the response overall was still unorganized and unclear after feeding additional prompts to try and improve these shortcomings. I am disappointed to say that I was unable to manipulate Notebook LM to write well and from my point of view. My exploration with Notebook LM has made it clear to me though, that the future of AI needs to be in the individualized training of AI from a person’s own outputs. This will lead to a more seamless interface for people and make AI a more effective writing and critical thinking tool. With personalization of AI, specifically chatbots and

writing tools, our society will be less threatened by groupthink and repetitive unoriginal outputs that don't reflect a person's own thinking.

Acknowledging that I would not be able to fully integrate my lens into the AI generated response I took the best output from Notebook LM and returned to ChatGPT 4.0. ChatGPT 4.0 has an explore GPT page where you can create or use another person's version of GPT, that has custom instructions, extra knowledge, and skills. It is like what I tried to create with Notebook LM but is more advanced and has, in my opinion, the superior writing capabilities of GPT. I experimented with different GPTs from the explore page and prompted them to "Rewrite the text in essay style" (the text being the Notebook LM generated response). After a while I found a GPT which I liked called "Systems Change Sage" which claims to be an "expert on social systems change and evaluation". I liked the initial rewrite of the Notebook LM text, and from there prompted it to explain the technological advances of AI in more detail, elaborate on certain sections and rewrite specific sentences.

At one-point Systems Change Sage GPT wrote about Fortran and LISP, which I recognized but could not fully define or contextualize. I returned to Notebook LM and asked, "What does *The Innovators* say about Fortran and LISP", to which it responded, "This essay does not mention Fortran or LISP". This seemed incorrect, and when I went back and checked the book, Notebook LM was wrong; it discusses both Fortran and LISP. I was disappointed that Notebook LM failed to respond accurately and lost trust in its capacity as a text reference tool. Another interesting thing I caught was a sentence developed that claimed, "Turing envisioned a device capable of emulating any other machine's operations through coded instructions." From my understanding through class and *The Innovators*, Turing envisioned a general-purpose machine that emulated humans not other machines.

Going back to Systems Change Sage GPT, the writing and content were optimized with each prompt I fed the chatbot; however, I struggled to design prompts that changed the structure and organization of the essay in the way I wanted. I took the almost fully completed draft and put it into Gemini, prompting it to re-organize the paper and make the tone of the paper consistent. These final prompts in Gemini significantly improved the narrative structure and gave the essay a uniformed voice. Prior to inputting the paper into Gemini, the essay sounded like a different person wrote each paragraph.

Throughout this process I struggled with the AI providing responses that were either too vague and theoretically dominant or too technical and chronologically focused. The final paper leans towards being general and conceptually based. This is because my goal is to highlight the humanism that threads through the development of AI.

AI's poor ability to cite sources is not only a technical weakness but also a strategic implementation to protect it from legal consequences of learning from and using other's work. I found that Gemini, Claude and Chat 3.0 did not generate relevant sources or use correct Chicago formatting. Gemini provided me with two sources that did not exist and another that listed Alan Turing as the author of a journal he did not write. I returned to the Chat 4.0 explore page and found the "Chicago Citation Wizard GPT." This GPT found relevant sources for the essay and generated the citations for my bibliography flawlessly with perfect formatting. Unfortunately, this GPT was unable to add correct in-text citations, which I ended up manually inputting.

This experiment of guiding AI to author my paper was challenging and exposed the limitations of AI. I have learned that an AI tool that trains off a person's outputs is missing in the market and is a great next frontier for AI development. It has also shown me in the future I will utilize AI to help me create outlines and edit grammatically; however, when it comes to the

writing the bulk of a work, I prefer my own outputs over the AI generated ones. At this point, it is more time consuming to rewrite AIs outputs to sound like me, than it is to just create the work myself. This also highlights that I need to continue working with AI to better understand how I can utilize it to its fullest potential and stay up to date, as its capabilities are expanding and improving at an incomprehensible pace.

## **Final Draft**

AI generated text, **Kenna generated text**

The development of Artificial Intelligence (AI) has been shaped by the enduring power of human creativity. This echoes the vision of Ada Lovelace, a champion for machines as tools to augment, not replace, human capabilities. While studying the analytical engine, Lovelace foresaw machines enhancing our capacity for innovation<sup>1</sup>. This human-centric approach continues to guide AI research, focusing on augmentation rather than usurpation of human intellect.

