Editor's Message ……

Artificial Intelligence: The New Genie in Science & Technology

The globe is currently witnessing a paradigm shift in data analysis, encompassing diverse fields. Handling huge amounts of data is required in diverse situations. Artificial Intelligence (AI), which emulates human intelligence, can help analyse this enormous data by finding patterns in the dataset, fundamentally changing data acquisition, hypotheses forming, experimentation, and interpretation of results. Tasks that otherwise required decades of painstaking efforts, can now be accomplished in a fraction of time! This breakthrough is expected to open doors to discoveries that were previously unimaginable. This article would briefly review the scope of the AI revolution in Science and technology.

Predicting protein structure accurately has been an open research problem for more than 50 years. AlphaFold, DeepMind's neural network-based model launched in 2020, has generated structural predictions for hundreds of millions of proteins, providing an invaluable resource for drug discovery, understanding diseases, and engineering biological systems (Luttens, et al, 2025).

AI holds immense promise in Drug discovery. The discovery of new drugs today needs more than 10 years of research and huge monetary investment. While the number of possible drug-like molecules has been estimated to be more than 10^{60}, a value that cannot be managed manually, a strategy that combines machine learning and molecular docking can enable rapid virtual screening of databases containing billions of compounds. A classification algorithm to identify top-scoring compounds based on molecular docking of 1 million compounds to the target protein has been developed. The conformal prediction framework was further used to make selections from the multi-billion-scale library, reducing the number of compounds to be scored by docking. The method lowered the computational cost of structure-based virtual screening by more than 1,000-fold. Experimental testing of predictions identified ligands of G protein-coupled receptors and demonstrated that our approach enables discovery of compounds with multi-target activity tailored for therapeutic effect (Luttens et al., 2025). AI platforms can thus screen billions of molecular candidates and predict their efficacy and toxicity, helping pharmaceutical companies identify viable drug candidates years earlier than conventional methods would allow.

Genomic sequencing projects produce datasets too big for any human team to manually analyze. AI models identify disease-associated genetic variants, predict gene expression patterns, and untangle complex gene-environment interactions that drive conditions like cancer, diabetes, and neurological disorders, helping in prediction of disease risk. AI would transform the fields of diagnostics and personalized medicine. AI algorithms may also transform the field of diagnostics, providing remarkable precision, reducing diagnostic turnaround times while enhancing accuracy. In oncology as well as treatment of genetic disorders, AI can analyze genomes, identify mutations and suggest targeted treatment, significantly improving patient outcomes. (Dara et al., 2025).

Astronomy surveys like the Vera Rubin Observatory capture millions of celestial objects nightly. Neural networks trained on astronomical images can classify galaxies, detect gravitational wave signals, or identify potentially habitable exoplanets with a speed and consistency impossible for human researchers. The Large Hadron Collider at CERN generates petabytes of collision data every second. AI, especially Machine Learning (ML) and Deep Learning, can filter, process, and analyze this data to identify rare phenomena in physics; and could also be helpful in particle beam handling, and in the upkeep of its facilities (Jubair et al., 2025).

Beyond analyzing data, AI is beginning to reshape the scientific process. Autonomous laboratory systems that combine robotics with AI to design experiments, execute, analyze results, & refine hypotheses without constant human intervention. (Takahashi et al., 2025). AI is also speeding up scientific literature review. With millions of papers published annually, no researcher can stay current across even a narrow subfield. Tools built on large language models can provide gist from thousands of papers and help scientists identify gaps in existing knowledge working as energetic research assistants (Silva et al., 2025).

Climate change is one of the most pressing global issues today. Advances in climate research are restricted by our ability to simulate climate at sufficiently small scales to resolve key processes; as well as our ability to interpret the huge amount of data from climate models and Earth observations. Use of AI models can improve the resolution and accuracy of climate simulations, helping scientists better predict extreme weather conditions, sea-level rise, and ecosystem disruptions (Kamran et al., 2025).

Despite these extraordinary advances, AI in science comes with serious concerns, required to be addressed in near future. Reproducibility is a fundamental value in science, yet many AI

models, particularly deep neural networks, function as "black boxes"! Their internal decision-making processes are highly complex for humans to easily interpret. Thus, despite knowing the inputs, outputs, and underlying algorithms, it becomes difficult to understand why they reach a particular conclusion. This opacity can make it harder to identify errors or biases in model outputs.

There are also risks of algorithm bias due to skewed training data or flawed design, often reflecting human prejudices. Another concern is automation bias, human tendency to over-rely on these automated technologies, where scientists unquestioningly accept AI-generated conclusions. Additionally, access to the computational resources needed to run large AI models is unevenly distributed, potentially widening the gap between well-funded institutions and those in lower-income countries.

In spite of these challenges, the AI-leap is highly promising. Next-gen scientists might use AI not only as a specialized tool, but as an integral part of their research environment, to enable them to think bigger, work faster, and tackle problems of huge complexity and scale that were once simply beyond reach. As with all powerful technologies, however, the AI Genie needs to be deployed responsibly; with transparency, equity, and a commitment to the integrity that makes scientific knowledge trustworthy.

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