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ARTIFICIAL INTELLIGENCE (AI) AND ITS IMPACT ON HEALTHCARE

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AI DEFINITIONS (Investopedia)



ARTIFICIAL INTELLIGENCE

... applying to any technique, that enables computers to mimic human intelligence, using logic, if then rules, decision trees, and machine learning (including deep learning)

MACHINE LEARNING

... subset of AIO, that includes statistical techniques, that enable machines to improve at tasks with experience

DEEP LEARNING

... subset of machine learning, comprising algorithms, that permit software to train itself to perform tasks like speech and image recognition, by exposing multilayered neural networks to vast amounts of data

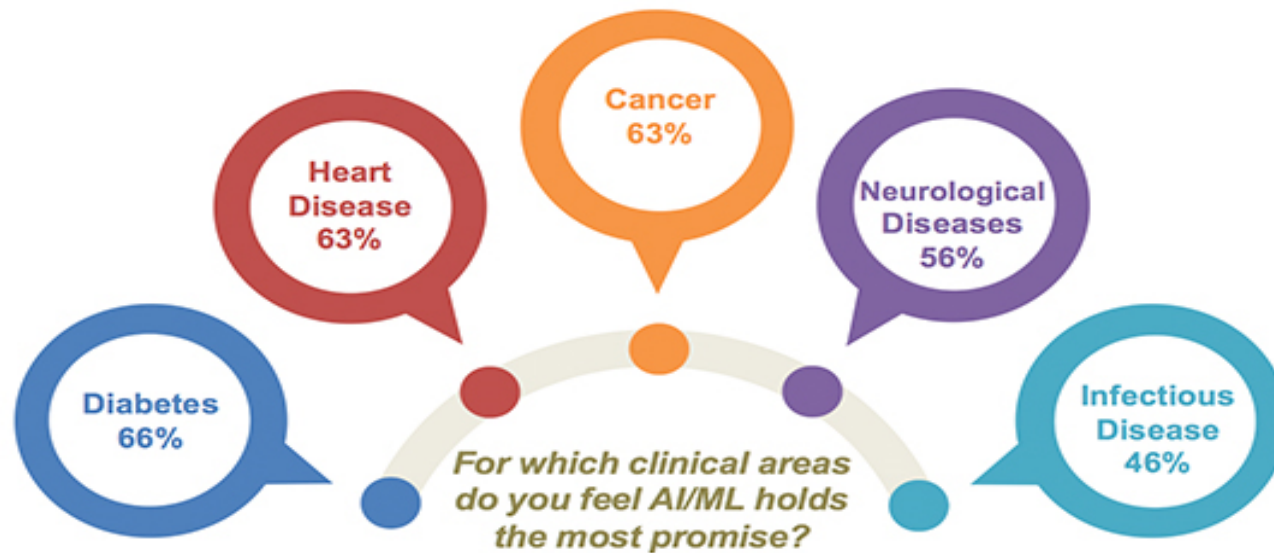
NEURAL NETWORK

...A series of algorithms that recognizes relationships in a set of data similar to a human mind

AI Impact on Healthcare

Health Information and Management Systems Society (HIMSS)

CHRONIC HEALTH CONDITIONS EXPECTED TO BENEFIT MOST FROM AI/ML



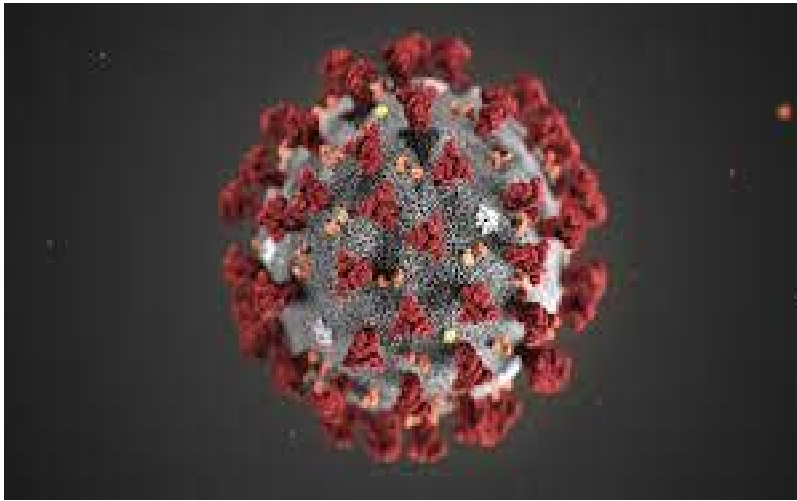
Medical Image Diagnosis



- ❑ Machine learning and deep learning are both responsible for the breakthrough technology called Computer Vision.
- ❑ This uses diagnostic tools for Image Analysis.

Inner Eye initiative developed by Microsoft which works on image diagnostic tools for image analysis. We expect more data sources from varied medical imagery become a part of this AI-driven diagnostic process

