International Journal of Scientific Research and Engineering Development-– Volume 6 Issue 5,Sep-Oct 2023

Available at www.ijsred.com

REVIEW ARTICLE OPEN ACCESS

Unlocking the Potential of Biotechnology: A Guide to Cutting Edge Technology

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Abstract:

Artificial intelligence (AI) in biotechnology for medicine is revolutionising the field. In biotech, AI is essential for fostering invention not solely in the laboratory but also all the way through a drug's development and commercialization. In particular, for forest biotechnology, in particular genetic engineering, can be useful in this regard. This section provides an overview of the use of AI in biotech for medicine.

Keywords — **Artificial Intelligent, Biotechnology, Drug Development,Commercialization,Medicine.**

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I. INTRODUCTION

Everyone is talking about AI. In contrast to the intelligence of people or animals, artificial intelligence (AI) refers to the intelligence of computers or software. Advanced search engines like Google search, recommendation systems, voice recognition software like Siri and Alexa, self-driving cars like Waymo, generative or artistic tools like chat GPT and AI art, and winning at the highest levels of strategic games like chess and go are just a few examples of AI applications. Drug discovery, drug safety, functional genomics, proteomics, metabolomics, pharmacology, pharmacogenetics, and pharmacogenomics all already use artificial intelligence.

II. UNCOVERING THE MYSTERIES OF THE BIRTH OF AI

The academic field of artificial intelligence was established in 1956. After deep learning outperformed all prior AI techniques in 2012, there was a significant rise in funding and interest in the area. The field had previously experienced repeated cycles of optimism followed by disappointment and loss of investment. The numerous subfields of AI study are focused on specific objectives and the use of certain techniques. Reasoning, knowledge

discovery, machine learning, representation, big data analysis, deep learning, decision support, knowledge-based reasoning, planning, learning, natural language processing, sensing, and support for robots are some of the traditional objectives of AI research. One of the long-term objectives of the area is general intelligence, or the capacity to solve any problem. Artificial neural networks, formal logic, search, and mathematical optimization, as well as methodologies based on statistics, economics, and probability, have been modified and combined by AI researchers to address these issues. Among many other disciplines, AI also makes use of psychology, linguistics, philosophy, and neuroscience.

III. UNDERSTANDING AI:

AI is a human intelligence that is capable of learning, solving problems, and making decisions. Without explicit direction, machine learning performs tasks using patterns and insights from data. Artificial neural networks that have multiple layers allow for decision-making and learning. DALL-EZ example for image and chatGPT for text AI that uses symbols to represent knowledge, such as a doctor in a white coat using a setscope, Then it manipulates those symbols according to logical rules to solve challenges, as opposed to ML and DL, which are used for voice and picture recognition. Natural language processing is one example of an application of symbolic AI. Widely accessible data sets are one indicator of AI success. Increasing computational capacity for Alexa, Siri, DeepL, and other members of the DL algorithm family became a growing trend in 2010 in both industry and daily life. Second AI spring: A natural language technology—check AI's chatGPT—that discloses what AI is capable of

IV. DEVELOPMENT OF AI:

Turning test was proposed in 1950.

- In 1955, 1st AI program was developed.
- John Mc cartly coined the term AI in 1956.
- In 1965, first intelligent system "DENDRAL" was created.
- "Wabot" first humanoid robot was developed in Japan in 1973.
- Deep Blue, IBM chess computer defeats human champion in 1997.
- In 2002, "Torch" - ML software Library was released.
- "Nao" - Intelligent robot was developed in 2006.
- Self driving cars was discovered in 2018.

V. REVOLUTIONIZING BIOTECHNOLOGY: THE ROLE AND APPLICATION OF ARTIFICIAL INTELLIGENCE:

AI has the potential to completely transform the biotechnology industry. Biotech companies can use AI in a variety of ways to improve their operations, spur innovation, and investigate new avenues for profit. The rate of innovation in the biotechnology sector is growing,and biotechnology firms are already recognising the value that AI can add to their overall operations. Over the past ten years, there has been an increased need for accelerated discovery, manufacture, and development of pharmaceuticals, industrial chemicals, and raw materials connected to biochemistry. In biotech,AI is essential for fostering invention not solely in the laboratory but also all the way through a drug's development and commercialization. AI-based tools assist in creating the structure of molecules based on the target market. Without having to carry out the tests in the lab manually, machine learning,a branch of artificial intelligence, assists in computing variations and mixtures of different compounds to determine the ideal combination. Innovations in biotechnology are being brought about by the application of artificial intelligence.

A. Exploring the Benefits of AI in Agriculture Biotechnology:

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B. Exploring the Possibilities of Gene Editing using AI :

Pharmaceutical businesses will be able to comprehend the human genome better. As AI and machine learning tools, methodologies, and models are improved. This will ultimately lead to the modification of genes, which is already possible with tools like CRISPR.

