Artificial Intelligence In Pharmacy

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Abstract:

 The current rise of artificial intelligence and machine learning has been significant. It has reduced the human workload improved quality of life significantly. Health care related problems can be solving with huge applications by artificial intelligence. Artificial intelligence use in pharmaceutical technology has increased over the years, and the use of technology can save time and money while providing a better understanding of the relationships between different formulations and processes parameters. AI to predict new treatment ,development of novel peptides from natural foods, treatment and management of rare diseases, drug adherence and dosage ,challenges to adoption of AI in pharma.

1. Introduction:

Artificial intelligence can define as branch of computer science which helps us to problem solving with aid of symbolic programing.AI is at the center of a new enterprise to build computational models of intelligence. The AI technology is used in each step of the drug designing procedure, which decreases the health hazards related to preclinical trials and also reduces the cost substantially. Artificial intelligence in medicine is the use of machine learning models to search medical data and uncover insights to help improve health outcomes and patient experiences. Artificial intelligence in Pharma refers to the use of automated algorithms to perform tasks which traditionally rely on human intelligence. Over the last five years, the use of artificial intelligence in the pharma and biotech industry has redefined how scientists develop new drugs, tackle disease, and more. The AI technology is used in each step of the drug designing procedure, which decreases the health hazards related to preclinical trials and also reduces the cost substantially. The AI is an effective tool for data mining based on the huge pharmacological data and machine learning process.


Advantages :

 Artificial intelligence presents the pharmaceutical industry with the opportunity to solve problems previously unsolvable with simple data analysis [1].

 AI is able to perform specific tasks and more accurately thereby reducing cost while increasing productivity.

 AI offers valuable insights that will dramatically improve the outcomes of clinical trials.

 Deep learning about Market dynamic, Customer behavior and their interplay.

☐ It improves the performance of antivirus detection systems and promotes production of new artificial intelligence algorithm.

☐ It also helps in terms of the industry's selection of patient for clinical trials and enables companies to identify any issues with compounds much earlier when it comes to efficacy and safety.

☐ AI have a low error rate compared to Humans, if coded properly. They would have incredible precision, Accuracy and speed.

☐ Robotic surgery and other types of surgery in the future, can achieve precision that Humans can't.

☐ AI is reinventing drug discovery by using deep learning and natural language processing to understand and analyze vast quantities of bioscience information [2,3].

Disadvantages:

☐ AI mainly lacks in Human touch, since it doesn't have capacity to think, it can only function according to programs.

☐ Can be changed foremost to mass scale destruction.

☐ If robots, starts to switch humans in all fields, it will finally lead to unemployment.

☐ lot of money and time to build, repair and rebuild.

Machines can easily lead to destruction, input in the wrong hands. That is, at least a fear of many humans.[4,5]
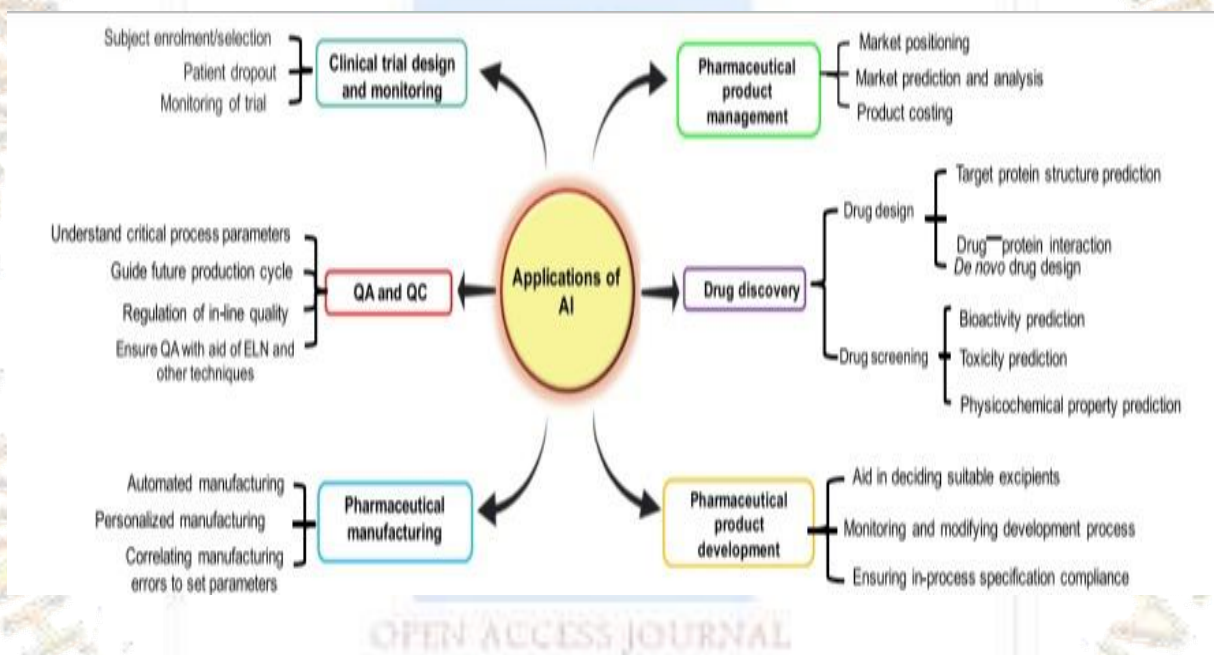
Applications of artificial intelligence (AI) in different subfields of the pharmaceutical industry, from drug discovery to pharmaceutical product management.

