TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 11395 - 11400

Outbreak Predictions in Healthcare Domain using Machine learning & Artificial Intelligence

[1]S.Vinay Kumar, [2]V.Suresh, [3]B.Dilip Kumar Reddy [4]Y.R.Janardhan Reddy

[1,2, 3,4]Assisstant Professor,G.Pulla Reddy Engineering College,Kurnool

[1]vinay.gprec@gmail.com, [2]sureshv@gmail.com, [3]dilip.kumar508@gmail.com, [4]yr.janardhan@gmail.com

Article Info
Volume 82
Page Number: 11395 - 11400
Publication Issue:
January-February 2020

Article History
Article Received*: 18 May 2019*
Revised*: 14 July 2019*
Accepted*: 22 December 2019*
Publication*: 21 February 2020*

Abstract
AI-based technologies and machine learning are being put to use in monitoring and predicting epidemics around the world. Today, scientists have access to an outsized amount of knowledge collected from satellites, real-time social media updates, website information, etc. Artificial neural networks help to collate this information and predict every disease from various techniques & outbreaks to severe chronic infectious diseases. Predicting these outbreaks is particularly helpful in third-world countries as they lack in crucial medical infrastructure and academic systems. A primary example of this is often the ProMED-mail, an internet-based reporting platform which monitors evolving diseases and emerging ones and provides outbreak reports in real-time.

Keywords: *Outbreaks, healthcare, predictions, Datasets, Behavioral Modifications, KNN Algorithm, Decision Tree, Naïve Bayes.*

I.INTRODUCTION

Healthcare is a crucial industry which offers value-based care to many people, while at an equivalent time becoming top revenue earners for several countries. Today, the Healthcare industry in the US alone earns revenue of $1.668 trillion. US also spends more on healthcare per capita as compared to most other developed or developing nations. Quality, Value, and Outcome are three buzzwords that always accompany healthcare and promise tons , and today, healthcare specialists and stakeholders round the globe are trying to find innovative ways to deliver on this promise. Technology-enabled smart healthcare is not any longer a flight of fancy, as internet-connected medical devices are holding the health system as we all know it together from falling apart under the population burden.

From playing a critical role in patient care, billing, and medical records, today technology is allowing healthcare specialists develop alternate staffing models, IP capitalization, that gives smart healthcare, and reducing administrative and supply costs. Machine learning in healthcare is one such area which is seeing gradual acceptance within the healthcare industry. Google recently developed a machine-learning algorithm to spot cancerous tumors in mammograms, and researchers in Stanford University are using deep learning to spot carcinoma . Machine Learning (ML) is already lending a hand in diverse situations in healthcare.

ML in healthcare helps to analyze thousands of different data points and suggest outcomes, provides timely risk scores, precise resource allocation, and has many other applications.

II. IDENTIFYING DISEASES AND DIAGNOSIS

One of the chief ML applications in healthcare is that the identification and diagnosis of diseases and ailments which are otherwise considered

TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 11395 - 11400

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 tumor sequencing that can help in making a fast diagnosis. Berg, the biopharma giant is leveraging AI to develop therapeutic treatments in areas like oncology. P1vital's PReDicT (Predicting Response to Depression Treatment) aims to develop commercially feasible thanks to diagnose and supply treatment in routine clinical conditions. Various diseases can be identified:

A. Heart Disease Diagnosis

The heart is one of the principal organs of our body. We often suffer a variety of heart diseases like Coronary Artery Disease (CAD), Coronary Heart Disease (CHD), and so forth. Many researchers are performing on machine learning algorithms for heart condition diagnosis. It is a really hot research issue everywhere the planet. An automated heart condition diagnosis system is one among the foremost remarkable benefits of machine learning in healthcare. Researchers are working several supervised machine learning algorithms like Support Vector Machine (SVM) or Naive Bayes to use as a learning algorithm for heart condition detection. The Heart disease dataset from UCI are often used as training or testing dataset or both. The WEKA data mining tool can be used for data analysis. Alternatively, if you would like, you'll use a man-made Neural Network (ANN) approach to develop the guts disease diagnosis system.

B. Predicting Diabetes

Diabetes is one among the common and dangerous diseases. Also, this disease is one among the leading causes to make the other severe illness and towards death. This disease can damage our various body parts like kidney, heart, and nerves. The objective of employing a machine learning approach during this field is to detect diabetes at an early stage and save patients.

