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Commentary

Using Artificial Intelligence (AI) to Establish Successful Disease Therapy Regimens

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Machines (computers) can demonstrate human-like actions including the capability of thinking and acting rationally. Surprised? Why is this important? When properly designed, AI processes exceed human brain performance in thinking. Surprised? Perhaps more important is that AI can produce results without having to be specifically instructed to do selected tasks because of the mathematical algorithms used. Algorithms are a set of instructions programmed into computers to solve a particular task or problem. These algorithms used in computers, although created by humans, allow computers to perform tasks intelligently without being explicitly instructed to do so. How can this problem solving happen?

AI systems are the result of reverse-engineering of human traits and capabilities used by computers. The computational strength available to analyze data and establish possible scenarios that surpass what humans are capable of exists. All of this computational ability translates to thinking outside the "human brain box" to find new opportunities for solving problems.

Researchers today recognize three different types of AI which are being used for different areas of problem solving: Artificial Narrow Intelligence (ANI) using Machine (computer) Learning, Artificial General Intelligence (AGI) using Machine (computer) Intelligence and Artificial Super Intelligence using Machine (computer) Consciousness. Machine (computer) Learning involving ANI specializes in solving just one problem. Machine Intelligence approaches are used to solve multiple problems in complicated extended complex problem solving recognize that a computer is as smart as a human in all areas. The highest level of computer involvement is Machine Consciousness (ASI) use which allows definition of an intellect that is much smarter than the best human brains in nearly every field of involvement. Perhaps most important is that each of these different AI types of problem-solving processes, the algorithms required have been defined by humans written by programs written for programming into computers!

With this understanding of AI, which type of AI is currently being utilized to establish successful therapy regimens for specific diseases or chronic medical conditions? Machine learning techniques have become valuable at various points in the drug development process, particularly in early-stage drug target discovery and offer impressions of the possible improvements in drug therapy efficiency and success in specific chronic diseases.

AI use allows biomedical assessment of data from multiple sources that is often lost in the various formats which are often not available to computational analysis. Sources of data are contained within publications, patents, clinical records and other public available documents which are often targeted to special readers. One algorithm, the Natural language processing (NLP) algorithm, uses a technique known as "deep learning" to analyze documents and data bases to identify biologically relevant *text* elements such a genes, proteins, drug

or clinical manifestations of the disease. This is known as "text mining". Use of NLP found data is today often connected by researchers together from multiple public, proprietary and government sources for drugs and diseases, worldwide, to define a "knowledge graph". This combination of chemical related data, drug-related data and disease related data allows an assembly of a complex network of biological or chemical information which can create a much more complete data story useful in a specific pursuit than any one dataset on its own.

Not surprisingly, Machine Learning (ML) can also extract informative features from image data. Developed computer vision algorithms can review large collections of various magnetic resonance imaging (MRI) data extracted from thousands of patients from various imaging of different body organs and parts to effect a rational prediction of possible connections contributing to specific diseases. This technique of AI is currently used to differentiate similar features of the different diseases and how they may influence different disease progression. The similar features of each disease, and their cause, onset and progression can then be used to predict similarities in another disease.

This can offer a possible recommendation for successful therapy regimens and possible points of intervention for the disease or chronic condition being pursued for successful disease therapy regimens.

The farther we go the more we know! What is next in drug development and disease regimen management? Who will bring this technology to design dementia and Alzheimer's patient life longevity and quality? Be Well!

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