Donald Aingworth
Professor Ryer
HIST 46: Independent Study
2025-11-30

An Reflection on Predictions of LLMs by Turing and Strachey

From Mary Shelley's *Frankenstein* to Marvin the Paranoid Andriod in *The Hitchhiker's Guide to the Galaxy*, the idea of artificially creating or replicating the human mind has captured the imagination of Science Fiction writers for centuries. We have come ever closer to this dream as time has passed, especially since the advent of the computer. As computers become better researched and tested, so has Artificial Intelligence, notably the Large Language Model (LLM), which refers to a software tool capable of linguistic analysis and capable of generating natural text. Seeds of this have been on the minds of Mathmaticians and Computer Scientists since the middle of the twentieth century, as was demonstrated in a 1951 radio broadcast by Alan Turing[5]. This essay seeks to analyze the predictions and assessments made by Turing during the broadcast and a letter in response by Christopher Strachey[3].

After an explanation of the nature of computers as machines that manipulate data based off of instructions, Turing's first prediction about a computer's imitation of the human brain is the necessary size of the machine. Turing predicts "We probably need something at least a hundred times as large as the Manchester Computer" (p.3). The Manchester Mark 1, created in 1949, was the most recent Manchester computer, which had 128 pages of main storage stored on magnetic drums. Each pages had a storage of 32 by 20 bits, equivalent to 1280 total bits or 160 bytes of storage each, totaling 20,480 bytes of storage memory[2]. Rounding up to 128 times the size of the Manchester computer to keep the powers of two used intact, this would ultimately total 20,971,520 bits of storage memory. Assuming Turing were estimating the amount of bits of storage necessary based on the number of neurons in the brain at a one to one ratio, a value he estimated to be between three hundred million and thirty billion in 1948 in a letter to I.J. Good[4], this would be much less than the required number of bits. In LLMs, the data storage required in much more than Turing's estimate, such as with OpenAI's GPT-3, which has 175 billion parameters, well above Turing's estimate[1], although Turing would have no way of knowing or predicting this. Considering the vague value of "a hundred times as large", this suggests that the estimation was intentionally made to be simple.

Turing's next major speculation is his prediction of how a mechanical brain will manifest. He predicts that by the end of the twentieth century, "it will be possible to programme a machine to answer questions in such a way that it will be extremely difficult to guess whether the answers are being given by a man or by the machine" (p.5). He goes on to predict the mechanical brain would be able to be tested as "something like a viva-voce[1] examination, but with the questions and answers all typewritten in". Turing's predicted machine is similar to the idea of the LLM, which replicates human language.

Christopher Strachey had a different perspective on the way a computer would imitate the human brain. His theory hinged on the human mind's ability to detect arbitrary patterns and relationships

[1] Orally rather than in written

and use those relationships, such as in training machines to play board games. In his letter to Turing following Turing's radio broadcast, Strachey cites an example of a human and a machine with soem level of memory playing Nim. He recounts having a friend named Anthony play the game of Nim four times against a machine with the ability to record winning positions that precede victory. While the machine was only able to record the list of winning moves, Anthony was able to identify the pattern of positions that would lead to a winning move. Starchey identifies this pattern recognotion, which is a key idea in machine learning that LLMs operate on, as a key difference between humans and machines.

A common idea that Turing and Starchey endorse is the likely resemblance between a program making a machine think and teaching said machine. While Turing's comment is brief and speculative, Starchey goes into detail about his theory. Starchey theorizes that

References

[1] Tom B. Brown et al. "Language Models are Few-Shot Learners". In: CoRR abs/2005.14165 (2020). arXiv: 2005.14165. URL: https://arxiv.org/abs/2005.14165.

[2] Brian Napper. The Manchester Mark 1. Archived from the original on 29 December 2008, retrieved 22 January 2009. 1999. URL: https://web.archive.org/web/20081229132333/http://www.computer50.org/mark1/MM1.html.

[3] Christopher Strachey to Alan Turing, May 15, 1951 from Grove Hill House, Grove Hill, Harrow, UK. Letter to Alan Turing about his Radio Broadcast. Courtesy of Kings College Cambridge's Turing Digital Archive.

[4] Alan Turing to I.J. Good, July 28, 1948 from Kings College, Cambridge, UK. Letter to I.J. Good. Courtesy of Kings College Cambridge's Turing Digital Archive.

[5] Alan M. Turing. Can digital computers think? [Radio broadcast]. Transcript courtesy of Kings College Cambridge's Turing Digital Archive. May 1951.