

Unleashing human potential: How superhuman AI influences decision-making

Professor Minkyu Shin of the Department of Marketing analyses the potential for superhuman AI in the context of the ancient game of Go and finds that it can prompt us to break away from traditional strategies and act as a catalyst for human innovation.

In an era marked by rapid technological evolution, artificial intelligence is no longer a concept restricted to the realms of science fiction. Instead, it has become an integral part of our daily life, transforming the way we work, socialise, learn, and make decisions. One particular area where AI's influence is profoundly felt is in decision-making, especially in complex environments that demand strategic thinking and foresight. But how exactly does AI influence human decision-making? And what are the implications of this influence on our professional and personal lives?

The advent of superhuman AI

Before we delve into the specifics, it's crucial to clarify what we mean by "superhuman AI." This term refers to AI systems that have the ability to outperform human experts in specific tasks or fields. Unlike traditional computational tools such as simple calculators or basic computers which are primarily designed to execute specific tasks based on predefined rules, superhuman AI systems are capable of learning, adapting, and making decisions that can outperform those made by humans.

Take the game of chess, for instance. Traditional computer programmes such as early versions of chess-playing software operate by following a set of predefined rules and algorithms. They can calculate thousands of potential moves and outcomes, but they are fundamentally limited by their programming and cannot adapt to novel situations or devise new strategies.

On the other hand, superhuman AI systems like Google's AlphaZero can teach themselves to play chess at an extremely high level by playing millions of games against themselves and learning from their mistakes. They can discover and implement novel strategies that human players, including grandmasters, may never have considered.

Another compelling example of superhuman AI in action can be found in the realm of natural language processing, a field that significantly influences our daily interactions and communications. Traditional chatbots work based on predetermined scripts and keyword recognition. They are limited to responding to specific prompts and often fail to understand or generate meaningful responses to unexpected queries. Their capability is akin to a basic calculator or computer, executing predefined tasks reliably but lacking the ability to learn, adapt, or think creatively.



In contrast, GPT models like OpenAI's ChatGPT represent an evolution in this technology. Trained on vast amounts of text data from the internet, these models can generate coherent and contextually appropriate responses to a wide range of prompts. They can grasp the nuances of language, understand complex queries, and even exhibit a degree of creativity in their responses. For instance, they can draft emails, write essays, answer factual questions, and even generate poetry or fiction. What sets ChatGPT apart is the ability to unearth hidden patterns in the data they've been trained on and generate novel responses based on those patterns. This is not unlike identifying a winning strategy in a game or uncovering a new theory from a dataset in scientific research.

Our research question: Can humans learn from "black box" superhuman AI?

The capability of superhuman AI to unearth hidden patterns and devise new rules or strategies indeed has profound implications for human decision-making. This suggests that humans can learn from these AI systems to improve their own decision-making processes. This could be applied in various contexts, whether that involves devising a winning move in a board game, making a critical business decision, or diagnosing a complex medical condition.

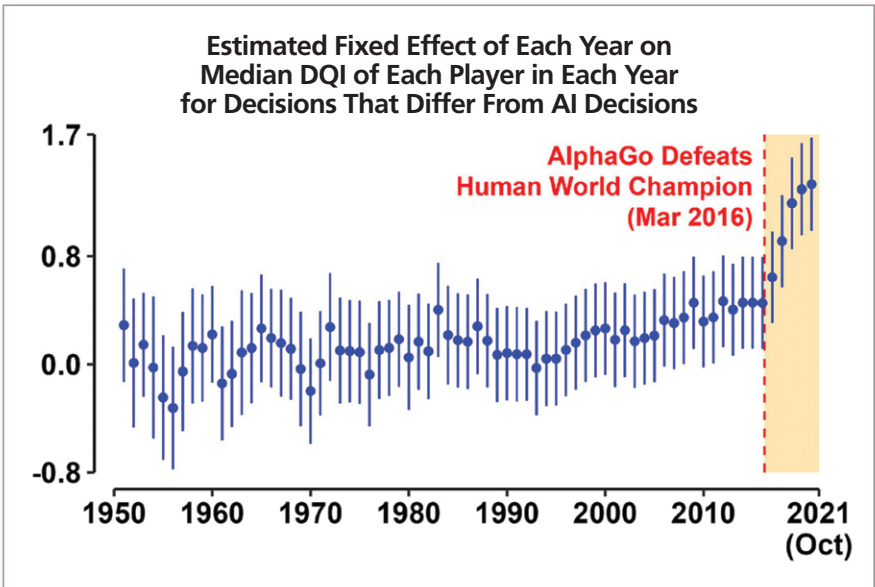
However, achieving this level of performance isn't always straightforward. To reach superhuman capabilities, AI systems often need to delve very deeply into their respective tasks, which can sometimes come at the cost of interpretability.

For instance, consider the workings of a deep neural network used for image recognition. These AI systems can identify objects, faces, and even subtle signs of disease in medical images with superhuman accuracy. However, the internal workings of these AI systems – the way they weigh and combine countless variables to reach a decision – can be incredibly complex and difficult for humans to understand. This is often referred to as the "black box" problem in AI.

In such scenarios, where superhuman AI systems are often designed without a focus on helping human decision-makers understand their output, it prompts us to question: can we still argue that superhuman AI brings advancement in human decision-making? And what could be a potential mechanism?