Over the last five years, the use of artificial intelligence in the pharma and biotech industry has redefined how scientists develop new drugs, tackle disease, and more [6,7].

AI mainly used in pharmaceutical industries for:

1. Drug discovery

2. Clinical research

3. Disease diagnosis

4. Novel medication

5. AI in science and research.

6. AI in data analysis.

7. AI in health care

8. Manufacturing of pharmaceutical products[8,9]

 AI in pharma refers to use of automated algorithms to perform tasks which traditionally rely on human intelligence[10].Over the last five years the use of AI in pharma and biotech industries have redefined how scientists develop new drugs, tackle disease and more [11,12].

1. Drug discovery:

The discovery of a novel drug molecule requires its subsequent incorporation in a suitable dosage form with desired delivery characteristics. In this area, AI can replace the older trial and error approach [13]. Drug design algorithms, such as coulomb matrices and molecular fingerprint recognition, consider the physical, chemical, and toxicological profiles to select a lead compound [14].

Pharma companies around the world are dvanced algorithms and AI-powered tools to streamline the drug discovery process. These intelligent tools are designed to identify intricate patterns in large datasets, and hence, they can be used to solve challenges associated with complicated biological networks [15].

This capability is excellent for studying the patterns of various diseases and recognizing which drug compositions would be best suited for treating specific traits of a particular disease[16].
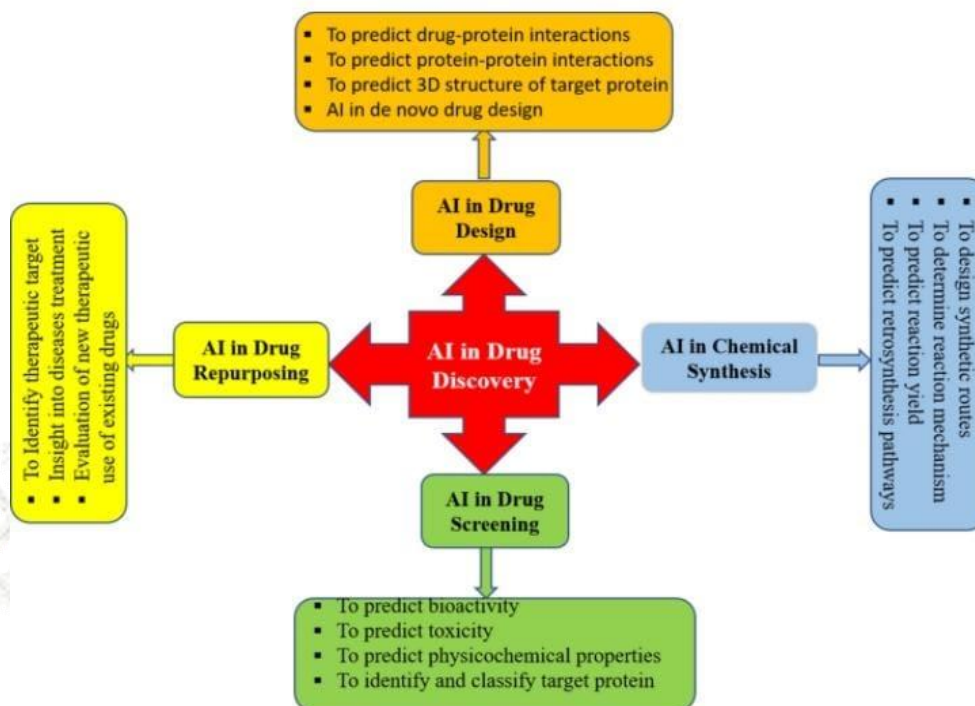
2. Clinical research:

