Editorial

Dr. Strange, Artisanisation, and the Percolative Artificial Intelligence: Where Should We Go?

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"– Dr. Strange: I went forward in time to view alternate future to see all the possible outcomes of the coming conflict.
– Star Lord: How many did you see?
– Dr. Strange: 14,000,605.
– Iron Man: How many did we win?
– Dr. Strange: One"

– Excerpt from a dialogue in Avengers: Infinity War (2018).

Percolation appears as a ubiquitous phenomenon in nature, with significant practical relevance in the study of networks. Its origins connect to the pioneering work of Paul Flory in 1940 and the foundational research of Broadbent and Hammersley in 1957, which established its intricate mathematical principles,[1,2] incorporating concepts from probability, physics, and graph theory. In a network composed of nodes and edges, understanding how percolation operates enables researchers to evaluate the effects of adding or removing an edge or a node on network connectivity. A simple example emerges in coffee brewing: an excessive amount of ground coffee can obstruct the water, preventing full percolation. This theory applies to porous materials development, including membranes, filters, and absorbent substances. The extracorporeal circulation membrane exemplifies this application,[3] serving as a crucial tool for sustaining cardiac and respiratory functions when conventional methods prove ineffective.[4] Additionally, a pilot study proposed these ideas as a conceptual framework for explaining atrial fibrillation termination.[5]

Percolation Theory also plays a crucial role in distribution networks, including energy and water systems. It contributes to disease propagation assessments, such as in epidemiology,[6,7] the study of geometric characteristics of viral capsids to understand specific geometries favored in natural evolution,[8] the dissemination of information in social networks, and forest fire analysis.[9] Kotlarz et al. applied the theory to examine the network effects of beta-amyloid protein deposition in Alzheimer's disease.[10] Rabinovitch et al. used percolation theory to investigate fibrosis in cardiac cells. Their findings suggest that fibrosis propagation in these cells mirrors the behavior observed in forest fires.[11]

Returning to the coffee filter analogy, one can see how the outcome depends on the amount of coffee grounds in the filter. This quantity directly affects the percolation process – using more grounds slows percolation or even blocks it while using fewer grounds allows a faster flow. Different amounts lead to distinct results. Fundamentally, this system operates as a network, where its structure either hinders or enhances connectivity. Similarly, in postmodern society, individuals must take deliberate action regarding Artificial Intelligence (AI) to ensure its use fosters a 'percolative' society, one that effectively achieves its intended objectives. The core issue concerns how AI can serve as an instrument of percolation for humanity, advancing it from its current state to a higher level of development while identifying the most effective ways to achieve this transformation.

Addressing this challenge is particularly complex, as we find ourselves simultaneously exploring the potential of Generative AI to transcribe medical consultations and aid in the diagnostic screening of cardiomyopathies and other life-threatening diseases, while these same technologies are being leveraged to develop autonomous weapons. Despite significant advancements in the diagnostic screening of atrial fibrillation, ensuring global access to the necessary devices remains a distant dream. Meanwhile, discussions on the numerous job opportunities created by AI in cardiology contrast with Yuval Harari's warning of a potential future in which, by 2050, a 'useless class' of displaced individuals may emerge,[12] facing drastically diminished employment prospects due to the transformative impact of AI and other disruptive innovations. In this context, companies like Artisan[13] drive AI work in light of the motto 'Stop hiring humans'. Artisanization is not a fairy tale. It raises critical issues and concerns about the continuity of the social fabric in a society shaped by this new work paradigm. Sanchez Rico et al., for instance, showed that unemployment elevates cardiovascular risk regardless of social status and work environment, exerting a cumulative effect over time. Additionally, they argue that prolonged unemployment contributes to a higher prevalence of cardiovascular events through multiple pathways, including, but not limited to, prolonged exposure to common risk factors.[14]

Keywords

Artificial Intelligence, Artisanisation, Ethics, Percolation, Percolative Artificial Intelligence

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Simultaneously, advancements made by DeepSeek[15] are fostering increased competition and driving greater efficiency in the development of AI. However, within the AI field, significant concerns still remain regarding data storage and protection, intellectual property rights, market oligopolies, the proliferation of deepfakes, and the broader ethical implications associated with these technologies. By contrast, despite significant advancements, the field of computing remains heavily male-dominated. The gender gap is a relevant problem, with women accounting for an estimated 15% – 30% of all researchers.[16]

In this context, Percolative AI represents an approach centered on building a society committed to the responsible and strategic use of these powerful tools. The illustrative examples mentioned earlier serve as indicators of a reality we seek to transform to align with these aspirations. This is clearly a complex and challenging endeavor, but it is one that healthcare professionals – and humanity as a whole – cannot afford to ignore. Percolative AI paves the way for an environment where technology is leveraged not merely for profit or destruction but as a means to promote well-being, equality, justice, and the advancement of the human condition. In this scenario, society must remain dedicated to steering the development of AI in a responsible, ethical, and value-driven manner, ensuring alignment with fundamental human principles.

Analogous to the dialogue led by Doctor Strange, millions – or perhaps even an infinite number – of possibilities unfold for this AI-driven society. However, only one – or at most a few – may truly hold promise for cardiology, computer science, or science as a whole. When Stephen Hawking launched the Centre for the Future of Intelligence, he warned that AI could be 'the best or the worst thing to happen to humanity'. Percolative AI embodies the commitment to ensuring that it becomes 'the best', a vision dedicated to leveraging AI for tangible global benefits while safeguarding real progress from being undone. Achieving this goal demands undeniably greater community engagement, together with an urgent and in-depth discussion about the objectives to be pursued with these tools and the methods by which they will be implemented, without shying away from complex and sensitive debates.

Let's be percolative!

Use of Artificial Intelligence

During the preparation of this work, the author(s) used ChatGPT for text review. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

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