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V-Discover

THE STUDENTS
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SWAMY VIVEKANANDHA COLLEGE OF PHARMACY

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ARTIFICIAL INTELLIGENCE IN PHARMACY



What is AI in Pharmacy?

AI in pharmacy refers to the integration and application of artificial intelligence (AI) technologies in various aspects of the pharmaceutical industry and pharmacy practice. These technologies aim to enhance drug discovery, development, distribution, and patient care processes.

AI has the potential to revolutionize the field of pharmacy and healthcare in general by improving efficiency, accuracy, and personalized treatment options. AI is the ability of a machine to perform the cognitive functions we associate with human minds, such as perceiving, reasoning, Problem-solving, and even exercising creativity.

K. Anushree

HISTORY OF AI IN PHARMACY

1. 1960s - Early Beginnings : To simulate human decision-making processes, including those related to pharmacy and medicine.
2. 1980s - Expert Systems: to assist pharmacists in drug information retrieval and drug interaction checking.
3. 1990s - Decision Support Systems: These systems provided pharmacists with real-time information and drug interaction.
4. 2000s - Drug Discovery and Molecular Modeling Machine learning techniques were applied to analyze vast databases of chemical compounds and biological data to identify potential drug candidates more efficiently.

History of Artificial Intelligence



5. 2010s - Personalized Medicine, Natural Language Processing (NLP) and Pharmacy Information Systems, Robotics and Automation, and Predictive Analytics.
6. 2020s - Continued Advancements: As of 2021, AI continued to advance in pharmacy and the healthcare industry. Ongoing research and innovations focused on drug discovery, personalized medicine, patient care, and administrative processes in pharmacy settings.

S. Dhanushya

ROBOTIC PHARMACY

Robotic pharmacy, also known as automated or robotic dispensing technology, refers to the use of robotic systems to automate various tasks



within a pharmacy setting. These advanced technologies are designed to enhance efficiency, accuracy, and patient safety in medication dispensing and inventory management processes.

Robotic pharmacy systems can be found in hospital pharmacies, retail pharmacies, and other healthcare facilities. Pharmacy robots are mechanical devices that conduct planned, sophisticated, and repetitive manipulations that mimic human behavior without continual input from a human.

D. Ramya



FATHER OF AI



The term "Father of AI" is often attributed to John McCarthy. John McCarthy was an American computer scientist who is widely regarded as one of the pioneers of the field of

artificial intelligence (AI). He coined the term "artificial intelligence" in 1956 when he organized the Dartmouth Conference, which is considered the birth of AI as a formal academic discipline.

McCarthy made significant contributions to AI research, including the development of the Lisp programming language, which became one of the early and influential languages for AI programming. He also worked on various AI projects and introduced the concept of time-sharing systems, which allowed multiple users to access a computer simultaneously.

While McCarthy is often referred to as the "Father of AI," it's essential to recognize that AI is a multidisciplinary field with numerous contributors over the years, and its development has been a collective effort involving many researchers and scientists.

R. Gayathiri - S. Akshaya

HOW AI IS HELPING PHARMA COMPANIES TO STAY COMPETITIVE

1. AI can improve the drug discovery process by performing quality control

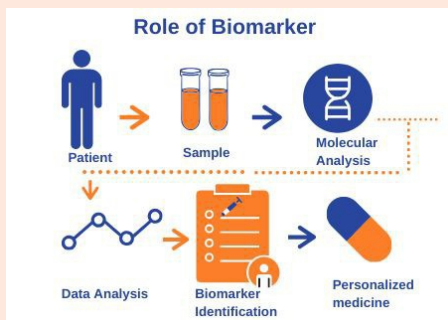


2. Help efficiently access and analyze vast amounts of chemical data to ultimately improve business processes and outcome.
3. Provide critical insights into how to improve the designing, optimizing, and synthesizing of drugs.
4. Fixing supply chain issues within the production line and reducing wastage of material.
5. Enhancing the production reuse value and forecasting demand and supply changes.
6. Performing predictive maintenance and reducing operational costs.

