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ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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Abstract: One of the most intriguing new developments in artificial intelligence is machine learning. There are several daily-used programs that incorporate learning algorithms. The moment to search the internet, a web search engine like Google or Bing is utilized. One of the reasons the internet functions so well is that a Google-implemented learning algorithm Microsoft has mastered the art of ranking websites. Each time Facebook is utilized, and it also identifies friends' images computer learning. Email spam filters protect users from also annoying to have to go through a ton of spam mails. In this essay, a quick summary and potential. The potential for machine learning's numerous applications has been created. The use of artificial intelligence (AI) has grown across numerous industries, including healthcare. Today, health care organizations of all sizes, types, and specializations are more interested in how artificial intelligence has developed and is assisting with patient requirements and care while also lowering costs and boosting effectiveness. This study investigates the effects of AI on healthcare administration, and problems associated with implementing AI in healthcare, as well as an analysis of numerous academic papers that employed AI models in a variety of healthcare fields, including dermatology, radiology, drug development, etc. The functions and services of healthcare have been significantly improved by the rise of machine learning (ML) and blockchain (BC). This study uses bibliometric visualization to examine how ML and BC are applied in the field of smart medicine. We list the nations with the highest output and most popular research topics.

Keywords: Artificial intelligence, Machine learning, Supervised learning, Unsupervised learning, Reinforcement learning Applications, Blockchain.

I. INTRODUCTION

One of the most widely employed types of AI in medicine and pharmacy is machine learning. AI tools may not be able to completely replace human doctors, but they can help them get better results. Each day, the healthcare sector produces enormous amounts of data. From medical literature, algorithms were able to extract details on drug interactions and negative effects. It can aid in the discovery of new compounds that may one day be combined to create the desired medicine as well as new uses for previously studied chemicals. The goal is to create cognitive helpers capable of reasoning and analysis. AI's ultimate goal is to provide machines intelligence similar to that of humans. Achieving this goal can be done by using learning algorithms that imitate how the human brain learns. Every aspect of life can be automated thanks to the machine learning field's size and rapid expansion. The intelligence of machines, as opposed to that of people or other living things, is referred to as artificial intelligence (AI). A conceptual framework for carrying out AI algorithms is called an artificial neural network (ANN). It is a replica of the way that neurons in the human brain communicate using different weights. Hardware-wise, the main focus of AI is the use of NN algorithms on a physical computing platform. Implementing the NN algorithm on a general-purpose central processor unit is the simplest method (CPU). This article examines recent developments in the use of AI in biomedicine, focusing on the key sectors of biomedical engineering and healthcare. According to our predictions, AI will keep growing and becoming a potent tool for biomedicine. Some programmable or adaptable accelerator hardware platforms can more effectively implement NNs for a specific application. AI can significantly contribute to the goal of making healthcare more interactive, personal, predictive, and preventative.

II. LITERATURE REVIEW

In order to create artificial intelligence (AI), hardware and software must work together. Analyzing connections between methods of treatment or prevention and patient outcomes is the primary goal of applications of artificial intelligence in the field of health. The majority of the time, it is used in procedures like patient monitoring, drug research, and developing treatment protocols.

Since the 1950s, artificial intelligence (AI) has been used in the field of medicine. AI development has sparked an increase in interest in and advancements in medical AI applications. AI is having an impact on medicine in a number of

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important areas, including diagnostics and clinical decision-making. By encouraging the medical community to use critical thinking and clinical inventiveness, artificial intelligence (AI) has the potential to lower care costs and eliminate repetitive tasks. These technologies can help find novel medications for managing healthcare services and treating patients. The focus of our essay will be AI ideas for the healthcare industry from the accounting, business, and management angles. Analyzing bibliometric data in the field of artificial intelligence (AI) offers insights for future researchers and practitioners. It also provides a topic dendrogram study that identifies five research clusters: health services management, predictive medicine, patient data, diagnostics, and clinical decision-making. [2]

An innovative idea known as "smart healthcare" refers to a set of guidelines that integrate management, prevention, diagnosis, and treatment. Medical staff members can log in to the medical system from any location to request medical photos and advice. Through the medical network, any hospital can obtain patient referral data. Scholars from a variety of fields have given the study of ML and BC a lot of attention. The current state of these two technologies in the medical industry has not been mapped by any study. In terms of nations, organizations, publication volume, authors, journals, sponsors, and subject areas, we examine the state of research.

Two sorts of artificial intelligence devices are distinguished. First place goes to machine learning (ML) algorithms that assess structured data, such as imaging, genomics, and EP data. NLP techniques extract features from unstructured data sources like clinical notes and medical literature. Wheelchair and robot assistance can be controlled using man-machine interfaces (HMI). Blind people may coexist with able-bodied people and take part in activities like innovation and computing on RUDO. Seniors can avoid falls and other problems by using a fall-recognition system.

III. APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

1. Managing Medical Records and other data: The most common usage of artificial intelligence and digital automation is in data management. Robots gather, archive, reformat, and track data to enable quicker, more reliable access. Information gathering and analysis are the primary steps in providing healthcare (like medical records and other past history).

2. Doing Repetitive Jobs: Robots can analyse tests, do X-rays, CT scans, data entry, and other routine jobs more quickly and precisely. In the fields of radiology and cardiology, the amount of data that needs to be analysed can be laborious and time-consuming. Future cardiologists and radiologists should focus on the most complex situations that benefit from human supervision.

