Artificial Intelligence In Advanced Pharmaceutical Sciences.

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Abstract

Artificial intelligence (AI) has emerged as a transformation technology in the field of pharmacy. Offering novel solution to complex challenges. This abstract provides on overview of key application of (AI) in pharmacy. It has greatly evolved in to a science of problems solving with the hug applications in health care and engineering. The article is described the Artificial intelligence in drug discovery, tools of AI, Development of drug delivery system, AI to predict new treatment, Advantages of artificial intelligence (AI) in pharmaceutical industry, Disadvantages of AI in pharmacy, challenges to adoption of AI in pharmacy, and Application of AI in pharmaceutical sciences.

Key words: Artificial intelligence in drug discovery, tools of AI, Development of drug delivery system, AI to predict new treatment, Advantages of artificial intelligence (AI) in pharmaceutical industry, Disadvantages of AI in pharmacy, challenges to adoption of AI in pharmacy, and Application of AI in pharmaceutical sciences.

Introduction

Artificial Intelligence (AI) is a branch of computer science that solves problems through symbols and engineering processes (1) Artificial Intelligence The main purpose of artificial intelligence is to interpret important information that formulates problems and offers abstract solutions. The common interpretation of mathematical theorems is called a method. Artificial intelligence as a field develops and uses algorithms to analyse, learn and interpret data. Artificial intelligence encompasses many branches of statistics and machine learning, learning models, clustering, similar buses (2) Artificial intelligence is a tool used in many areas of life and business. In recent years, the pharmaceutical industry has discovered new and innovative ways to use these powerful tools to help solve some of the biggest challenges facing the pharmaceutical industry today. Artificial intelligence in medicine refers to the use of atomic algorithms to perform tasks that normally rely on human intelligence. Over the past five years, the application of artificial intelligence in the pharmaceutical and biotechnology industries has redefined the way scientists develop new drugs and treat diseases.

Artificial intelligence in drug discovery:

Drug discovery often takes a long time to test anti-cancer drugs. The discovery of compounds that are interesting and worthy of further investigation should also be repeated. To speed up this screening process, the Novartis research team used images from machine learning algorithms to predict undetected topics that might be worth further investigation. Computers are faster at discovering new information than human analyses and laboratory tests, and therefore can deliver new drugs more quickly. It also eliminates labour costs associated with manual verification of each compound [33]. Today's intellectual property from a leading biopharmaceutical company the company includes the Jal Action Platform and the deal has the ability to improve health outcomes. Improve patient outcomes with real-time data collection. Discovery is trying to use it with Wetware. The use of technology in the drug discovery process is expensive and extensive.
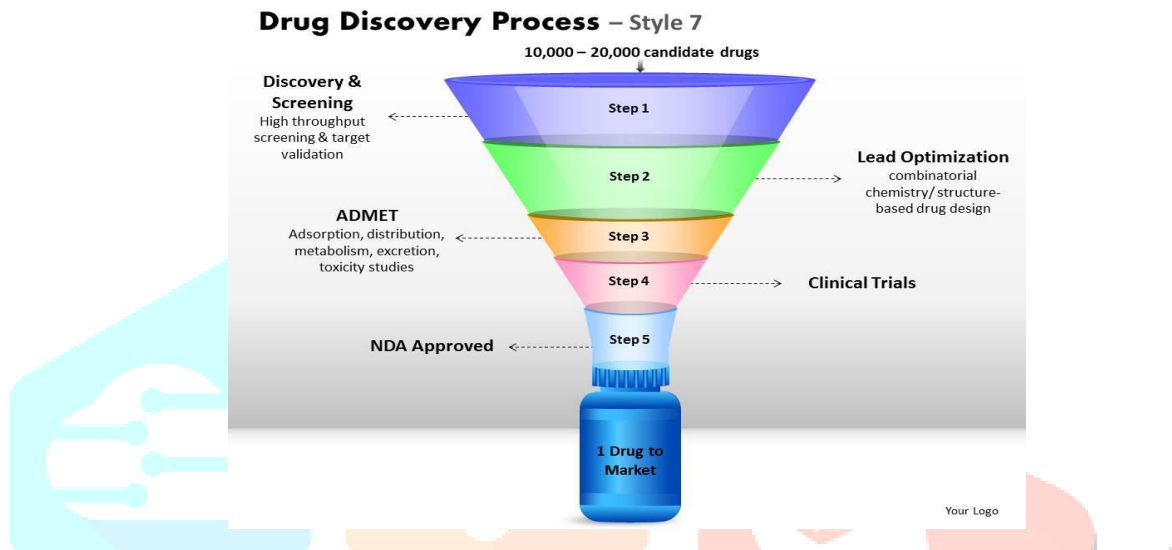