- G. Sriharini

PREDICTIVE BIOMARKER AI IN PHARMACY

1. Personalized treatment selection
2. Drug discovery and development
3. Real-time patient monitoring
4. Early disease detection
5. Treatment resistance prediction



S. Rakshitha

Advancing biomedical science

1. Immunotherapy and Gene Therapy
2. Biomarker Discovery
3. Nanomedicine
4. Organ-on-a-Chip Technology
5. Regenerative Medicine
6. Bioinformatics
7. Global Collaboration and Open Science



- J. Akilashree



INVASION OF AI INTO INDIA

1. **Business and Industry :** Industries such as finance, healthcare, e-commerce, manufacturing, and agriculture have seen the integration of AI-powered solutions for data analysis, customer service, predictive analytics, and more.

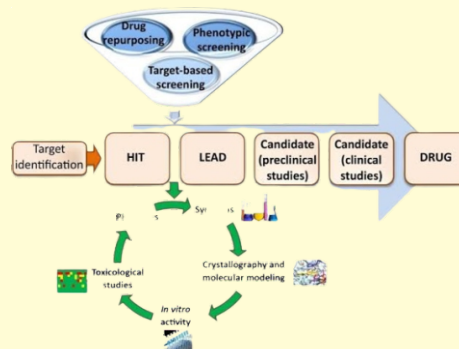


2. **Government Initiatives :** The Indian government has recognized the potential of AI and its impact on economic growth and development.
3. **Healthcare :** AI-powered diagnostic tools, medical imaging analysis, and telemedicine platforms are helping to expand access to quality healthcare, particularly in remote and underserved areas.
4. **Education and Research :** The aim is to prepare a skilled workforce that can contribute to the development and deployment of AI technologies.

C. Arockiya Preethi

LEAD OPTIMIZATION

AI has the potential to enhance the "lead optimization" process by accurately predicting the pharmacological properties of lead molecules using their chemical structures. By employing machine learning algorithms, it becomes possible to create predictive models that can estimate essential properties of these molecules, including solubility, toxicity, and bioavailability.



LEAD OPTIMIZATION OFFERS

- Evidence of target or pathway engagement in the human system.
- Human dose predictions.
- Patent fillings.
- Studies to maximize potency and selectivity plus minimize toxicity.
- Generating a preclinical candidate adhering to agreed upon criteria.

- K. Sangeetha Priya, D. Logeshwari

NATURAL LANGUAGE PROCESSING TOOLS FOR ANALYZING MEDICAL LITERATURE

Natural Language Processing (NLP) is a branch of artificial intelligence that focuses on understanding and processing human language.

1. **Text Mining :** NLP tools facilitate efficient text mining by automatically identifying and categorizing medical concepts.
2. **Literature Review :** NLP tools can assist in conducting comprehensive literature reviews by summarizing research articles and identifying key findings.
3. **Information Extraction :** They can identify and extract important data points, such as patient demographics, treatment outcomes, and adverse events, from clinical notes or reports.
4. **Entity Recognition:** NLP algorithms can recognize and classify medical entities, such as medical conditions, medications, and anatomical terms, within the literature.
5. **Sentiment Analysis :** NLP tools can be used to perform sentiment analysis on medical literature.
6. **Language Translation:** NLP models with translation capabilities aid in breaking language barriers, allowing medical literature written in different languages to be comprehensible to a wider audience of researchers and healthcare professionals.
7. **Biomedical Named Entity Recognition (BioNER) :** To identify and extract biomedical entities like genes, proteins, and diseases from scientific articles, supporting research in genomics and molecular biology.

- M. Nandhini

BENEFITS OF AI IN PHARMA

- To identify patients with rare diseases and accurately predict them.
- It enables personalized recommendations for both doctors and patients through real-time data analysis.
- Enhances patient care and supports healthcare professionals in making well-informed decisions regarding treatment options.
- The 1st use of AI in the pharmaceutical industry was by Pfizer.

- S. Roshika

QUALITY ASSURANCE IN PHARMACY

- Automated defect detection in production lines.
- Detection of micro anomalies which are not visible to humans.
- Logical classification of defects.
- Cross-customer evaluation & optimization.