Clinicaltrials are directedtoward establishing the safety and efficacy of a drug product in humans for a particular disease condition and require 6–7 years along with a substantial financial investment.However, only one out of ten molecules entering these trials gain successful clearance, which is a massive loss for the industry [17]. . AI can assist in selecting only a specific diseased population for recruitment in Phase II and III of clinical trials by using patient-specific genome–exposome profile analysis, which can help in early prediction of the available drug targets in the patients selected [18].

3. Disease diagnosis :

The main potential of AI in the pharmaceutical industry is to reduce costs and increase efficiency [19]. Artificial intelligence can assist providers in a variety of patient care and intelligent health systems. Artificial intelligence techniques ranging from machine learning to deep learning are prevalent in healthcare for disease diagnosis, drug discovery, and patient risk identification.Artificial intelligence techniques are used to predict diseases based on available patient data.Pharma companies can use AI to develop cures for both known diseases like Alzheimer's and Parkinson's and rare diseases. Generally, pharmaceutical companies do not spend their time and resources on finding treatments for rare diseases since the ROI is very low compared to the time and cost it takes to develop drugs for treating rare diseases. According to Global Genes, nearly 95% of rare diseases don't have FDA approved treatments or cures. However, thanks to AI and ML's innovative abilities, the scenario is rapidly changing for the better.The AI system to diagnose the heart disease through Cardiac image. The concentration around this disease is not completely unexpected [20].
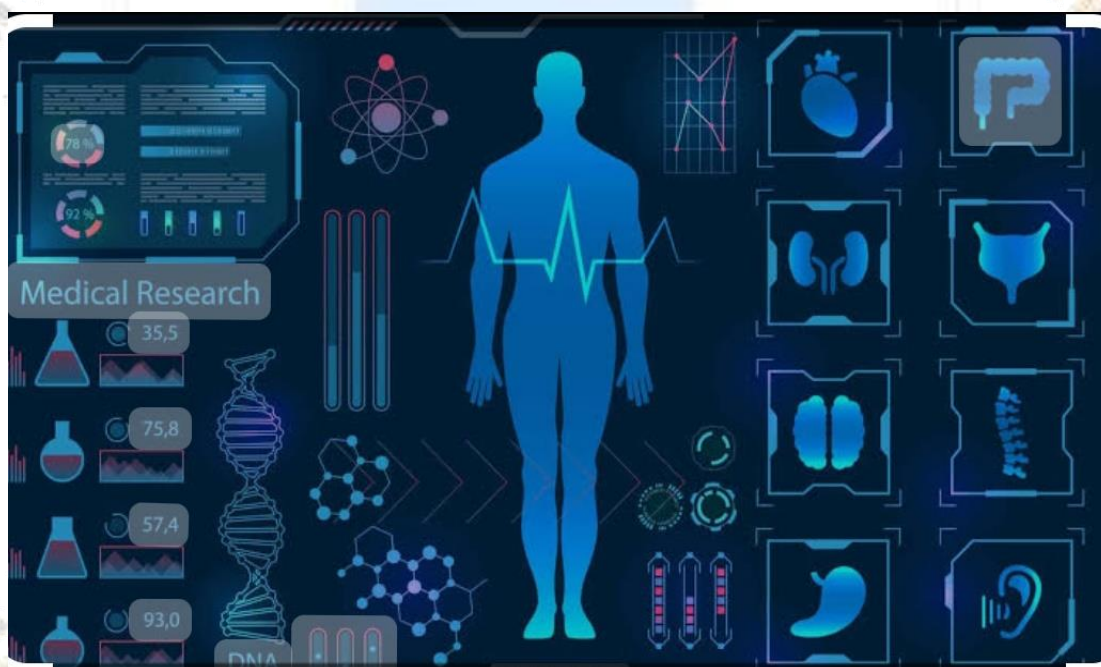
4. Novel medication:

The use of artificial intelligence (AI) has been increasing in various sectors of society, particularly the pharmaceutical industry. The use of AI in diverse sectors of the pharmaceutical industry, including drug discovery and development, drug repurposing, improving pharmaceutical productivity, and clinical trials, among others; such use reduces the human workload as well as achieving targets in a short period of time[18].We also discuss crosstalk between the tools and techniques utilized in AI, ongoing challenges, and ways to overcome them, along with the future of AI in the pharmaceutical industry.
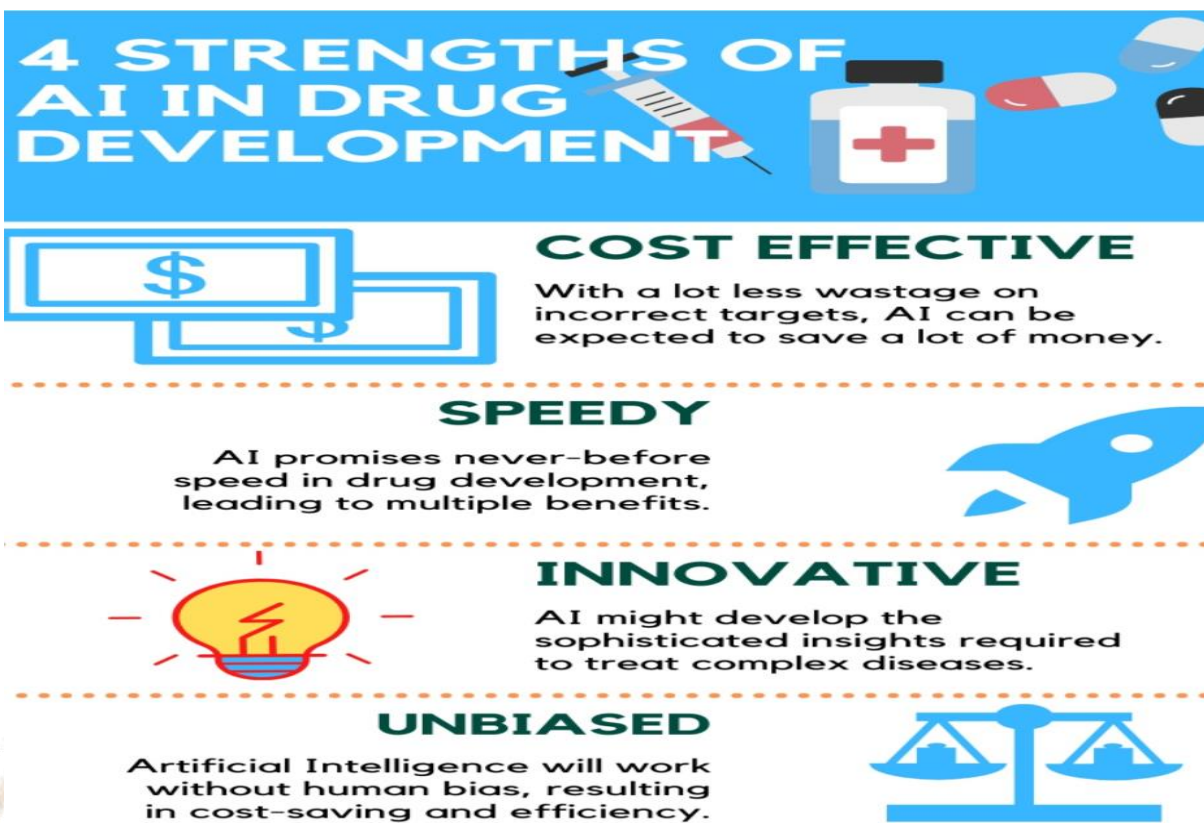
5.AI in science and research:

AI is making lots of progress in the scientific sector. Artificial intelligence can handle large quantities of data and processes it quicker than human minds. This makes it prefect for research where the sources contain high data volumes. AI is already making breakthroughs in this field [21]. The right information is presented at the right time to facilitate informed patent and provider discussions [1].

6.AI in data analysis:

Data analysis can benefit largely from AI and ML. AI algorithms are capable of improving with iteration, and this way, their accuracy, and precision increase accordingly. AI can help data analysts with handling and processing large datasets. An automated data entry platform, such as an Electronic Lab Notebook, along with sophisticated, intelligent techniques, can ensure the quality assurance of the product [98]. Also, data mining and various knowledge discovery techniques in the Total Quality Management expert system can be used as valuable approaches in making complex decisions, creating new technologies for intelligent quality control [99].AI can be of real help in analyzing the data and presenting results that would help out in decision making, saving human effort, time, and money thus help save lives [8].