3. Medication Management: Robots can analyse tests, do X-rays, CT scans, data entry, and other routine jobs more quickly and precisely. In the fields of radiology and cardiology, the amount of data that needs to be analysed can be laborious and time-consuming. Future cardiologists and radiologists should focus on the most complex situations that benefit from human supervision.

4. Drug Creation: Clinical trial drug development can take more than ten years and cost billions of dollars. The world could alter if this process was made quicker and more affordable. During the recent Ebola virus panic, an artificial intelligence (AI) algorithm was employed to search for existing medications that may be modified to treat the illness.

5. Health Monitoring: Heart rate and activity levels are tracked by wearable health trackers like those made by Fit-Bit, Apple, Garmin, and other companies. They can share this information with doctors (and AI systems) for extra data points on patient requirements and behaviours, as well as alert the user to undertake more exercise.

6. Precision Medicine: By using the data in DNA, genetics and genomics search for mutations and connections to disease. Body scans with AI can detect cancer and vascular disorders early and anticipate potential health problems based on a person's genetic makeup.

IV. OBJECTIVES

1. To study artificial intelligence applications.
2. To detect the spread of COVID 19, Pneumonia and Malaria infectious diseases using AI technology.
3. To discover the drugs process used for COVID 19, Pneumonia and Malaria using AI technology.

V. RESEARCH METHODOLOGY

Python: Python is an interpreted, general-purpose, dynamic, and high-level programming language. It supports a variety of programming paradigms, such as imperative, functional, and procedural programming. Its ease of learning and versatility make it a desirable scripting language for application development.

Machine Learning: Algorithms used in machine learning are created to assess data and extract information from it. The two main categories of machine learning algorithms are supervised learning and unsupervised learning. It has been suggested that partially supervised learning be used as a solution in cases where the results of particular subjects are

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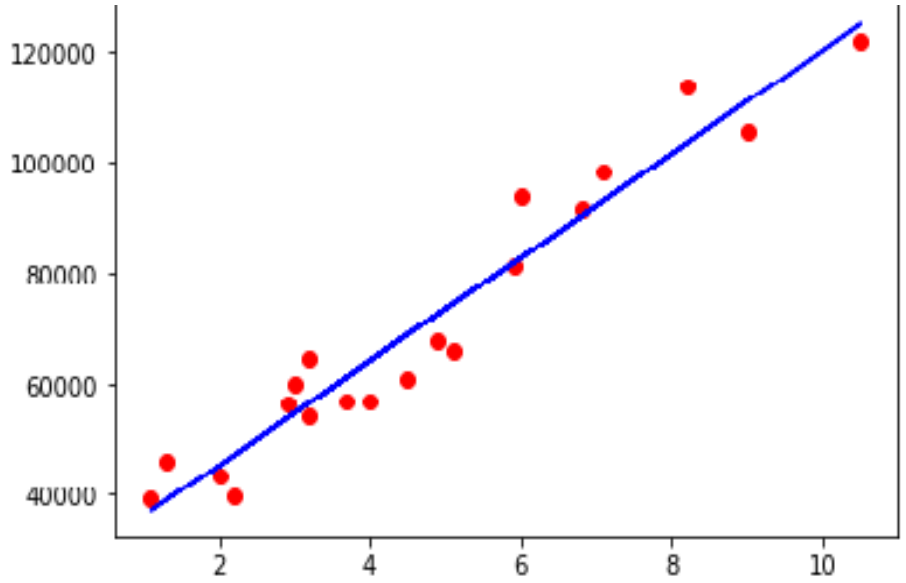
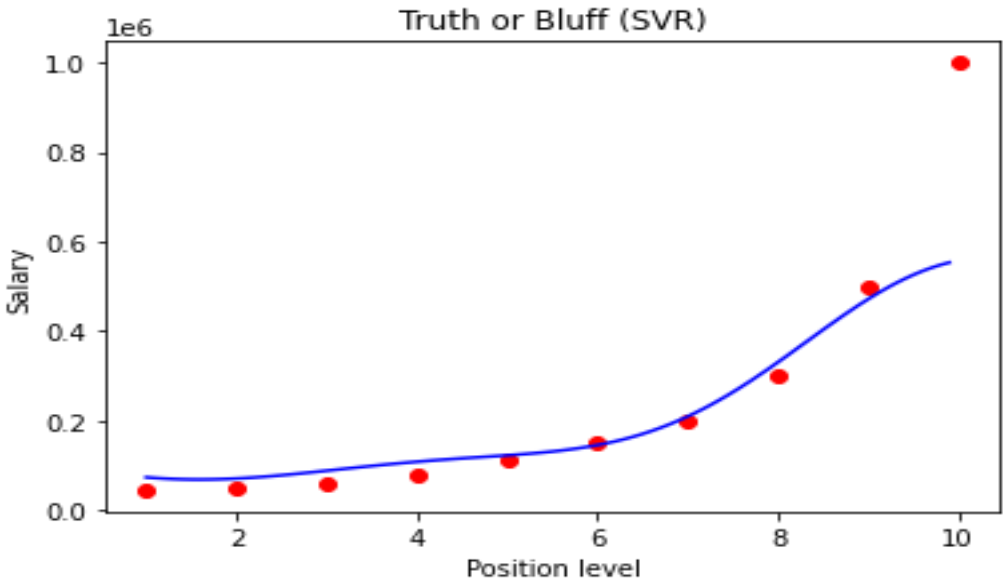
unclear. A more complicated kind of neural network is deep learning. A deep neural network is one that has multiple layers. To aid with therapeutic decision-making, NLP aims to extract relevant information from written texts. The NLP pipeline is designed to help doctors with treatment decision-making, side effect monitoring, and plan notification.