- J.R. Joshika

PREDICTION OF TREATMENT RESULTS

- Relevant patient data, including demographics, medical history, diagnostic tests, and treatment outcomes, is collected and compiled into a structured dataset.
- Machine learning algorithms are used to build predictive models based on the selected features. The algorithms learn from this data to recognize patterns and relationships between the features and treatment responses.
- The trained models are then validated using a separate set of data to ensure their accuracy and generalizability.
- Once the model is validated, it can be used to predict treatment outcomes for new patients. When a patient's relevant data is fed into the model, it generates a probability or score that indicates the likelihood of a positive response to a particular treatment.
- The predictive results can assist healthcare providers in making informed decisions about treatment selection, dosages, and potential alternatives.
- This personalized approach can optimize patient care, reduce adverse effects, and enhance treatment efficacy.

- M. Abinaya

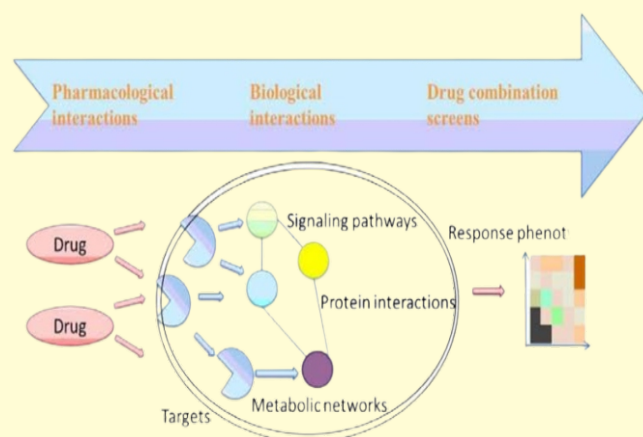
AI PHARMACOGNOSY

- AI pharmacognosy refers to the application of artificial intelligence (AI) techniques in the field of pharmacognosy. Pharmacognosy is a branch of pharmaceutical sciences that deals with the study of natural products derived from plants, animals, and microorganisms, and their potential therapeutic benefits.
- AI models can predict potential drug-drug interactions between natural products and synthetic pharmaceuticals, thereby ensuring the safety and efficacy of herbal or traditional remedies when used in combination with conventional medications.
- AI tools can analyze SAR data to uncover the relationship between the chemical structure of natural compounds and their pharmacological activities.

- S. Shrinishi

POLYPHARMACOLOGY IN DRUG DISCOVERY

Polypharmacology in drug discovery refers to the approach of developing drugs that can interact with multiple biological targets, rather than just a single target, to achieve therapeutic effects. However, polypharmacology recognizes that many diseases often involve complex and interconnected pathways, and targeting multiple pathways simultaneously can lead to more effective and comprehensive treatment options.



Advantages of Polypharmacology in Drug Discovery :

1. Enhanced Therapeutic Efficacy
2. Combating Complex Diseases
3. Reduced Drug Resistance
4. Increased Safety
5. Repurposing Existing Drugs

- S.Boomika Parvathi

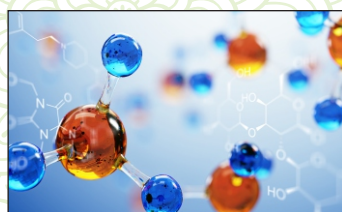
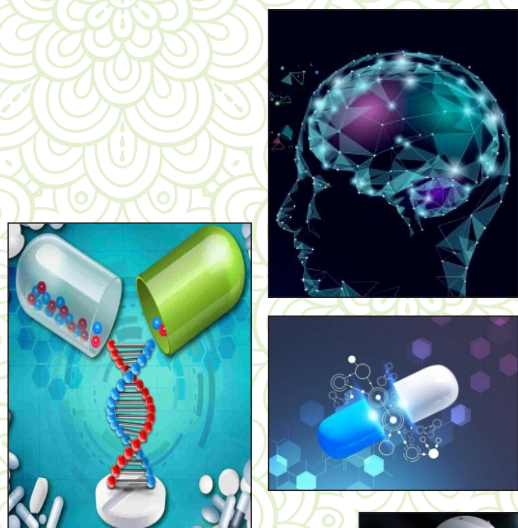
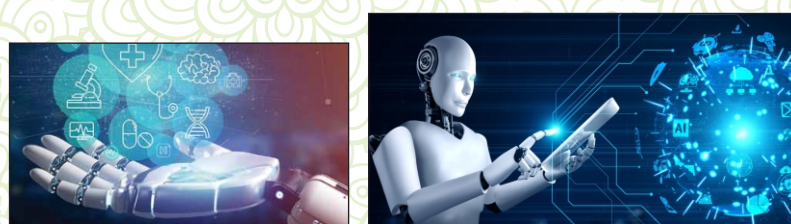
ARTIFICIAL INTELLIGENCE IN PHARMACOVIGILANCE :