7.AI in healthcare:

The medical sector is also using this technology for its advantages. In the diagnosis stage, a substantial proportion of AI literature analyzes data from diagnosis imaging, Genetic testing and electrodiagnosis [6]. AI in the development of a pharmaceutical product from the bench to the bedside can be imagined given that it can aid rational drug design [16]. AI is helping medical researchers and professionals in numerous way [22] (Figure 3).
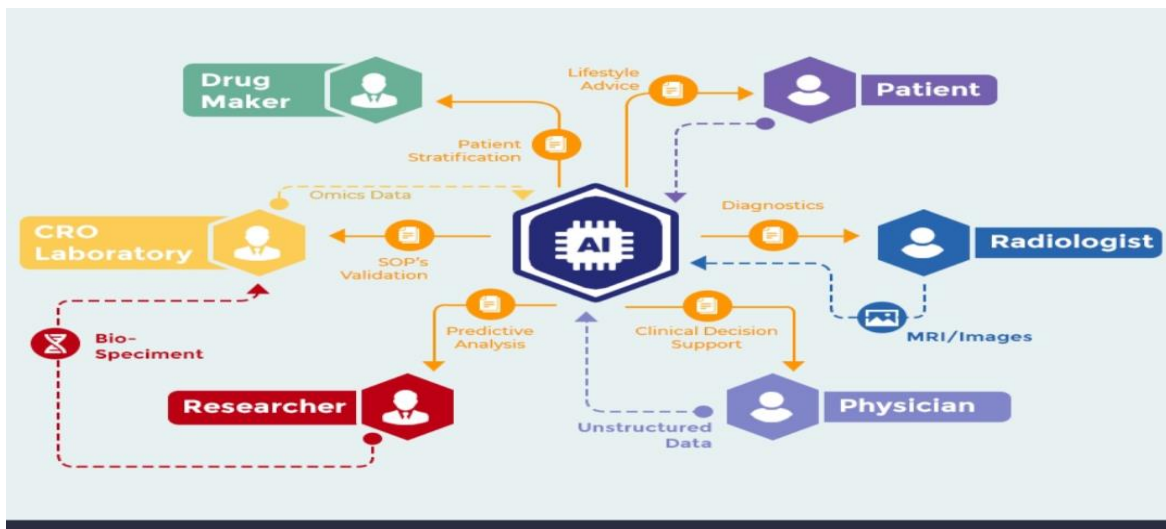
8. Manufacturing of pharmaceutical products:

Pharma companies can implement AI in the manufacturing process for higher productivity, improved efficiency, and faster production of life-saving drugs. The pharmaceutical industry is responsible for a variety of activities such as drug research, development, manufacturing, and distribution [13]. The AI technology is used in each step of the drug designing procedure, which decreases the health hazards related to preclinical trials and also reduces the cost substantially. The AI is an effective tool for data mining based on the huge pharmacological data and machine learning process.[20].

Future scope:

Artificial intelligence in Pharma refers to the use of automated algorithms to perform tasks which traditionally rely on human intelligence.The main potential of AI in the pharmaceutical industry is to reduce costs and increase efficiency [24]. Over the last five years, the use of artificial intelligence in the pharma and biotech industry has redefined how scientists develop new drugs, tackle disease, and more. Artificial Intelligence is the future of pharma and it is here to stay. It can bring down costs, enhance patient care, foster profitable innovation, and improve business outcomes across the value chain[25]. Nearly all pharma companies are leveraging the power of AI to help them face many challenges. The pharmacy of the future will likely not be fully automated, as pharmacists provide expert level insight, knowledge and management when it comes to pharmaceuticals. For the foreseeable future, AI and robots will not be able to compete with the expertise of pharmacists.AI This will be necessary to shorten drug development cycles, reduce costs, and improve success rates: the ultimate goal of implementing AI in this context [26].

Conclusion:

Human being is the most sophisticated machine that can ever be created. A.I 1000 times faster, error free, time saving, cost saving, efficient work ability than human beings. The advancement of AI, along with its remarkable tools, continuously aims toreduce challenges facedbypharmaceutical companies, impacting the drug development process along with the overall lifecycle of the product, which could explain the increase in the number of start-ups in this sector[23]. AI-based approaches and specific challenges remain with regards to the implementation of this technology, it is likely that AI will become an invaluable tool in the pharmaceutical industry in the near future.The introduction of artificial intelligence has resulted in tremendous growth in the pharmaceutical sector's various key area.

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