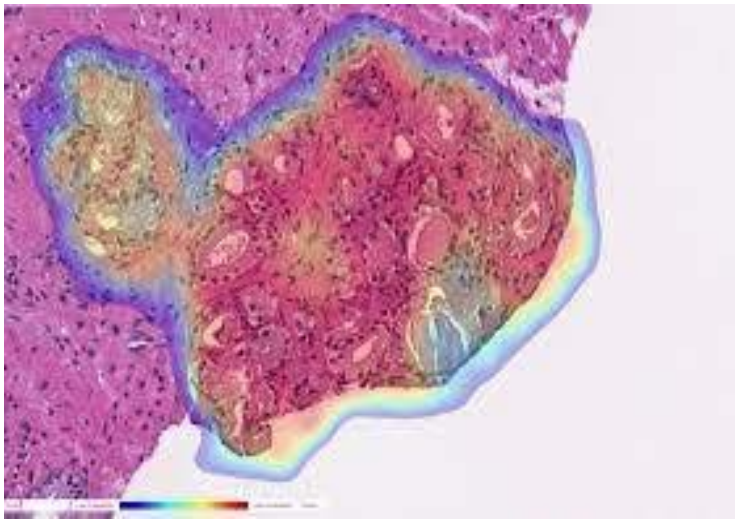
Disease Outbreak Prediction



- ❑ AI-based technologies and machine learning are today also being put to use in monitoring and predicting epidemics around the world.
- ❑ Data collected from satellites, real-time social media updates, website information, etc. Artificial neural networks help to collate this information and predict everything from malaria outbreaks to severe chronic infectious diseases

ProMED-mail, an Internet-based reporting platform which monitors evolving diseases and emerging ones and provides outbreak reports in real-time.

Identifying Disease and Diagnosis



- ❑ identification and diagnosis of diseases and ailments which are otherwise considered hard-to-diagnose.
- ❑ This can include anything from cancers which are tough to catch during the initial stages, to other genetic diseases.

IBM Watson Genomics is a prime example of how integrating cognitive computing with genome-based tumour sequencing can help in making a fast diagnosis.

Berg, the biopharma giant is leveraging AI to develop therapeutic treatments in areas such as oncology.

Smart Health Records



- ❑ Maintaining up-to-date health records is an exhaustive process,, a majority of the processes take a lot of time to complete.
- ❑ The main role of machine learning in healthcare is to ease processes to save time, effort, and money.
- ❑ Document classification methods using vector machines and ML-based OCR recognition techniques are slowly gathering steam,

Google's Cloud Vision API and MATLAB's machine learning-based handwriting recognition technology. MIT is today at the cutting edge of developing the next generation of intelligent, smart health records, which will incorporate ML-based tools from the ground up to help with diagnosis, clinical treatment suggestions, etc.

Accurate Radiotherapy



- Medical image analysis has many discrete variables which can arise at any moment in time.
- One of the most popular uses of machine learning in medical image analysis is the classification of objects such as lesions into categories such as normal or abnormal, lesion or non-lesion, etc.

Google's DeepMind Health is actively helping researchers in UCLH develop algorithms which can detect the difference between healthy and cancerous tissue and improve radiation treatment for the same.

Personalized Medicine



- ❑ Personalized treatments can not only be more effective by pairing individual health with predictive analytics
- ❑ Currently further research and better disease assessment is being assessed

IBM Watson Oncology is at the forefront of this movement by leveraging patient medical history to help generate multiple treatment options. In the coming years, we will see more devices and biosensors with sophisticated health measurement capabilities hit the market, allowing more data to become readily available for such cutting-edge ML-based healthcare technologies.

Machine learning and Behavior Change



- ❑ Behavioural modification is an important part of preventive medicine,
- ❑ In the fields of cancer prevention and identification, patient treatment, etc.

Somatix is a B2B2C-based data analytics company which has released an ML-based app to recognize gestures which we make in our daily lives, allowing us to understand our unconscious behavior and make necessary changes

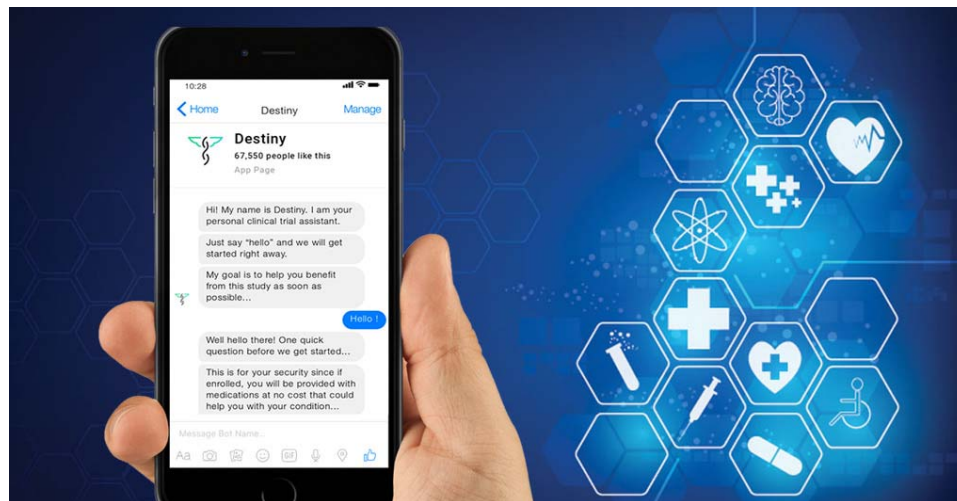
Drug Discovery & Manufacturing



- ❑ Early-stage drug discovery process.
- ❑ New sequencing and precision medicine methods
- ❑ alternative paths for therapy of multifactorial diseases.
- ❑ identify patterns in data without providing any predictions.

Project Hanover developed by Microsoft is using ML-based technologies for multiple initiatives including developing AI-based technology for cancer treatment and personalizing drug combination for AML (Acute Myeloid Leukemia).

Clinical Trials



- ❑ Machine learning has several potential applications in the field of clinical trials and research.
- ❑ clinical trials cost a lot of time and money and can take years to complete in many cases. Applying ML-based predictive analytics to identify potential clinical trial candidates

Real-time monitoring and data access of the trial participants, finding the best sample size to be tested, and leveraging the power of electronic records to reduce data-based errors

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- Google Corporation

To all my teachers.