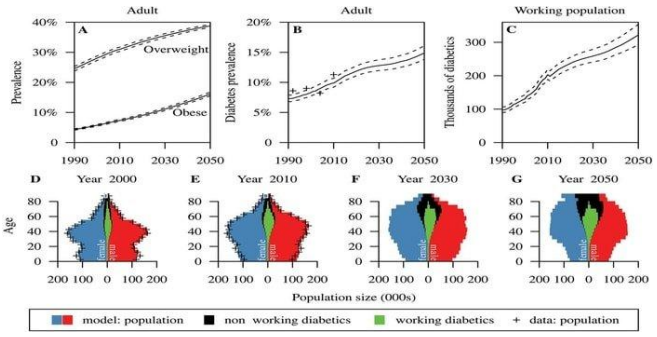

Figure 1.Represents predicting diabetes in Adults and working population

As a classification algorithm, Random forest, KNN, Decision Tree, or Naive Bayes are often wont to develop the diabetes prediction system. Among these, Naive Bayes outperforms the other algorithms in terms of accuracy. Because its performance is superb and takes less computation time. You can download the diabetes dataset from here. It contains 768 data points with nine features each.

C. Prediction Of Liver Disease

The liver is that the second most vital viscous in our body. It plays a vital role in metabolism. One can attack several liver diseases like Cirrhosis, Chronic Hepatitis, cancer of the liver, and so on. Recently, machine learning and data processing concepts are used dramatically to predict disease.

It is considerably challenging task to predict disease using voluminous medical data. However, researchers try their best to beat such issues using machine learning concepts like classification, clustering, and lots of more. Indian Liver Patient Dataset(ILPD) are often used for a liver disease prediction system. This dataset contains ten variables. Or, liver Disorders Dataset can also be used. As a classifier, Support Vector Machine (SVM) can be used. You can use MATLAB to develop the disease prediction system.

D. Cancer Detection And Prediction

At present, machine learning approaches are getting used to detect and classify tumors extensively. Also, deep learning plays a big role in cancer detection. As deep learning is accessible and data sources are available. A study showed that deep learning reduces the share of error for carcinoma diagnosis.

Machine learning has proven its capabilities to detect cancer successfully. China researchers explored Deep

January - February 2020
ISSN: 0193 - 4120 Page No. 11395 - 11400

Gene: a cancer type classifier using deep learning and somatic point mutations. Employing a deep learning approach, cancer also can be detected by extracting features from organic phenomenon data. Moreover, the Convolution Neural Network (CNN) is being applied in cancer classification.

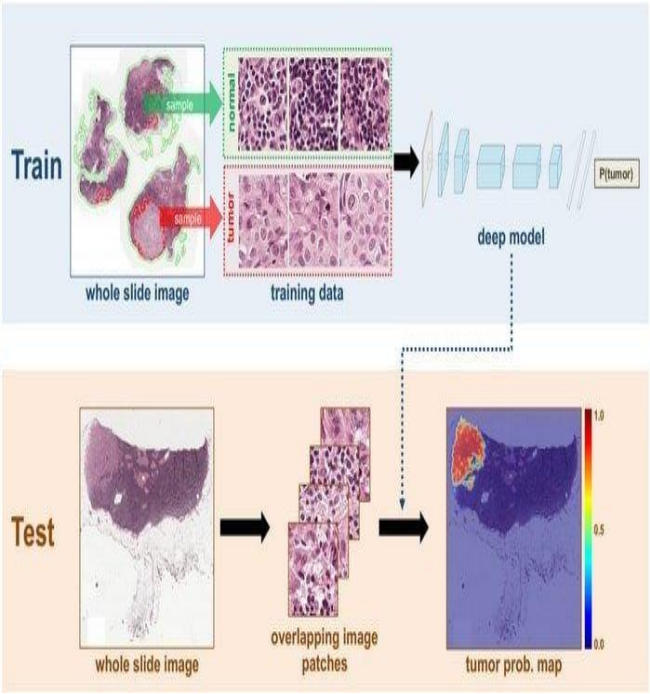

Figure 2. Machine Learning provide the capabilites to spot the Cancer

III. MEDICAL IMAGING DIAGNOSIS:

Machine learning and deep learning are both liable for the breakthrough technology called Computer Vision. This has found acceptance within the Inner Eye initiative developed by Microsoft which works on image diagnostic tools for image analysis. As machine learning becomes more accessible and as they grow in their explanatory capacity, expect to ascertain more data sources from varied medical imagery become a neighborhood of this AI-driven diagnostic process.