Fig.1: Artificial intelligence in drug discovery process

Artificial Intelligence (AI) Drug Discovery

Artificial Intelligence (AI) plays an important role in drug discovery by accelerating and improving all aspects of the drug development process. Drug research takes a long time to measure the effects of chemical compounds on diseases. Finding compounds that are interesting and worth studying requires further analysis. for the sake of it, he needs to cut it, he needs to cut the cuts, he needs to cut the branches, he needs to cut the branches. Artificial Intelligence (AI) has recently begun to accelerate its application in many areas of society, with the pharmaceutical industry taking the lead. In this review, artificial intelligence is used in drug discovery and development, drug recycling, product development products, clinical research, etc. It has been shown that it is used effectively in various areas of the pharmaceutical industry, thus reducing the number of employees and achieving targets in a short time. of your time. The tools and technologies used in the use of artificial intelligence, ongoing problems, ways to overcome these difficulties and the future of artificial intelligence in the pharmaceutical industry were discussed. Drug discovery and development integrated with artificial intelligence has accelerated the development of the pharmaceutical industry and led to changes in the pharmaceutical industry. Here we talk about integration, tools and strategies for using these skills, ongoing challenges and ways to overcome them.
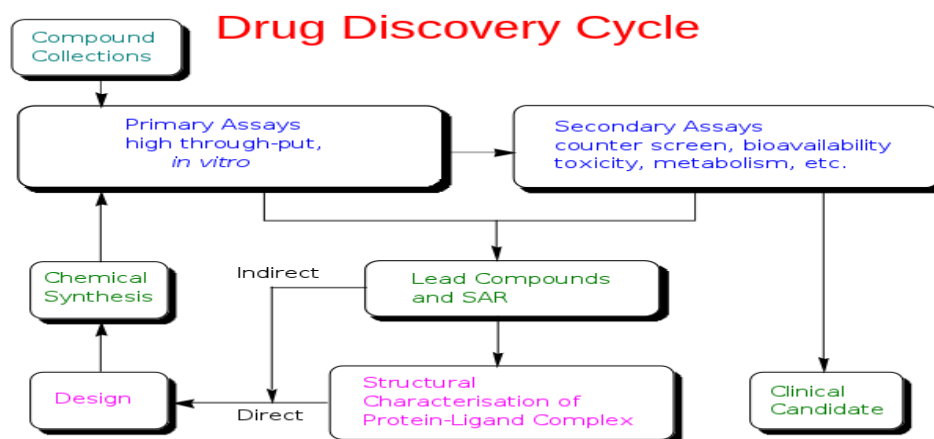
Fig.2: Drug Discovery Cycle

Artificial intelligence has been making inroads in drug discovery for a good part of the last decade. We recently published an analysis that showed that biotech companies using an AI-first approach have more than 150 small-molecule drugs in discovery and more than 15 already in clinical trials. This AI-fueled pipeline has been expanding at an annual rate of almost 40%. Given the transformative potential of AI, pharma companies need to plan for a future in which AI is routinely used in drug discovery. New players are scaling up fast and creating significant value, but the applications are diverse and pharma companies need to determine where and how AI can most add value for them. In practice, this means spending the time needed to understand the full impact that AI is having on R&D, which includes separating hype from actual achievement and recognizing the difference between individual software solutions and end-to-end AI-enabled drug discovery can deliver value in small-molecule drug discovery in four ways: access to new biology, improved or novel chemistry, better success rates, and quicker and cheaper discovery processes.