Machine Learning Algorithms

1. Linear Regression: It attempts to predict the relationship between a continuous target variable and one or more independent variables. Linear regression is a supervised learning approach. Ordinary-least squares is the most widely used method (OLE). By minimising the sum of squares of the distance between the data points and the regression line, the optimum regression line is identified using this method.



2. Support Vector Machine (SVM): The supervised learning algorithm Support Vector Machine (SVM) is primarily employed for classification problems. SVM creates a decision boundary to discriminate between classes. The decision border is drawn to optimise the distance to the support vectors.



Decision boundary in a 2D space is a line.

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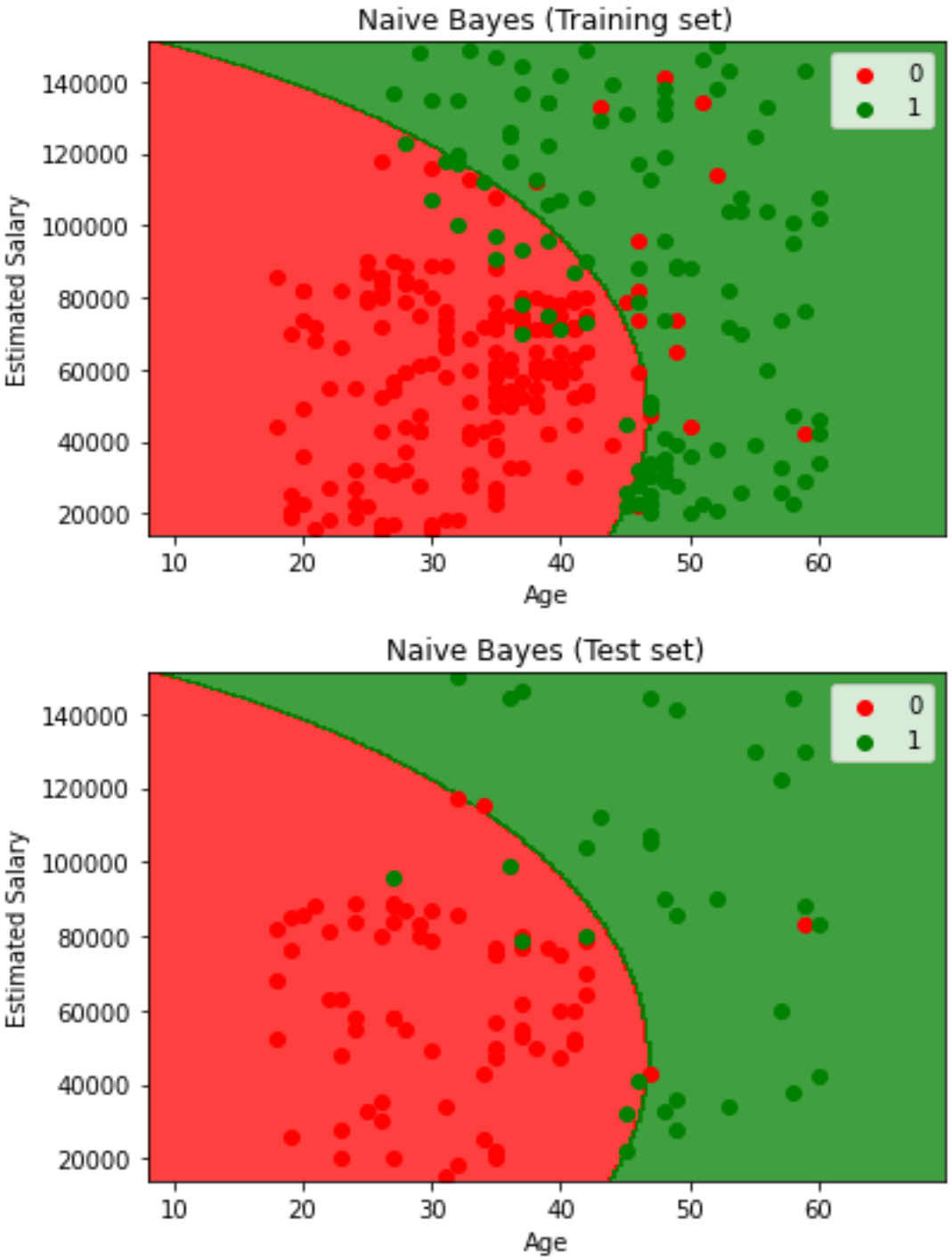
3. Naïve Bayes: An approach for supervised learning used for classification tasks is called naive bayes. It makes the supposition that features are unrelated to one another and do not correlate. This technique is referred to as "naive" since it makes the erroneous assumption that characteristics are uncorrelated.



4. Logistic regression: An algorithm for supervised learning is logistic regression. It is frequently employed for binary classification jobs like predicting ad clicks or spam email. Any real number is input into logistic regression, which converts it to a number between 0 and 1. The algorithm performs a binary classification problem using the logistic function and log odds.