Result 1: Human players in the game of Go get better after AlphaGo.

Our research, carried out over the span of 71 years and involving analysis of more than 5.8 million strategic decisions, delves into these questions. We focused on the ancient game of Go, a domain where AI, specifically superhuman AI such as AlphaGo, has already surpassed human performance. Our findings shed light on the interplay between AI and human decision-making, and hint at powerful implications for businesses, education, and even societal norms.

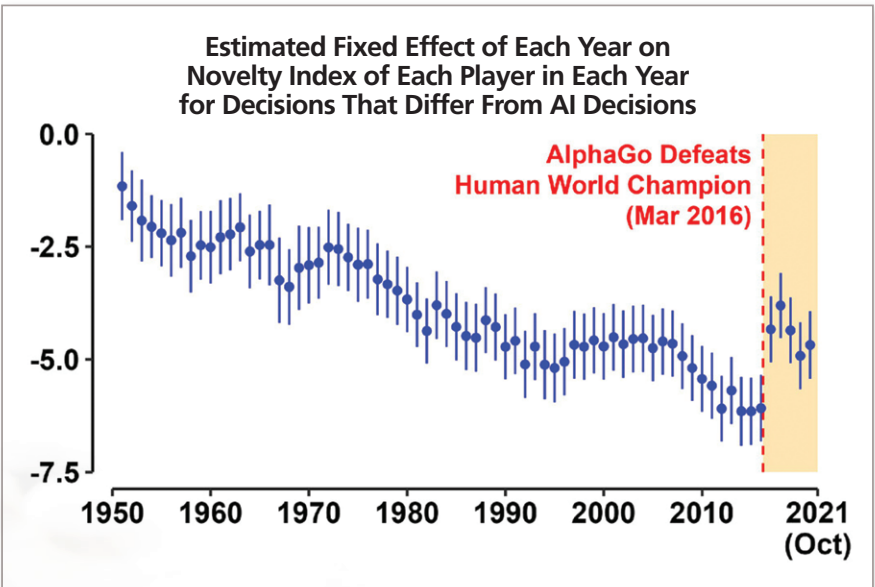


Result 1

In our research, we used a superhuman AI programme to assess the quality of human decisions in the game of Go. By generating 58 billion counterfactual game patterns, we compared the win rates of actual human decisions with those of counterfactual AI decisions. What we discovered was quite intriguing. In the era following the advent of superhuman AI (i.e., AlphaGo), human players began to make significantly better decisions. This observation leads to a fascinating question: what could be the mechanisms driving this improvement?

Result 2: Human players have started making more novel move decisions since AlphaGo's introduction.

Upon analysing human players' strategies across time, we found that the introduction of superhuman AI also coincided with an increase in novel decisions. In other words, moves that had never been observed before started occurring more frequently. What's more, these novel decisions were associated with higher decision quality, indicating that they weren't simply random but strategically advantageous.



Result 2

This points toward a fascinating phenomenon. The development of superhuman AI programmes may have prompted human players to break away from traditional strategies and explore new, innovative moves. This exploration, in turn, appears to have improved their decision-making.

Despite AlphaGo and related systems not being explicitly designed to enable human players to understand its decision-making process, it has inadvertently become a tool for human advancement in the game of Go. Its unconventional and superior strategies have pushed human players to reconsider their traditional gameplay and experiment with new approaches. By observing and adapting the AI's outputs, players have been able to devise novel strategies, leading to a significant improvement in their decision-making quality. Thus, although AlphaGo may operate as a "black box," its influence has sparked progress and innovation amongst human players.



“Superhuman AI is more than just a tool for improving efficiency or automating tasks. It is a catalyst for human innovation”

Everyday applications and impacts

While our research focused on the game of Go, its implications extend far beyond this specific context. At its core, decision-making is a universal process, applicable in a multitude of situations from everyday choices to complex business strategies.

In business scenarios, for instance, this could mean that AI systems could stimulate human managers to break away from traditional, time-honoured strategies and explore novel, more effective approaches. This could lead to innovative breakthroughs, allowing companies to gain competitive edges or solve previously intractable problems.

In educational settings, AI could foster a culture of innovation and creativity among learners. By providing insights which challenge traditional thinking, AI tools could encourage learners to explore uncharted territories in their respective fields, thereby enhancing their problem-solving skills and broadening their perspectives.

Concluding remarks

Our research offers a glimpse into the intricate dynamics between superhuman AI and human decision-making. It highlights how AI, a creation of human intellect, can in turn stimulate human intellect to reach new heights. By catalysing novelty and innovation, superhuman AI can be a powerful ally in our quest for progress, opening up new vistas of possibilities in various domains.

It is important to remember, however, that this is just the beginning. As AI continues to evolve and becomes even more integrated into our lives, its influence on human decision-making could also evolve in ways we cannot fully anticipate today. Nevertheless, our findings suggest a promising trajectory, one where AI and humans can co-evolve, each pushing the other toward greater heights of innovation and decision-making prowess.

In conclusion, superhuman AI is more than just a tool for improving efficiency or automating tasks. It is a catalyst for human innovation, a spark that can ignite the flame of creativity and decision-making excellence. As such, understanding its influence on human decision-making is not just an academic pursuit - it is a quest to understand the future trajectory of human potential itself.

Reference



Professor Minkyu Shin
Assistant Professor
Department of Information Systems