AI Tools:

Robotic Pharmacy:

UCSF Medical Centre uses AI to prepare and track medications to improve patient safety. According to them, the technology prepared 3, 30,000 doses without any assistance. The robot has proven to be superior to humans in both size and ability to deliver the correct medication. Robotics may involve the preparation of oral and injectable medications, including toxic chemicals. This gives UCSF pharmacists and nurses the freedom to hone their skills by focusing on direct patient care and collaborating with healthcare providers. In a robot pharmacy, AI-driven robots can dispense medication, manage inventory, and assist pharmacists in filling prescriptions accurately and quickly.

Robot pharmacies are automated healthcare facilities that use robotics and advanced technology to dispense medications and provide pharmacy services. These pharmacies can offer several benefits, such as increased accuracy in filling prescriptions, 24/7 accessibility, and reduced wait times for customers. Robots in these pharmacies can count pills, package medications, and even assist with medication management for patients. While they can enhance efficiency, they also raise questions about the role of human pharmacists and the need for oversight to ensure patient safety. Robot pharmacies are an innovative approach to healthcare, and their adoption may continue to grow in the future as technology advances.

Fig.2: Robotic Pharmacy   **Fig.3: Robotic Surgery**

ERICA ROBOT:

Erica is a new robot created by Hiroshi Ishiguro, a professor at Osaka University in Japan. It was developed in collaboration with the Japan Science and Technology Agency, Kyoto University and the International Advanced Telecommunications Research Institute (ATR). He speaks Japanese and has a mixture of European and Asian facial features.[11] Like any normal person, he loves animated movies, wants to travel to South Asia, and wants to spend his life with someone he can talk to. The robot cannot walk on its own; but has developed the ability to understand and answer questions using human facial expressions, a robot nose, eyes, etc. has created. The Erica robot pharmacy developed by a company called Erica Technologies is an advanced robotic system designed to automate various tasks within a pharmacy setting. This technology aims to streamline prescription dispensing, inventory management, and customer service in pharmacies. Erica robots can accurately dispense medications, track inventory levels, and provide information to customers, enhancing efficiency and reducing errors in pharmaceutical operations. Keep in mind that my knowledge is based on information available up to September 2021 and there may have been further developments or new systems since then.

Fig.4: ERICA ROBOT

Tug Robots:

Aethon TUG robots are designed to move autonomously in hospitals, distribute medicines, meals, samples, supplies, and carry heavy items such as linens and garbage. Comes in two configurations, ... fixed and support cart, as well as a swap base platform that can be used to transport the rack, rear legs and cart. While rigid trucks are used to transport drugs, sensitive materials and laboratories, exchange platforms are also used to: Vyas et al: Artificial Intelligence: A New Era in the pharmaceutical business Asia Magazine Drug April 2018 - 12 June 75 Transport information that can be loaded on different racks: The TUG can carry different types of tools or racks, making it very useful and capable. Tug robots are