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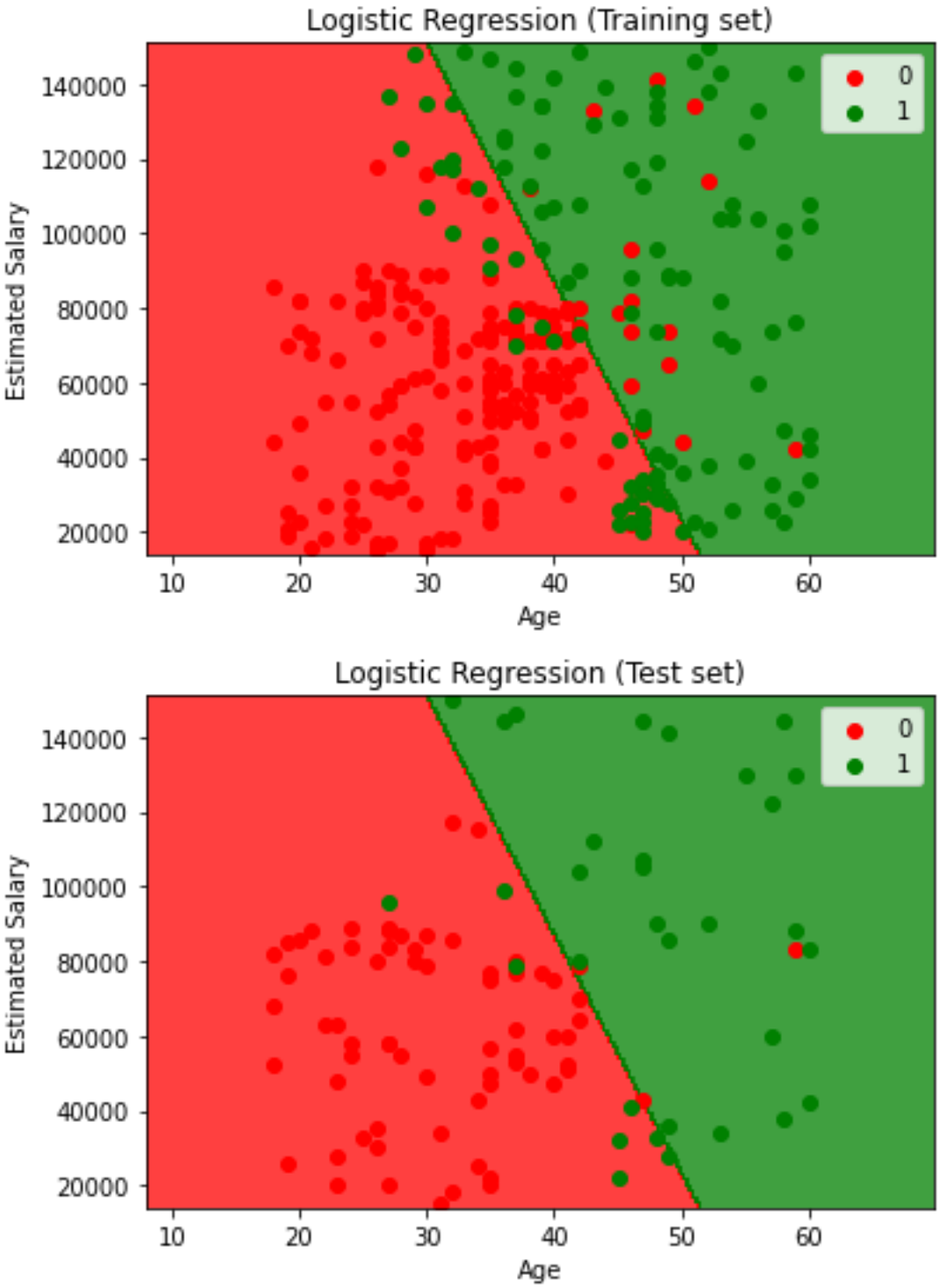

5. K-Nearest Neighbours (KNN): k-nearest neighbours (KNN) is a supervised learning algorithm that can be used to solve both classification and regression tasks. The value or class of a data point is determined by the data points around it. KNN becomes very slow as the number of data points increases because the model needs to store all data points.

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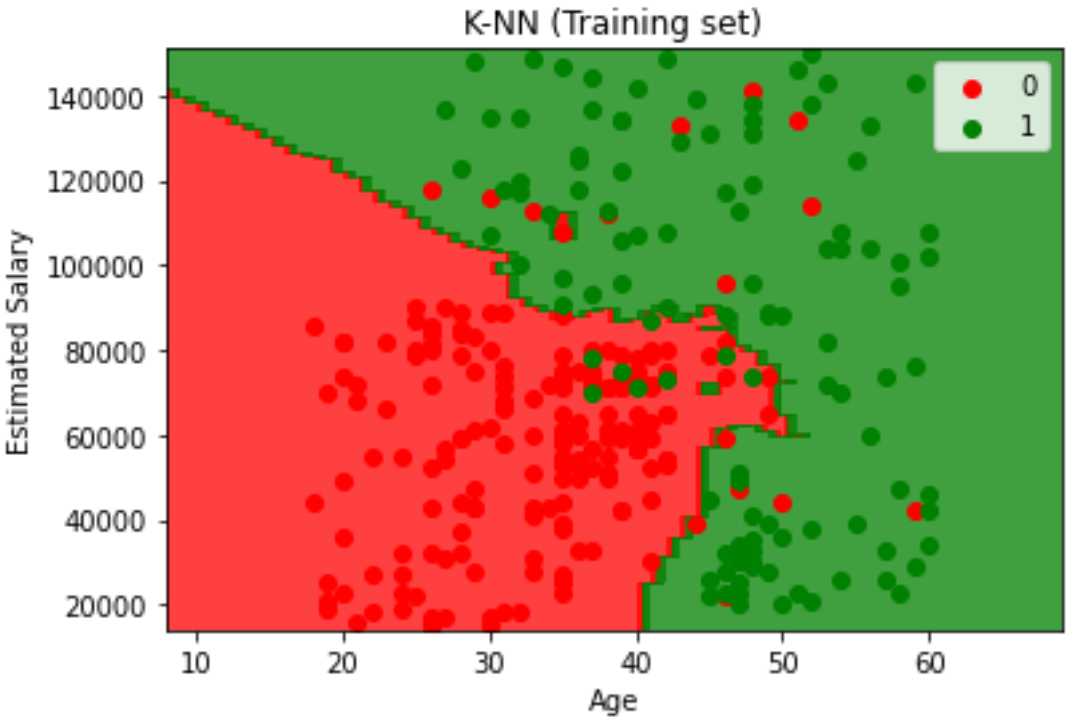