One could argue that the story of AI begins with Alan Turing's groundbreaking concept of the universal machine. This theoretical construct laid the groundwork for modern computing and, by extension, AI. Turing's influential 1950 paper, "Computing Machinery and Intelligence," proposed the possibility of machines simulating aspects of human intelligence. His now-famous Turing Test established a benchmark for gauging a machine's capability for human-like

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<sup>1</sup> Isaacson, Walter. *The Innovators: How a Group of Hackers, Geniuses, and Geeks Created the Digital Revolution*. 1st Simon & Schuster trade pbk. ed. New York: Simon & Schuster Paperbacks, 2015.

intelligence<sup>2</sup>. The test posits that a machine indistinguishable from a human in conversation could be considered intelligent. The official birth of AI as a scientific field is often traced back to the 1956 Dartmouth Conference, a gathering of researchers optimistic about machines mimicking human learning and intelligence<sup>3</sup>. John McCarthy, a key organizer, is often credited as the "father of AI" for coining the term "artificial intelligence".

In the 1950s and 1960s technological advancements were pivotal for subsequent AI breakthroughs. The invention of transistors and the miniaturization of integrated circuits (ICs) significantly increased processing power and reduced the cost of computers. This period also saw the advent of programming languages like Fortran and LISP, instrumental in the development of early AI programs<sup>4</sup>. Early AI research heavily favored symbolic approaches, such as rule-based systems and logic programs, aimed at codifying knowledge and reasoning processes. A significant milestone in AI's evolution came in 1966 with the creation of ELIZA, a natural language processing program demonstrating the possibility of machines mimicking human conversation, albeit in a primitive form by today's standards<sup>5</sup>.

While achieving some success, these systems were limited by their reliance on explicit programming for specific tasks. The subsequent decades witnessed advancements in machine

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<sup>2</sup> Copeland, B. J. *Alan Turing: The Essential Turing*. Oxford: Oxford University Press, 2004.

<sup>3</sup> McCorduck, Pamela. "The Dartmouth Conference and the Dream of AI." In *Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence*, edited by Pamela McCorduck, 102-120. 2nd ed. Natick, MA: A K Peters, Ltd., 2004.

<sup>4</sup> Patterson, D. A., and J. L. Hennessy. *Computer Organization and Design: The Hardware/Software Interface*. Morgan Kaufmann, 2013.

<sup>5</sup> Weizenbaum, J. "ELIZA - a Computer Program for the Study of Natural Language Communication." *Communications of the ACM* 9, no. 1 (1966): 36-45.

learning algorithms, enabling computers to learn from and make predictions based on data. These advancements paved the way for a new generation of sophisticated AI applications.

The 1990s and 2000s saw the explosion of the internet and the subsequent surge in online data, further accelerating the AI revolution<sup>6</sup>. This confluence empowered the development of even more complex machine learning models. **These models, supplied with vast amounts of data, became adept at image recognition, speech translation, and sentiment analysis, demonstrating the growing potential of AI to augment human capabilities in various domains.** The most recent wave of progress in AI is marked by the emergence of deep learning. Inspired by the structure and function of the human brain, deep learning algorithms have revolutionized fields like computer vision and natural language processing<sup>7</sup>. For instance, advancements in deep learning have led to the development of AI systems that can generate human-quality text, translate languages with remarkable fluency, and even create realistic artwork. **At this point, despite progress in employing artificial neural networks in deep learning, AI systems are binary not analog like the human brain, making the outputs lack a certain humanistic flare. These advancements, once again, stem from the ingenuity of humans who have harnessed the power of computation to mimic the human learning process at an unprecedented scale.**

The journey of AI underscores the enduring power of human creativity. From Ada Lovelace's pioneering vision to the ongoing breakthroughs in deep learning, human ingenuity has consistently guided AI's evolution. As we stand at the precipice of a future increasingly

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<sup>6</sup> Patterson, D. A., and J. L. Hennessy. *Computer Organization and Design: The Hardware/Software Interface*. Morgan Kaufmann, 2013.

<sup>7</sup> Heaton, Jeff. "Ian Goodfellow, Yoshua Bengio, and Aaron Courville: Deep Learning: The MIT Press, 2016, 800 Pp, ISBN: 0262035618." *Genetic Programming and Evolvable Machines*. New York: Springer US, 2018.

intertwined with AI, it's crucial to remember the enduring human touch at its core. This human-centric approach ensures that AI remains a tool for amplifying human potential, fostering collaboration, and unlocking possibilities that were once unimaginable. By harnessing the combined strengths of human creativity and machine intelligence, we can usher in a future where AI serves as a powerful partner in progress, **not a replacement for the very ingenuity that brought it into existence.**

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