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A Survey on Drug Discovery in Medical Application using Artificial Intelligence

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Abstract

Artificial intelligence is the one that is developed and used in all developing sectors. It is almost used in every field. Artificial intelligence (AI) is the term used to describe the use of computers and technology to simulate intelligent behavior, and critical thinking comparable to a human being. AI is also used in the medical field for various purposes. It has been concentrating on rare diseases that are still in the process to cure. It is also used to discover the drug for medical purposes. The four major things that AI that concentrate is identifying, discovering, speeding up, and diagnosing the disease. Cancer, neurology, cardiology, radiology are the disease where AI is used. Cancer is one such disease where AI is mostly used. Experts say that there is no future medical without AI. From the early stages, until now, AI has been developing steadily its growth in the future will be unexplainable. Moreover, it can be a replacement for humans also.

Keywords: Artificial intelligence (AI), history of AI, drug discovery, biomarkers, AI in cancer, survey, future work

Introduction

Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. Particular applications of AI include expert systems, machine vision, and speech recognition. The field and science of making the machines understand the world just like a human and attain the human level of thinking and decision making on this own are known as artificial intelligence. It is used in many sectors, such as transportation, finance, healthcare, medical applications, banking, etc. It can also serve in almost any sector right from suggesting information to even in your banking transactions. There are some examples of AI. They are spam filters, the voice of text features, process automation, security surveillance, sales, and business forecasting, smart email categorization. The recent applications in AI technology and its current applications in the field of medicine are discussed in detail.

History

Dendral, the expert system or the first problem solving which was developed in the 1960s and 1970 in the Research while it was developed for application in the application in organic chemistry, it was provided the basic for subsequent system MYCIN, which was considered as one of the most significant of early uses of Artificial intelligence (AI) in medicine. MYCIN and other systems like INTERNIST -1 and CASNET didn't achieve any us by medico scientists.



In the 1980s and 1990s brought the development of the microcomputer and network connectivity. During this, researchers and developers that AI systems in healthcare should be designed to replace the absence of data and build on the expertise of physicians.

In 2005, Blue Brain, a project to simulate the brain at molecular details. It was developed and also in the developing state. Most of the people were creating a new project in the medical field, and it was helpful for many people to cure their disease.

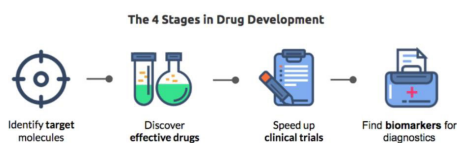
Application of AI include

- Improvements in computing power are resulting in faster data collection and data processing.
- Growth of genomic sequencing databases
- Widespread implementation of electronic health record systems.
- Improvements in natural language processing and computer vision, enabling machines to replicate human perceptual processes.
- We have enhanced the precision of robot-assisted surgery.
- Improvements in deep learning techniques and data logs in rare diseases.

Drug Discovery

There are four main stages in drug development.

- Identifying
- Discovering
- Speeding up
- Finding for diagnosing the disease.



Stage 1: Identifying

The first and foremost thing in drug discovery is

that they should understand the biological origin of disease as well as the mechanism, then they should identify the good targeting of the disease. Machine learning can more easily analyze the available dates and can even learn to automatically identify good target proteins.

Stage 2: Discoveries

The Next process is to find a compound hat will interact with the identified target molecules. These involve a large number of potential compounds for their target. Machine learning here helps to predict the suitability of molecules based on structural finger prints and molecular descriptions. Then they blaze through millions of molecules and filter them all down. These also have minimal side effects. This may also save a lot of time in drug design.

Stage 3: Speeding up

It is very difficult to find a Candidate for trial. If you chose them wrong, it would prolong the trial costing a lot of time and resources. Machine learning helps in speeding up the trials by automatically identifying suitable candidates. Allowing the resources to intervene earlier and also saving the development of the drug.

Stage 4: Finding for diagnosing the diseases

You can only treat patients for the disease once you're sure of your diagnosis. These methods are expensive and complicated. Biomarkers are molecules that are found in bodily fluids (human blood) that help us to certainty as to whether or not a patient has the disease. The making of the process is secure and cheap.

These can also be used to pinpoint the progression of the disease which helps the doctor to choose the correct treatment and monitor whether the drug is work

AI can automatically concentrate on the large portion of the manual work and speed up it to good and bad candidates.

Biomarkers can also be used to identify

- Presence of disease as easily as possible. These are diagnostic biomarkers.
- Risk of the patient developing the disease-risk

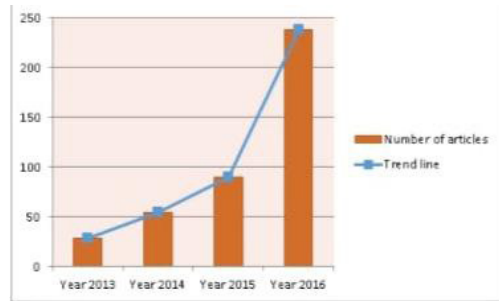
biomarkers.

- The likely progress of the disease-prognostic biomarkers.
- Whether the patient will respond to a drug-predictive biomarker.