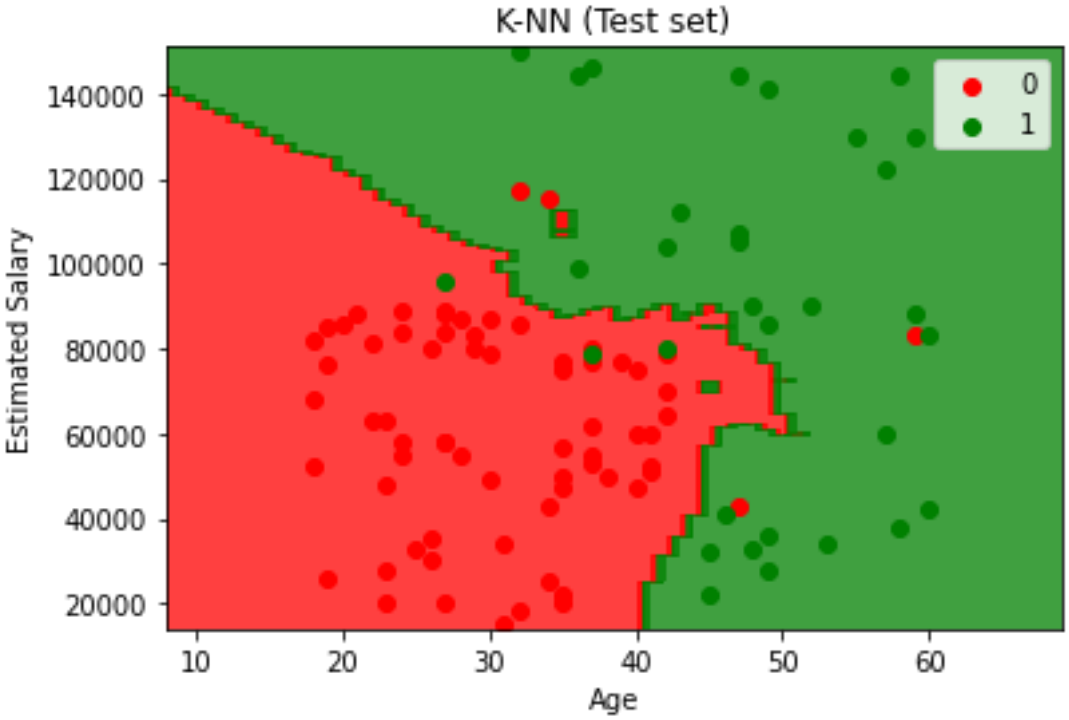

6. K Means Clustering: Clustering is an unsupervised learning technique, data points have no labels attached to them. The goal of K-means clustering is to divide data into k clusters so that data points within each cluster are comparable but farther apart.

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7. Decision tree: A supervised learning approach called a decision tree is most frequently applied to classification issues. It divides a population into multiple homogenous segments using a variety of methodologies, including Gini, Information Gain, Chi-square, and Entropy.