Artificial Intelligence (AI) is increasingly being used in pharmacovigilance, which is the process of monitoring, detecting, assessing, and preventing adverse drug reactions (ADRs) and other drug-related issues after a medication is approved and released to the market.

1. Data Mining and Text Analytics
2. Signal Detection and Prioritization
3. Automated Case Processing
4. Drug-Drug Interaction (DDI) Prediction
5. Risk Assessment and Benefit-Risk Analysis
6. Automated Signal Validation
7. Predictive Safety Analytics
8. Pharmacovigilance Report Triage

FUTURE OF 3D PRINTING IN MEDICINE

In the future, researchers envision a scenario where 3D printing technology will enable the mass production of functional human limbs, replacement joint cartilage, and even organs suitable for transplantation. The medical field is already benefitting from 3D printing, with the production of various devices such as orthopedic and cranial implants, surgical instruments, dental restorations like crowns, and external prosthetics.



SHORT INFORMATION BEHIND AI

WILL THE PHARMACIST BE REPLACED BY AI ?

According to SAMM ANDEREGG, the CEO of doc station, a pharmacy information technology company, despite the significant advancements in AI capabilities, artificial intelligence will never completely eliminate the necessity for pharmacists.

- S. Sahana

WHAT IS MOONSHOT MEDICINE ?

In 2020, the drug discovery process commenced with ambitious aspirations to develop groundbreaking medications, often referred to as "moonshot" medicines. These innovative drugs aimed to address the limitations of current treatments for the condition, which primarily focus on slowing disease progression but often come with uncomfortable side effects, as highlighted by Zavoronkov.

- N.Chaitanya

RISK OF AI

- Data Privacy and Security
- Misinterpretation of Data
- Limited Generalization
- Regulatory Compliance
- Ethical Issues
- Cost and Accessibility
- Algorithm Bias
- Adherence and User Errors
- B.Jothi Lakshmi



ARTIFICIAL INTELLIGENCE IN PHARMACY

SOM (OR) KOHENIN'S MAP

Teuvo Kohonen introduced SOM (Self-Organizing Map) or Kohonen's Map, an artificial neural network, during the 1980s. It is an unsupervised learning algorithm used for dimensionality reduction, often resulting in a discrete representation of the input space, typically in two dimensions. This representation is known as SOM or Kohonen's Map.

- S. Siva Reshma

AI IN QUALITY INSPECTION

With minimal effort and training, an artificial intelligence system effortlessly acquires the ability to recognize various elements such as scratches, cracks, shapes, defects, and other errors in objects. Its detection capabilities are highly dependable and tireless. As a result, the identified flawed products can be separated and prevented from reaching the customers or undergoing further processing.

- S. Priyanka

RARE DISEASE AND PERSONALIZED MEDICINE

Utilizing data from body scans, patient biology, and analytics, artificial intelligence is deployed in diverse ways to identify diseases like cancer and even anticipate potential health issues based on individuals' genetic profiles. For example, IBM Watson for Oncology utilizes each patient's medical data and history to suggest a personalized treatment strategy.