commonly used in pharmacy settings to automate various tasks, such as medication dispensing and delivery. These robots are designed to navigate hospital or retail pharmacy environments autonomously, safely transporting medications and supplies to different locations within the facility. They help reduce human error, improve efficiency, and free up pharmacy staff to focus on more critical tasks.
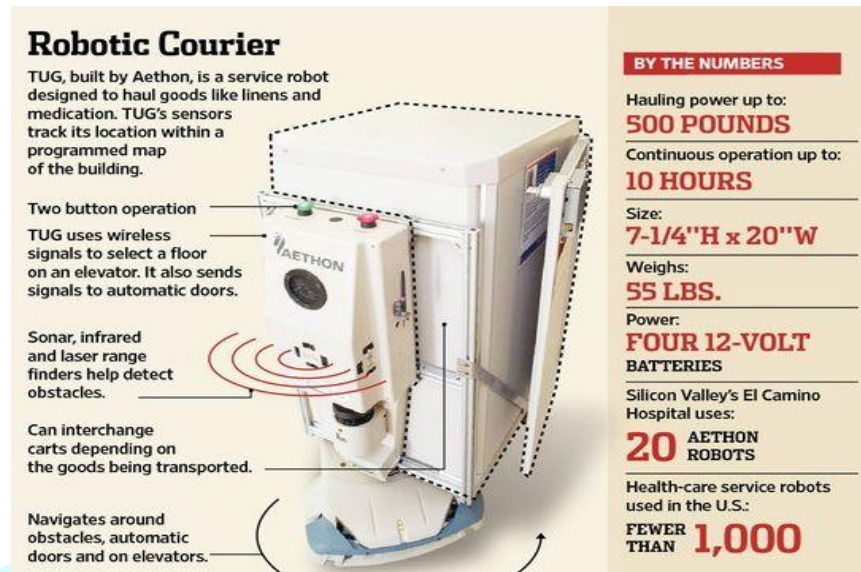
Fig.2: Tug Robotics technology

Artificial intelligence in medicine is a good idea:

The medical industry can use the technology to make new changes. The latest technological development that comes to mind is artificial intelligence, the development of computers that can perform tasks that normally require human intelligence, such as vision, speech recognition, decision making, and interpreting words. IBM estimates that across healthcare, approx. As of 2011, there is 161 billion gigabytes of data. There is a lot of knowledge in this field, and artificial intelligence provides real assistance in analysing information and presenting results that can help make decisions. It helps save lives by saving manpower, time and money. Epidermal origin prediction: Machine learning/artificial intelligence can be used to learn the origin of the epidermis. Check results, social network activity and predict with incredible accuracy when and where the epidermis will be affected. In addition to the information listed above, there is much more information. Example: Self-healing. Help us create new tools for patients, doctors and more. Medical procedures. Clinical trials that use predictive analytics to determine candidate diagnoses through social media and doctor visits.

Advantages and disadvantages

1. Automation: AI can perform repetitive tasks more efficiently and accurately than humans leading to increased productivity and cost savings.

2. Decision Making: AI systems can analyze vast amounts of data to make informed and data-driven decisions in real-time.

3. 24/7 Availability: AI-powered chatbots and virtual assistants can provide round-the-clock customer support and assistance.

4. Personalization: AI can tailor recommendations and experiences based on user preferences enhancing customer satisfaction.

5. Improved Healthcare: AI can assist in medical diagnosis drug discovery and personalized treatment plans leading to better healthcare outcomes.

6. Enhanced Security: AI can detect and respond to cybersecurity threats more effectively protecting sensitive data and systems.

7. Predictive Analytics: AI can forecast trends and identify potential issues helping businesses plan and mitigate risks.

8. Language Processing: AI enables natural language understanding and generation facilitating human-computer communication.

9. Autonomous Vehicles: AI plays a crucial role in self-driving cars making transportation safer and more efficient.

10. Efficiency in Manufacturing: AI-powered robots and automation systems optimize manufacturing processes.

11. Accessibility: AI can assist individuals with disabilities by providing speech recognition, text-to-speech and other accessibility features.

12. Environmental Impact: AI can optimize energy usage reduce waste and support sustainability efforts.

13. Scientific Discovery: AI aids in data analysis for scientific research accelerating discoveries in various fields.

Disadvantages of AI technology

1. Job Displacement: Automation driven by AI can lead to job loss in certain industries, as tasks once performed by humans are automated This can be particularly concerning for jobs that are routine and repetitive.

2. Bias and Fairness: AI systems can inherit biases from the data they are trained on, leading to unfair or discriminatory outcomes, especially in areas like hiring or lending where historical biases exist in the data.