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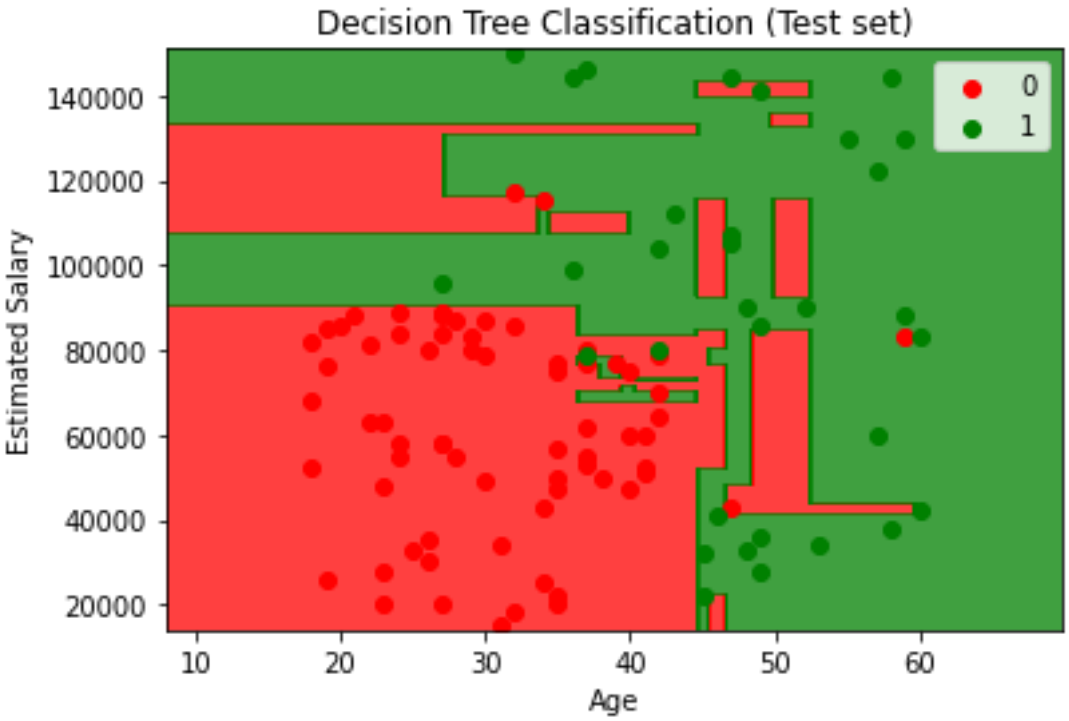
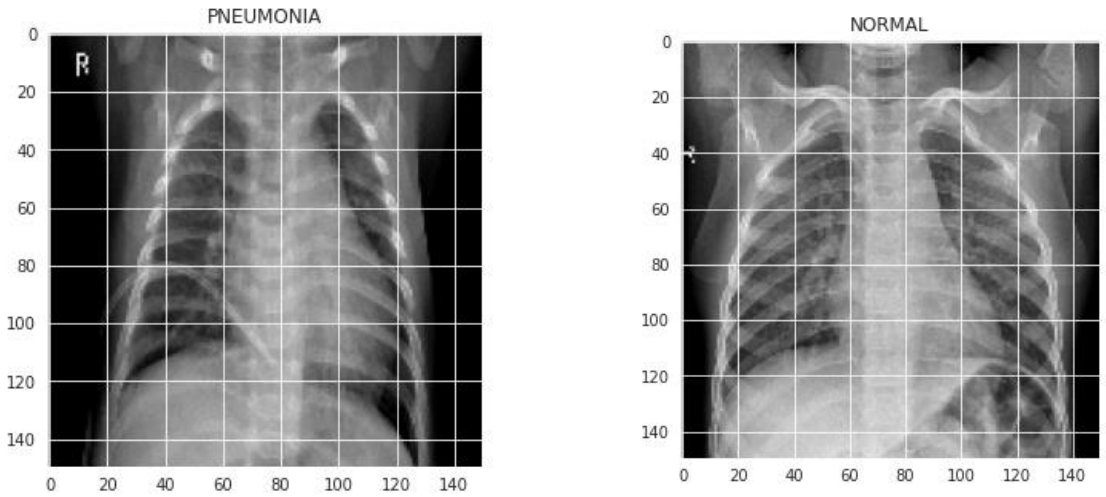


8. Convolutional Neural Network: A subclass of neural networks called convolution is adept at handling data with a grid-like architecture, like a picture. Convolution makes use of three key principles that inspired researchers in computer vision. A convolutional layer, a pooling layer, and a fully connected layer are typically its three layers.

VI. DETECTION OF THE SPREAD OF PNEUMONIA AND MALARIA INFECTIOUS DISEASES USING AI TECHNOLOGY

1. Detection of Pneumonia using CNN: Pneumonia is a lung inflammation that mostly affects the tiny air sacs known as alveoli. The location of the disease's acquisition—such as the community or the hospital—can be used to categorise it. Smoking, a history of smoking, and having trouble coughing are risk factors.

First we have imported all the libraries and the dataset. Next, we will make predictions by using training and testing dataset.
Previewing the images of both the classes.



First image is showing pneumonia and second image is showing normal. All these predictions are made using CNN algorithm.