This method brings personalised medicine one step closer to reality, even though there are still a lot of clinical trials to be completed. Theoretically, it will be feasible to detect some diseases that are genetically predisposed before they manifest. Certain hereditary illnesses will be treatable by patients even before they manifest.

C. Closer Look at AI in Forest Biotechnology:

Humanity depends more and more on wood, and natural forests have great ecological Importance. But since they can't keep up with demand, these slowly expanding forests are losing and degrading their forest resources. Forest biotechnology, in particular genetic engineering, can be useful in this regard. This is crucial since, for instance, planted forests are urgently required to sustainably supply the world's need for wood. There are numerous potential uses for AI, such as:

1) Predictive modelling:

Using data from satellite photography, drone imagery, and other sources, AI can be used to study and forecast the growth and productivity of various tree species in various places. For optimal output, this can aid in planting and managing forests more effectively.

2) *Mastering the Art of Disease and Pest Management*:

Using AI, data on the existence and transmission of diseases and pests in forests can be analyzed, and their anticipated effects on health and productivity of trees may be predicted. This can assist in locating vulnerable regions and putting preventative measures in place to safeguard forests.

3) *Level-3 Heading*:

Using AI, data on the existence and transmission of diseases and pests in forests can be analysed , and their anticipated effects on the health and productivity of trees may be predicted. This can assist in locating vulnerable regions and putting preventative measures in place to safeguard forests

4) A Comprehensive Guide to Environmental Monitoring :

Using AI, data from sensors and other sources may be analysed to track the condition of forests and spot potential environmental problems.

D. How AI is Transforming Industrial Biotechnology:

Industrial biotechnology, also referred to as "white biotechnology," is a contemporary application of biotechnology that uses living cells and their enzymes to process and manufacture goods, chemicals, and fuels sustainably from renewable sources. Over the past In the past ten years, there has been a significant growth in demand for raw materials related to biochemistry, pharmaceuticals, food-grade chemicals, and industrial chemicals. To significantly shorten the time it takes to get a drug from the research facility to the market for regular people, ML and technology based on AI may be used to design innovative pharmaceuticals and identify their efficacy and side effects before they are produced. In biotechnological processing, microorganisms and plant or animal cells are utilised to create goods for a range of industries, including healthcare, food and feed, cleaning agents, pulp, and textiles.

E. Advancing AI in Medical Biotechnology: A Comprehensive Guide:

Companies that provide in vitro diagnostics (IVD) employ AI to analyse data and make decisions. However, ethical and legal concerns are thoroughly considered and addressed. By enabling faster, more accurate, and more cost-effective identification and medication development, AI in biotechnology for medicine is revolutionising the field. Drug targeting, identification, drug screening, image screening, and predictive modelling are some of the specialised applications of AI.

F. Uncovering the Mysteries of Drug Discovery:

One of the first mid-stage human trials for a medicine found and created by artificial intelligence has begun at a biotech startup sponsored by Chinese conglomerate Fosun Group and private equity behemoth Warburg Pincus. Scientist Alex Zhavoronkov, a Latvian-born man who created Insilico Medicine, reported that it had administered a unique medication to a patient in China who had the chronic lung condition idiopathic pulmonary fibrosis. Over the last few years, the number of AI algorithms that have received FDA approval has expanded significantly, and the AI market for health care is expected to reach a staggering amount of $6.6 billion in the next few years.

G. How AI is Transforming Pharmaceuticals:

There are no assurances that pharmaceuticals found by artificial intelligence (AI) or the services that produce them will be profitable, and some detractors caution that the technology's potential is being overstated.

H. Harnessing the Power of Artificial Intelligence:

Environmental sciences also have challenges, even though ML has roots in medical studies and incorporates multi-omic approaches for system biology. The application of soil metaproteomics in addition to the coupling to other omic data—or just the shortage of this data—are demanding computing time and resources as general databases, for example, grow in size significantly. As ML is particularly beneficial for the prediction of large datasets in this situation and humans-in-the-loop can increase explanatory power by avoiding findings that are improbable to happen in the ecosystem under investigation, algorithms for DL may be a resource-saving alternative. The integration of omics data into bioinformatics and ML will enable the transition from explanational data to applications in fields like medicine.