3. Privacy Concerns: AI systems often require access to large amounts of data, which can raise privacy concerns. Improper handling of data can lead to breaches or misuse of personal information.

4. Lack of Creativity and Empathy: AI lacks the ability to think creatively or empathize with humans. This can be a limitation in tasks that require emotional understanding or nuanced decision-making.

5. High Costs: Developing and implementing AI technology can be expensive, particularly for smaller businesses or organizations. This can create a digital divide.

6. Storage is large, but access and retrieval will not rely on memory as humans do. They will not reach the level of creativity that humans have, or at least not according to our technological understanding.

7. As seen with smartphones and other technologies, as a result, people will become addicted. They lose their intellectual skills and mental capacity. If placed incorrectly, the machine may be damaged. Yes, at least that's what many people fear [16].

Application:

(1) In Formulation:

Controlled release tablets: The first work in the use of neural networks for modelling pharmaceutical formulations was performed by Hussain and coworkers at the University of Cincinnati (OH, USA). In various studies they modelled the in vitro release characteristics of a range of drugs dispersed in matrices prepared from various hydrophilic polymers. In all cases, neural networks [17] with a single hidden layer were found to offer reasonable performance in the prediction of drug release In a more recent study involving the formulation of diclofenac sodium from a matrix tablet prepared from acetyl alcohol, personnel from the pharmaceutical company KRKA dd (Smerjeska, Slovenia) and the University of Ljubljana (Slovenia) have used neural networks to predict the rate of drug release and to undertake optimization using two- and three- dimensional response surface analysis [18]. Immediate release tablets: Work in this area began only some three years ago with two studies. One by Turkoglu and coworkers from the University of Marmara (Turkey) and the University of Cincinnatill used both neural networks and statistics to model tablet formulations of hydrochlorothiazide The networks produced were used to prepare three-dimensional plots of massing time. compression pressure and crushing strength, or drug release, massing time and compression pressure in an attempt to maximize tablet strength or to select the best lubricant [19]. Although trends were observed no optimal formulations were given. The trends were October Issue comparable to those generated by statistical procedures. Comparable neural network models Department of Pharmaceutic were generated and then optimized using genetic algorithms. It was found that the optimum formulation depended on the constraints applied to ingredient levels used in the formulation and the relative importance placed on the output parameters. A high tablet strength and low friability could only be obtained at the expense of disintegration time. In all cases lactose was the preferred diluents and fluidized bed the preferred granulating technique

(2) In Product Development:

The pharmaceutical product development process is a multivariate optimization problem. It involves the optimization of formulation and process variables. One of the most useful properties of artificial neural networks is their ability to generalize. These features make them suitable for solving problems in the area of optimization of formulations in pharmaceutical product development [21]. ANN models showed better fitting and predicting abilities in the development of solid dosage forms in investigations of the effects of several factors (such as formulation, compression parameters) on tablet properties (such as dissolution) ANNS provided a useful tool for the development of micro emulsion-based drug-delivery systems in which experimental effort was minimized.

Challenges to adoption of ai in pharma:

Challenges of Adopting Artificial Intelligence in the Pharmaceutical Industry: While AI has the potential to help transform the pharmaceutical industry, adaptation alone may not be an easy task. Challenges faced by pharmaceutical companies when trying to adopt AT: • Many pharmaceutical companies are not familiar with this technology. Because of its novel and esoteric nature, Al is still something of a "black box". Lack of proper IT infrastructure – This is because most of the IT applications and processes used today are not designed or built with AI in mind. To make matters worse, pharmaceutical companies need to spend a lot of money improving their IT systems. Most of the information is in plain text; This means that pharmaceutical companies must put a lot of effort into preparing this information and converting it into a verifiable form. Despite all these limitations, one thing is clear: AI is already replicating biotechnology and pharmaceuticals. Ten years later. Businesses will only see skills as important. modern technology,

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