Singularity: Will it happen?

AI, although still in its fledgling stages, has become a significant facet of current technology. It is being used in various areas of industry, such as finance and medicine, and further research is being conducted to advance it further. It must be considered how far scientists can develop AI. Many posit the idea that AI may reach a point in its development where it can improve itself without intervention from humans, essentially ridding itself of its flaws. But is such superintelligence or technological singularity, as it is called, possible? Many prominent scientists and entrepreneurs, among whom include Stephen Hawking and Elon Musk, have spoken out about the importance of this topic, particularly regarding its prospective dangers. If singularity is possible, many fear that it could lead to humans' demise. Although it remains to be seen whether singularity is possible, there is substantial commentary surrounding the issue.

In the paper titled, "Stifling AI: Human Perils", Gurkaynak et al. examine predictions concerning the future development of AI. Technological progress in the field is divided into three categories: Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Super Intelligence (ASI). The first category includes AI that focuses on a specific domain (video games, chess, stock predictions, etc.), the second includes AI with human-like cognitive facilities (thinking, feeling, consciousness, etc.), and the third category includes AI that has surpassed humans in all mental facets. According to Gurkaynak et al. we are currently in the ANI stage and may reach AGI by 2030. It is entirely possible to then achieve ASI by 2045 due to Moore's Law, which states that technological progress doubles every two years (Gurkaynak et al. 752). To illustrate their point, they use the example of the human genome project, only one percent of which was completed in the first seven years researchers spent out of the 15. Based on the rate of progress during these first seven years, it was believed that the project would take an

extra 700 years to complete - almost one hundred times more than the time it actually took to complete (Gurkaynak et al. 752). AI development is following a similar course, Gurkaynak et al. believe, and may yield results in due time. It should be noted that the paper's overall positive attitude toward AI may highlight an innate optimistic bias for the development of ASI.

Amit Tyagi's views concur with Gurkaynak et al. in his paper entitled, "Artificial Intelligence: Boon or Bane?" Like Gurkaynak, Tyagi also categorizes current AI as ANI and believes we may reach AGI soon because the rate of progression is augmenting. He reinforces his claim by citing recent feats by various technology giants. Google's own research team, Google Brain, which published an open source AI technology called TensorFlow as well as an AI system that learns to excel at video games. In general, Google, Microsoft, and IBM are investing more and more into AI research. Deep learning, which focuses on neural networks, is another area of heavy research according to Tyagi and will be the foundation for AGI (Tyagi 48). AGI will then be the tipping point from which artificial intelligence may skyrocket, as was notably argued in the previous paper.

As opposed to Gurkaynak et al. and Tyagi, Dubashi et al. argue against the possibility of singularity in their paper entitled, "AI Dangers: Imagined and Real". Moore's Law, they posit, does not necessarily imply that substantial progress will be made to lead to singularity. More processing power only guarantees an increase in computational speed and does not imply that machines will be able to mimic the cognitive facilities that humans have. Dubashi, et al., state that the jump from current AI to superintelligence "seems to us much more than fanciful" (Dubashi, et al. 43). This could mean that they simply don't have enough faith in current progress and are basing their argument on their lack of faith. In fact, later in the paper they argue that recent advances have been niche and do not convey any exponential growth (Dubashi, et al.

44). This contradicts the view of Tyagi, who presents several examples of major progress within the field. This view also seems myopic in that in only considers recent progress as an indicator of the trajectory of technological progress. As mentioned in the previous source, it is entirely possible to have slow progress in the beginning stages and then skyrocket as was the case with the Human Genome project.

Unlike the aforementioned articles, Toby Walsh's article, "What If...We Create Human-level Artificial Intelligence" takes a somewhat impartial approach to answering the question on hand. While Walsh himself is a believer in the inevitability of technological singularity, he provides a plethora of counterarguments against its inception. His first counterargument centers around the fact the processing power does not equate to intelligence, echoing Dubashi et al., and that despite massive leaps in processing power in the coming years, it is not clear whether this would directly lead to machines with human-like cognitive abilities (Walsh 32). His second counterargument dictates that humans simply aren't intelligent enough to create AI that would lead to technological singularity. Lastly, he posits that even if AI does attain human-like intelligence, the rate of progression might diminish and plateau, making it impossible to even double its intelligence (Walsh 33). Thus, technological singularity may not be reached. In keeping with his impartial tone, he offers his argument for why technological singularity is possible. Should AI fail to display a technological leap, it is possible for scientists to hardcode superintelligence into a machine albeit it would take more time than initially hypothesized. While most of Walsh's arguments invalidate the possibility of singularity in the future, he personally believes that it is feasible and will happen within "30 to 40 years" (Walsh 32).

Like Walsh, Spyros Makridakis presents views from both ends of the spectrum in his article entitled, "The forthcoming Artificial Intelligence (AI) revolution: Its impact on society

and firms". One optimistic argument centers around the fact that open source software allows a multitude of contributors and thus a greater chance of a breakthrough. This also provides researchers some solace to develop novel and more powerful learning algorithms. Furthermore, deep learning algorithms will be able to remember what they learned and apply this information to different situations (Makridakis 50). Makridakis also presents a rather strong argument against the advent of technological singularity. According to him, doubters often contend that no algorithm would be able to replicate human cognition (Makridakis 52). This is because algorithms depend on a set pattern or procedure. Creativity, the highest form of human cognition, however, is spontaneous and there would be no way to model this as an algorithm. Makridakis himself leans more toward the optimistic argument, but it should be noted that this may be an overcompensation for incorrectly downplaying the Internet's impact in his 1995 paper.

Based on the literature, whether technological singularity will emerge is still a hotly contested topic. Gurkaynak et al. and Tyagi argue that based on current trends in technology, singularity may be achieved within the next few decades. Dubashi et al. argue that because intelligence is much more complex than simple processing power and, contrary to Tyagi, progress in the field has not been exponential, the leap to superintelligence may not be feasible at all. Walsh and Makridakis both try to present arguments from both sides of the spectrum, however, it seems evident that their biases lie in favor of the technological optimists who anticipate singularity to happen. Overall, there is no definite consensus on the issue of whether singularity is feasible as both sides feel strongly about their respective arguments.

Works Cited

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