I. : Revolutionizing Animal Biotechnology with AI:

Animal Genomics, Animal Cloning, and Transgenic Animals are three different fields within Animal Biotechnology, which, as the name implies, mostly deals with animals. Animal biotechnology is the practice of altering living things through science and engineering. The field's objectives include improving animals, cultivating microorganisms, and producing items for specific agricultural needs. This section enhances hereditary alteration animals' pharmaceutical or agricultural maintenance capabilities by using sub-atomic scientific approaches. Research on the subject is used for a variety of purposes, such as improving animal products, human healthcare, animal healthcare, and environmental advantages. One cannot overstate how crucial it is to maintain animal health and production. A healthy environment is the result of healthy people and healthy animals

VI. *THE BENEFITS OF AI: A CLOSER LOOK*

- with the use of ai, cbct image quality can be improved using dl-based techniques. enabling more precise patient positioning. similar methods can be applied to patient monitoring, whether using optical surface imaging, onboard mri, or ultrasonography.

- 3b-fibreglass: the creator and the supplier of glass-fibre goods and techniques for thermoplastic material and thermoset polymer reinforcement is 3b-fibreglass. their customers are in the auto and wind energy sectors. there are two stages to the production process. in the first, glass is made by melting sand made from silica. limestone, a rock, and clay called kaolin. the second stage involves creating fine filaments by passing molten glass from the heater through hole bushings.
- using ct images to identify strokes or lung cancer
- evaluating the risk of cardiac arrest or other heart conditions using cardiac mri and ecg data.
- identifying skin conditions from skin photographs
- identifying signs of diabetic retinal degeneration in photos of the eyes
- at 3b-fibreglass, the fundamental issue was that the surface of the glass fibre continued shattering when it was forced through the openings. the business applied ai. to get an understanding of the main reason for the breakage. they used computer vision to keep an eye on the fibre traffic and then analyse the information. the ai initially trained to recognise the breach

VII. *What Can AI and Biotechnology Do to Save Lives?*

Technically speaking, biotechnology and artificial intelligence can save lives. This is accomplished through assisting scientists in producing higher-quality medications (with fewer or noadverse effects), correctly diagnosing complex medical conditions, and identifying and modifying patternsto prevent fatal diseases, etc. Most importantly, fusing AI with biotech enables various industry participants to communicate and collaborate without regard to distance. They can uncover answers to save lives.and develops pharmaceutical (medical) technologies based on AI.

VIII. *: How is the Biotechnology Industry Evolving as a Result of Artificial Intelligence?*

Big data, AI, and ML technologies are becoming essential for the progress of the biotech sector. In 2023, according to many experts and senior executives of big biotech and pharmaceutical businesses, AI in biotechnology will revolutionise the field, add value, and be appropriate for the tasks for which it is used. AI's contribution to biotechnology goes beyond automating tedious operations and organising data flow. In addition to many other tasks, artificial intelligence can assist with research, daily tasks, data analytics, and medicine production. By enabling human researchers to quickly and precisely handle massive datasets, it accelerates the entire process.

IX. *The Negative Impact of AI: A Comprehensive Guide:*

AI automation may result in job losses in some industries, which would have an impact on the labour market and the workforce.

- Ethical Issues: Data Privacy, Algorithm Prejudice, and the Potential Abuse of AI technologies are just a few of the ethical concerns that AI brings.
- Lack of innovation and apathy AI isn't creative or empathic, which limits its capacity to comprehend emotions and come up with novel ideas.
- Cost and Intricacy: The creation and execution of AI systems can be costly, and it takes resources and specialised skills.
- Trust and Dependability: artificial intelligence (AI) systems might not always be completely trustworthy, which can breed mistrust in their capacity for making decisions.
- Technology Dependence: Overusing AI

can make people dependent on it and impair their ability to think critically.

X. UNCOVERING THE SECRETS OF MARKET SIZE:

Predictive modelling, image screening, drug screening, and the identification of pharmacological targets are a few applications of AI in the biotechnology sector. Additionally, clinical trial data is controlled, and AI is used to explore the scientific literature. Due to its widespread acceptance (such as ChatGPT), AI is a hot issue. Together, biotechnology and AI can develop in ways that have never been possible before. This can help advance important Sustainable Development Goals and resolve several global concerns. Food accessibility to clean water, well-being, and health, consuming responsibly, green energy and generation, addressing climate change, safeguarding life beneath the ocean, restoring and encouraging sustainable use of landscapes, managing forests ethically, inverting and halting degradation of land, preventing a desertification process, and halting desertification are a few examples of current goals

XI. CONCLUSIONS:

Today, all where any digital data processing technology processes any data is commonly and authentically referred to as AI. So, the foundation of any AI application is digitization. and digital transformation. The deciding elements have been and will continue to be the availability of massive and high-quality data quantities and the quick development of computing power. In the future, these will still be the forces that propel AI. There is still no end in sight. for this development process, which is still in progress. Although the future will not look No matter how official the futurists and the media predict, it is very probable that AI will grow more and more prominent in.

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