- M. Malin

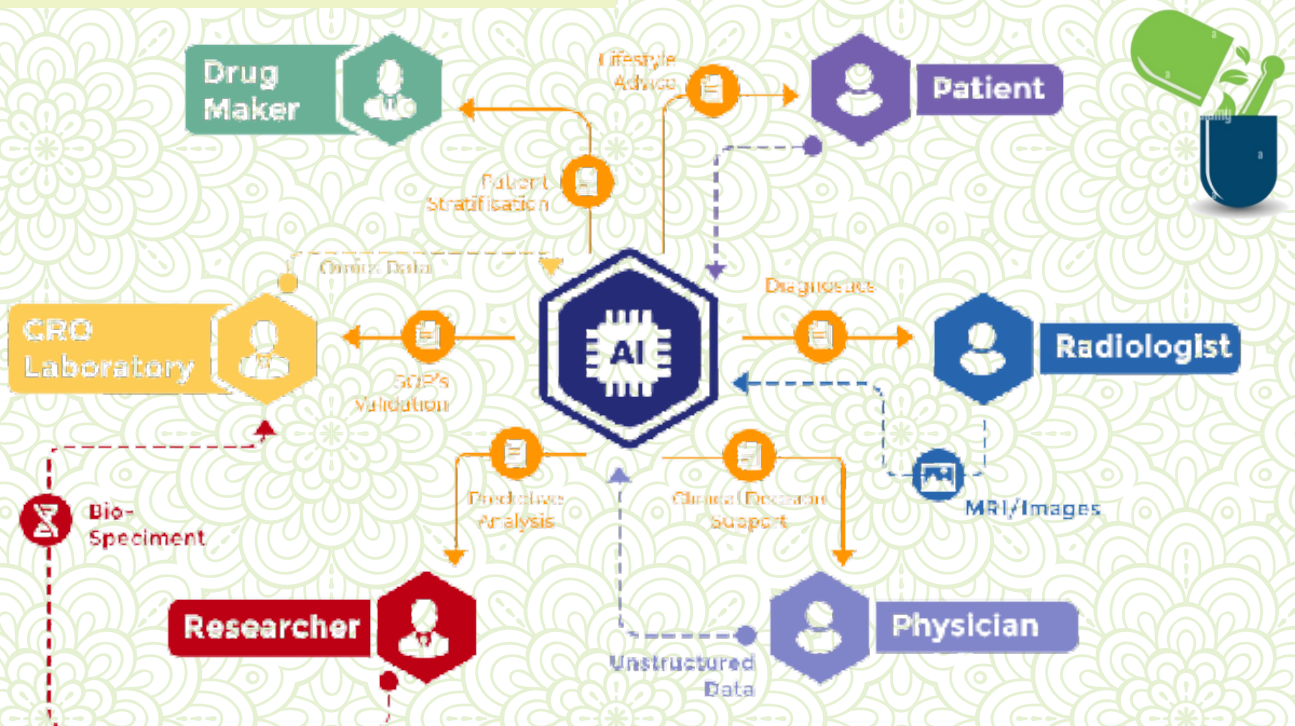
STARTUP HOPES TO USE ITS IVF – PREDICTIVE SOFTWARE AGAINST CORONAVIRUS

An Israeli startup that harnesses the power of artificial intelligence and machine learning to assist fertility specialists in choosing optimal embryos for implantation and creating tailored hormonal treatments for in vitro fertilization (IVF) patients, now envisions employing a similar technology to aid in the diagnosis and treatment of COVID-19 patients.

- M. Sakunthala

HOW AI IS USED IN ANIMAL HUSBANDRY

AI monitoring systems can effectively identify developing trends in poultry weight, providing farmers with the ability to pinpoint healthy livestock accurately. AI sensors, such as those used in bee homes, employ precise robotics, computer vision, and artificial intelligence to enable continuous and real-time monitoring.





"Vidhya Rathna"

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M.Pharm. (Master of Pharmacy)	2 Years (Co.Ed)
Ph.D. Full time	3 Years (Co.Ed)
Ph.D. Part time	4 Years (Co.Ed)

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Pharmacy Practice

Pharmacology

Pharmaceutical Chemistry

Pharmacognosy

Pharmaceutical Analysis