AI in Cancer

Andrew. D. Smith has published this in his article that the Food and Drug Administration (FDA) has also Cleared at least one product that uses AI to analyze mammography. The Transpara device from a Netherlands company called ScreenPoint Medical has carried out a series of tests. The biggest challenge Pitted transpara against 101 radiologists in the analysis of 2652 digital mammograms.

“Machine learning is a very powerful tool, but it requires a huge amount of data,” says Tony Kerlavage, who runs one of the nation’s largest repositories for cancer data, NCI’s Center for Biomedical Informatics and Information Technology. There are CT scans and Mammograms to identify cancer. There are some more things that are improving in AI.



Future of AI Medical

The artificial intelligence (AI)market in health care is expected to grow to \$66 billion by 2021 according to Accenture consulting this innovative technology has led many advancements, for AI-based software for management of medical records, to robotics assisting surgeries.

AI vs. Humans

AI is proving to be as dependable as physicians in diagnosing medical condition researchers at AI, a hospital in Oxford, England, have developer AI for predicting heart disease. According to their report, the technology performed better than doctors in cardiovascular disease prediction in 80 percent of cases. Scientists at the machine - a learning based microscope that can detect deadly blood infection with an astonishing 95% accuracy.

Survey on AI used fo Medical Purpose

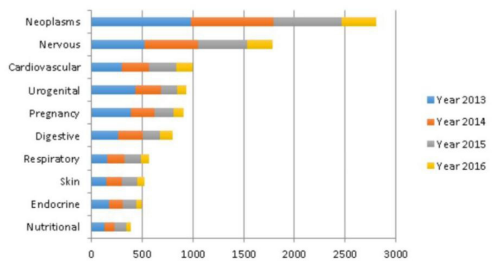


Figure 1: There is the top 10 disease where AI is mostly used

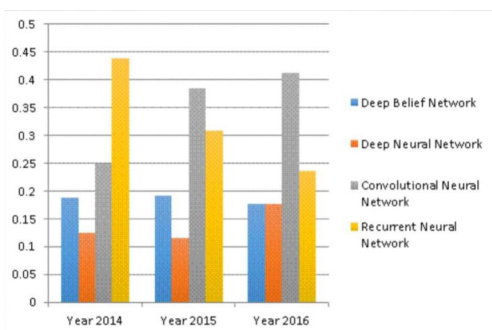


Figure 2: Survey on an article that has been written

Conclusion

There are many different AI techniques available that are capable of solving a variety of clinical problems. It will support the future needs of medicine by analyzing the various forms of data that patients in hospitals records at every moment. Future medicine is likely to be even more data-dependent on the synergy between medicine and AI technology. AI promises to change the practice of medicine, and many of their need to be explored and developed better. A lot of AI is already being utilized in the medical field for various purposes. AI is growing into the public health sector, and in the future, it is going to have a major impact on every aspect of primary care. AI is also used to collect and analyze the patient’s details. This is essential because AI is completely replacing humans in the field of medicine.

References

- Dilsizian, S.E. and Siegel, E.L. "Artificial Intelligence in Medicine and Cardiac Imaging: Harnessing Big Data and Advanced Computing to Provide Personalized Medical Diagnosis and Treatment." *Curr Cardiol Rep*, vol. 16, no. 1, 2014.
- Fleming, Nic. "How Artificial Intelligence is Changing Drug Discovery." *Nature*, 2018.
- Jha, S. and Topol, E.J. "Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialist." *JAMA*, vol. 316, no. 22, 2016, pp. 2353-2354.
- Kolker, E. et al. "How Healthcare can Refocus on its Super-Customers (Patients, n=1) and Customers (Doctors and Nurses) by Leveraging Lessons from Amazon, Uber, and Watson." *Omics*, vol. 20, no. 6, 2016, pp. 329-333.
- Lamberti, Mary. et al. "A Study on the Application and Use of Artificial Intelligence to Support Drug Development." *Clinical Therapeutics*, vol. 41, no. 8, 2019, pp. 1414-1426.
- Nagarajan, N. "Application of Computational Biology and Artificial Intelligence Technologies in Cancer Precision Drug Discovery." *BioMed Research International*, 2019.
- Nogrady, B. "Artificial Intelligence Shakes Up Drug Discovery." *The Scientist*, 2019.
- Patel, V.L. et al. "The Coming of Age of Artificial Intelligence in Medicine." *Artificial Intelligence Medicine*, vol. 46, no. 1, 2009, pp. 5-17.
- Romm, E.L. and Igor F. Tsigelny. "Artificial Intelligence in Drug Treatment." *Annual Review of Pharmacology Toxicology*, vol. 60, no. 1, 2020, pp. 353-369.
- Réda, C. et al. "Machine Learning Applications in Drug Development." *Computational and Structural Biotechnology Journal*, vol. 18, 2020, pp. 241-252.
- Stephen Chan, H.C. et al. "Advancing Drug Discovery via Artificial Intelligence." *Trends in Pharmacological Sciences*, 2019.
- Winters, B. et al. "Diagnostic Errors in the Intensive Care Unit: A Systematic Review of Autopsy Studies." *BMJ Quality and Safety*, vol. 21, no. 11, 2012, pp. 894-902.

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