Machine Learning Predicts the Drug discovery byBiologicalInput:

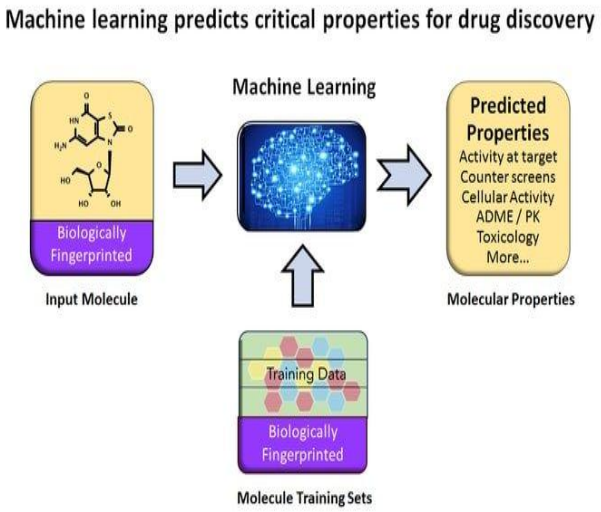

Figure 3.ML Predicts the Drug discovery by Biological Input:

The use of machine learning in drug discovery may be a benchmark application of machine learning in medicine. Microsoft Project Hanover is functioning to bring machine learning technologies in precision medicine. at the present , several companies are applying machine learning technique in drug discovery. As an instance, Benevolent. Their objective is to use AI (AI) in drug discovery.

There are several benefits of applying machine learning during this field, like it'll speed up the method and reduce the failure rate. Also, machine learning optimizes the manufacturing process and price of drug discovery.

I. Personalized Medicine:

Personalized treatments can't only be simpler by pairing individual health with predictive analytics but is additionally ripe are for further research and better disease assessment. Currently, physicians are limited to picking from a selected set of diagnoses or estimate the danger to the patient supported his symptomatic history and available genetic information. But machine learning in medicine is making great strides, and IBM Watson Oncology is at the forefront of this movement by leveraging patient medical record to assist generate multiple treatment options. Within the coming years, we'll see more devices and biosensors with sophisticated health measurement capabilities hit the market, allowing more data to become readily

TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 11395 - 11400

available for such cutting-edge ML-based healthcare technologies.

Machine learning for personalized treatment may be a hot research issue. The goal of this area is to supply better service supported individual health data with predictive analysis. Machine learning computational and statistical tools are wont to develop a customized treatment system supported patients' symptoms and genetic information.

To develop the personalized treatment system, a supervised machine learning algorithm is employed. This technique is developed using patient medical information. Skin Vision app is that the example of personalized treatment. By using this app, one can check his/her skin for carcinoma on his/her phone. The personalized treatment system can reduce the value of healthcare.

IV. DRUG DISCOVERY/MANUFACTURING

The use of machine learning in preliminary (early-stage) drug discovery has the potential for various uses, from initial screening of drug compounds to predicted success rate supported biological factors. This includes R&D discovery technologies like next-generation sequencing.

Precision medicine, which involves identifying mechanisms for "multifactorial" diseases and successively alternative paths for therapy, seems to be the frontier during this space. Much of this research involves unsupervised learning, which is in large part still confined to identifying patterns in data without predictions (the latter remains within the realm of supervised learning).

A: Matrix representation of the supervised and unsupervised learning problem.

B: Decision trees map features to outcome.

C: Neural networks predict outcome supported transformed representations of features.

D: The k-nearest neighbor algorithm assigns class supported the values of the foremost similar training examples.