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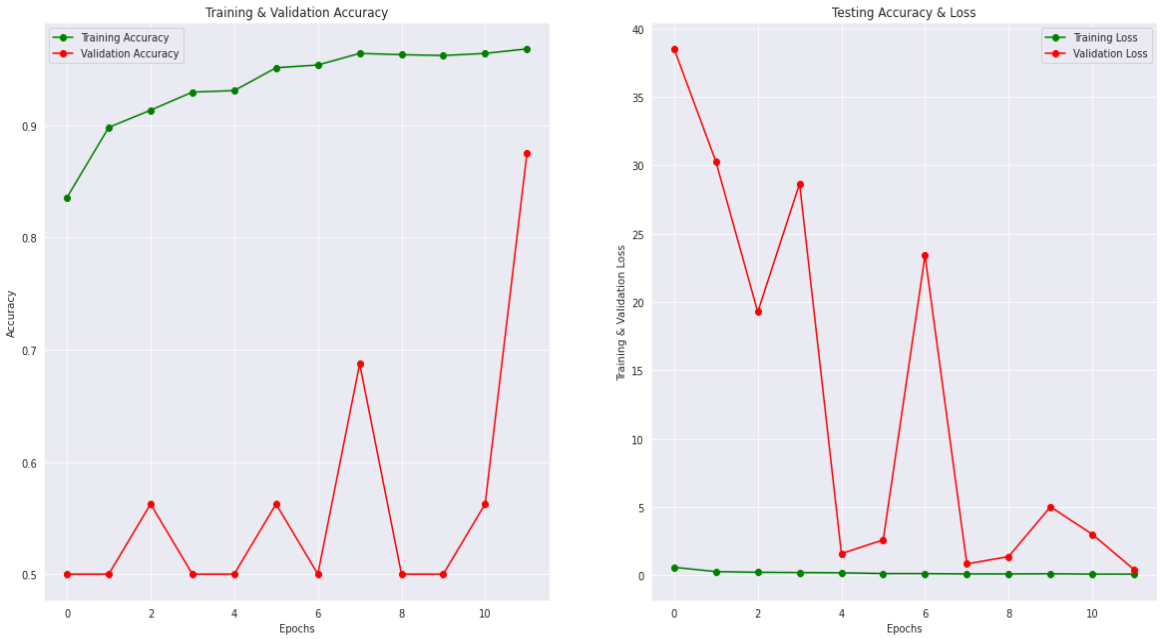
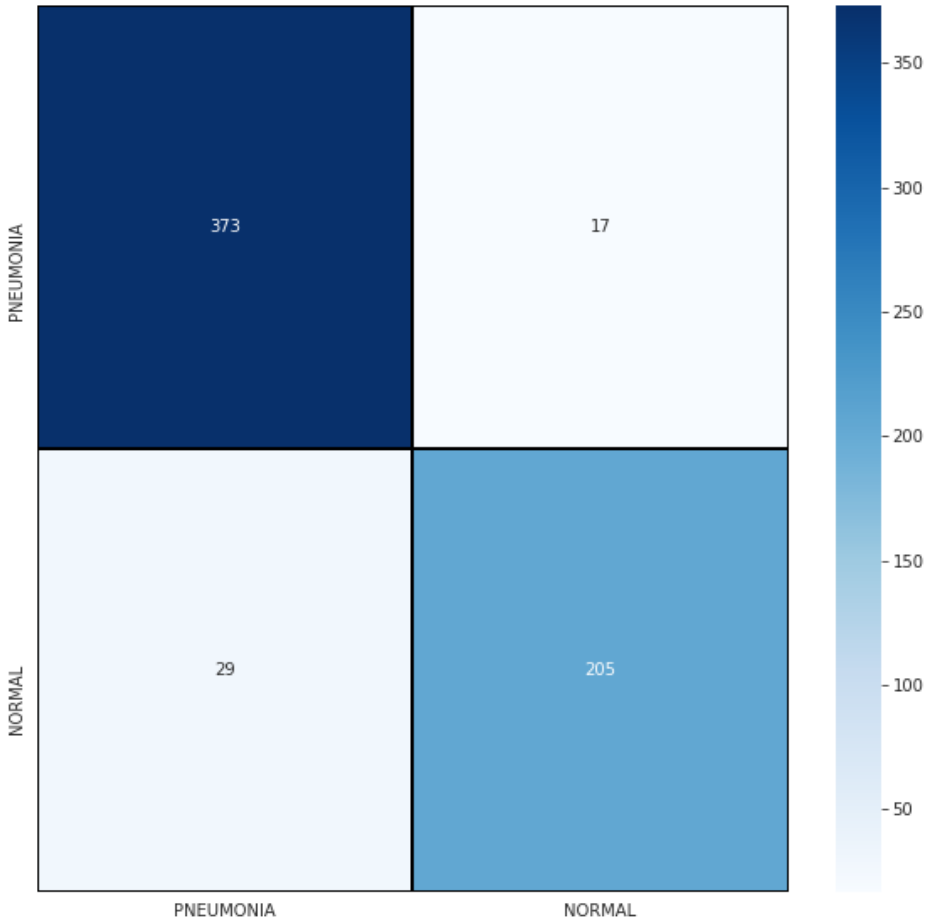
Analysis after Model training



The above diagram shows the accuracy of the training and testing dataset. The first diagram depicts that the training accuracy of the dataset is very high which implies that the dataset is very accurate.
The second diagram depicts that the testing dataset is on the bottom line but it is giving good predictions.

After predictions, the results are as follows:



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The levels 17 and 29 show that the health is absolutely disease free. Level 205 shows that the person is pneumonic but at a normal level. Level 373 which is above 350 shows that the person is severely pneumonic and needs immediate treatment.

2. Detection of Malaria using Deep Learning: Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable. Malaria causes symptoms that typically include fever, tiredness, vomiting, and headaches. In severe cases it can cause yellow skin, seizures, coma, or death.

Signs and symptoms

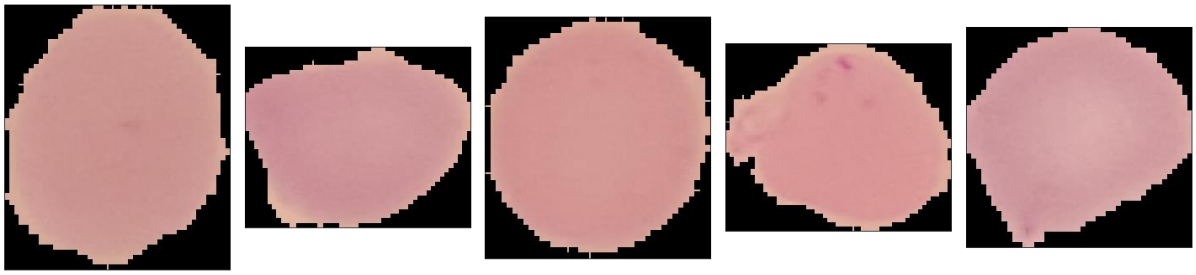
A malaria infection is generally characterized by the following signs and symptoms:

- Fever
- Chills
- Headache
- Nausea and vomiting
- Muscle pain and fatigue

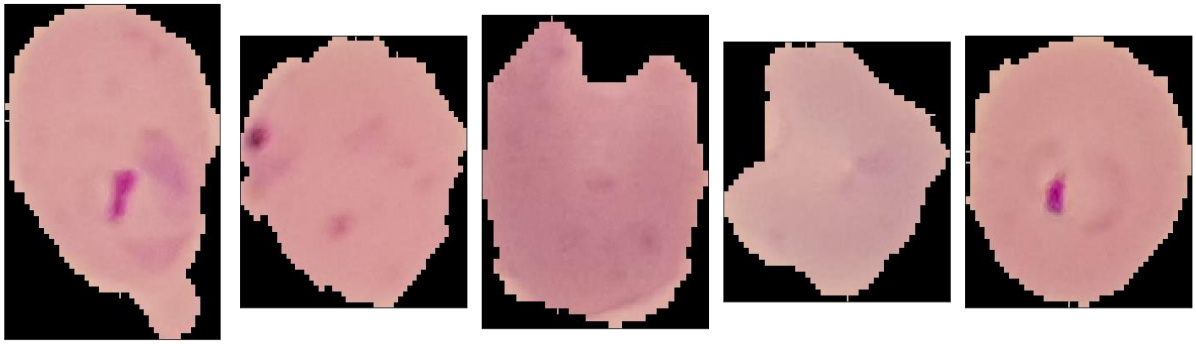
Other signs and symptoms may include:

- Sweating
- Chest or abdominal pain
- Cough

First we have imported all the libraries and the acquired dataset.
Then after importing the libraries and dataset, we have made few predictions in the form of images how severe malaria can be.



The above set of images show that the person is completely uninfected from malaria.



The second set of images shows that the person is infected from malaria from normal to severe in range.

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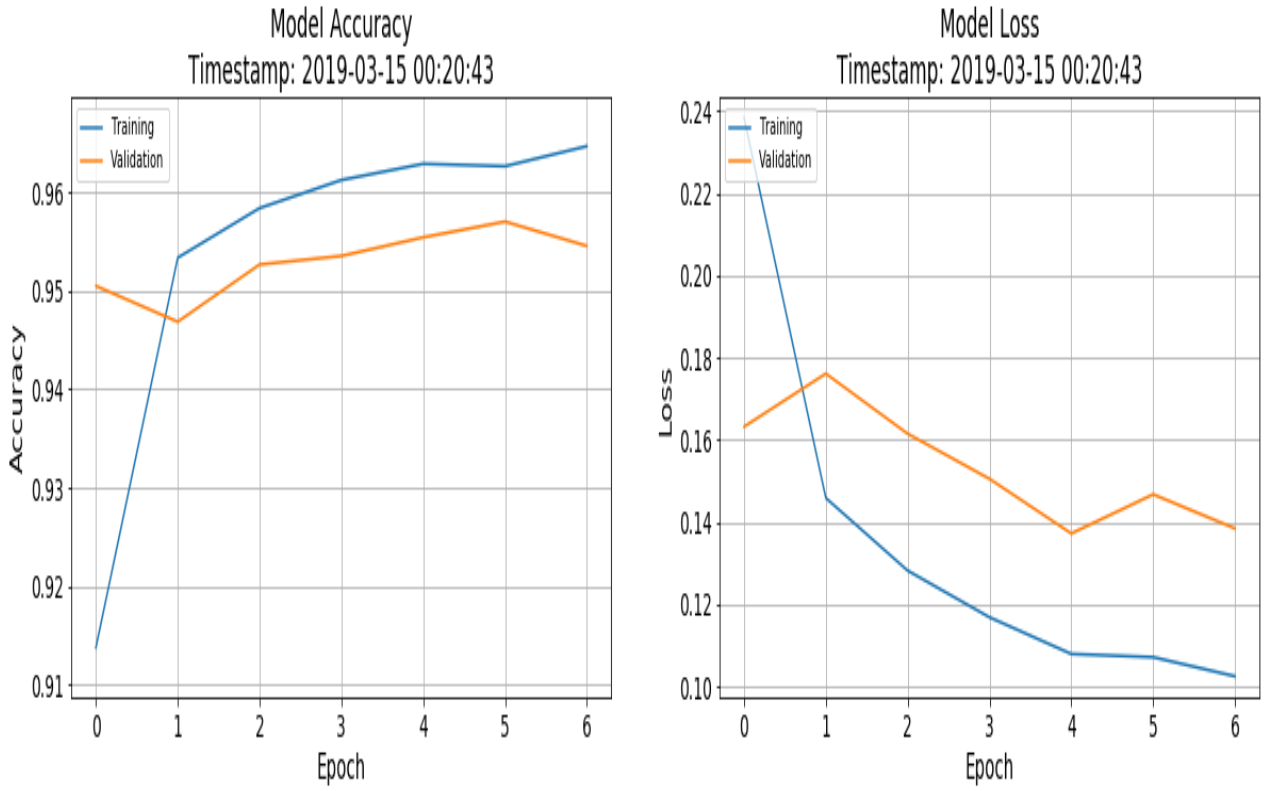

The above diagram depicts that the training model for malaria detection is the most accurate data and only 3% of model loss has occurred which means the deep learning model is the best suited model for malaria detection.

VII. CONCLUSION

The literature supports the promise of AI in the healthcare sector. At many levels, AI is on the way to becoming more useful, which leads to more effective and quicker patient outcomes. Artificial intelligence, Deep learning, machine learning, and intelligence aid us in providing optimum care during operations, early detection of illnesses like cancer etc., are a few things to take into account. While investigating AI, it is also referenced in this essay. Given the most current developments in AI research, with assistance from support, and government resources, it is very likely artificial intelligence will be used in healthcare develop significantly, and there is tremendous opportunity for saving money and raising the standard of healthcare service.

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