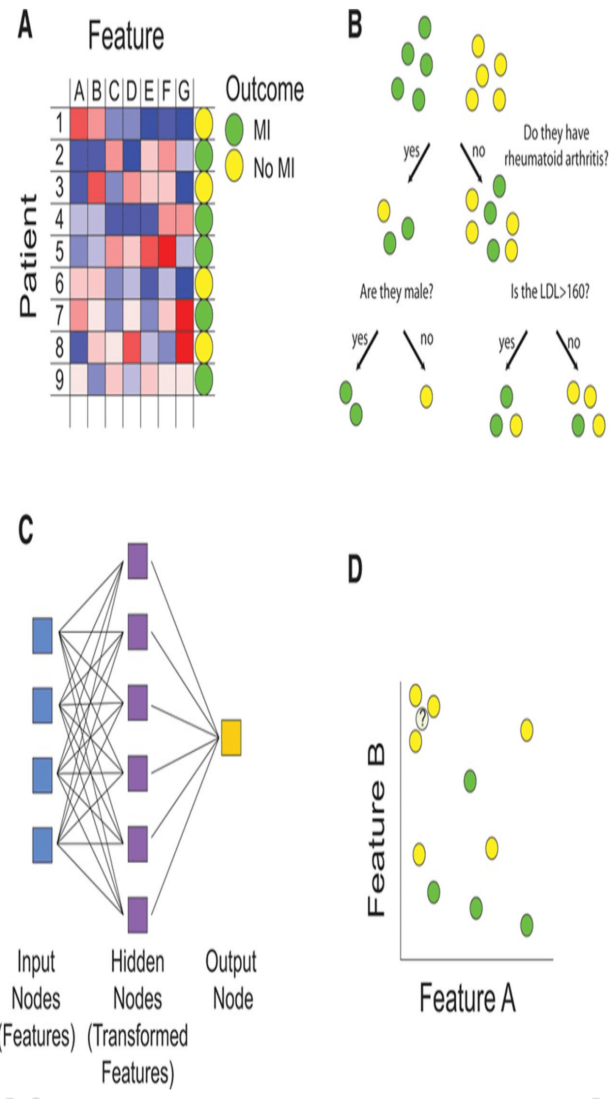

Figure 4.Represents the Features of the patients and outcome of MI

I. Machine Learning-Based Behavioral Modification:

Behavioral modification is a crucial a part of medicine , and ever since the proliferation of machine learning in healthcare, countless startups are cropping up within the fields of cancer prevention and identification, patient treatment, etc. Somatic may be a B2B2C-based data analytics company which has released an ML-based app to acknowledge gestures which we make in our daily lives, allowing us to know our unconscious behavior and make necessary changes.

II. Maintaining Smart Health Records:

Maintaining up-to-date health records is an exhaustive process, and while technology has

January - February 2020
ISSN: 0193 - 4120 Page No. 11395 - 11400

played its part in easing the info entry process, the reality is that even now, a majority of the processes take tons of your time to finish. The most role of machine learning in healthcare is to ease processes to save lots of time, effort, and money. Document classification methods using vector machines and ML-based OCR recognition techniques are slowly gathering steam, like Google's Cloud Vision API and MATLAB's machine learning-based handwriting recognition technology. MIT is today at the leading edge of developing subsequent generation of intelligent, smart health records, which can incorporate ML-based tolls from the bottom up to assist with diagnosis, clinical treatment suggestions, etc.

CONCLUSION

Artificial intelligence (AI) and Machine Learning in healthcare are often implemented with the assistance of complex algorithms and software to emulate human cognition within the analysis of complicated medical data. the first aim of health-related AI applications is to research relationships between prevention or treatment techniques and patient outcomes.

REFERENCES

[1] "A survey of big data architectures and machine learning algorithms in healthcare" Int. J. Biomedical Engineering and Technology, Vol. 25, Nos. 2/3/4, 2015.

[2] "Artificial intelligence in healthcare" Published: 10 October 2018,in *Nature Biomedical Engineering*.

[3] "Systematic Poisoning Attacks on and

Defenses for Machine Learning in Healthcare"

IEEE VOL. 19, NO. 6, NOVEMBER 2015.

[4] "A guide to deep learning in healthcare"published in Nature medicine Published: 07 January 2019.

[5] "Systematic Poisoning Attacks on and Defenses for Machine Learning in Healthcare" IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS, VOL. 19, NO. 6, NOVEMBER 2015.

[6] International Journal of Information Sciences and Techniques (IJIST) Vol.6, No.1/2, March 2016-"SURVEY OF DATA MINING TECHNIQUES USED IN HEALTHCARE DOMAIN "Sheenal Patel and Hardik Patel.

[7] "Applications of Data Mining Techniques in Healthcare and Prediction of Heart Attacks" K.Srinivas et al. / (IJCSE) International Journal on Computer Science and Engineering Vol. 02, No. 02, 2010, 250-255.

AUTHORS PROFILE

Mr.S.Vinay Kumar is currently working as Assistant Professor in CSE department,GPREC Kurnool.He has a total of 9 years of teaching experience whose areas of interest include Machine Learning, Software Engineering and BigData. He have memberships of MISTE

and IEEE.

Mr.V.Suresh is currently working as Assistant Professor in CSE department,GPREC,Kurnool.He has a total of 8 years of teaching experience whose areas of interest include Machine Learning, Software Engineering and BigData

TEST Engineering & Management

January - February 2020
ISSN: 0193 - 4120 Page No. 11395 - 11400

Mr.B.Dilip Kumar Reddy is currently working as Assistant Professor in CSE department,GPREC,Kurnool.He has a total of 9 years of teaching experience whose areas of interest include Big Data,Computer Networks and Artificial Intelligence.

Mr.Y.R.Janardhan Reddy is currently working as Assistant Professor in CSE department, GPREC,Kurnool. He has a total of 8 years of teaching experience whose areas of interest include Machine Learning, IOT and BigData.