

AI-BASED LOCALIZATION AND CLASSIFICATION OF SKIN DISEASE

Submitted in partial fulfillment of the
requirements for the award of

Bachelor of Engineering degree in information technology

By

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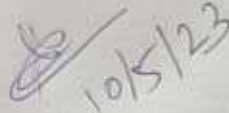
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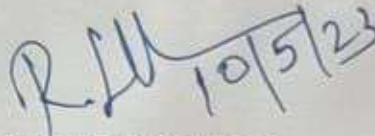
BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **KIRAN K(39120054)** and **V.SATHISH KUMAR(39120105)** who carried out the Project Phase-II entitled “**AI-BASED LOCALIZATION AND CLASSIFICATION OF SKIN DISEASE**” under my supervision from January 2023 to May 2023.


10/5/23

Internal Guide

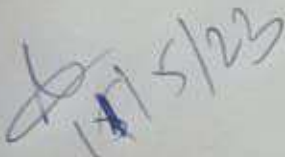
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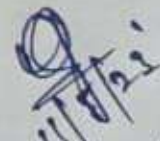
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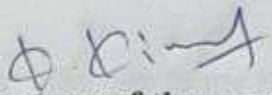
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DECLARATION

I, KIRAN K(Reg.No-39120054) hereby declare that the Project Phase-II Report entitled "AI-BASED LOCALIZATION AND CLASSIFICATION OF SKIN DISEASE" done by me under the guidance of Dr. A.SIVASANGARI M.E.,Ph.D is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in INFORMATION TECHNOLOGY.

DATE : 11/05/23

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ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management of SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T.Sasikala M.E., Ph. D, Dean**, School of Computing, **Dr. R.SUBHASHINI M.E., Ph.D.**, Head of the Department of Information Technology for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr.A.SIVASANGARI M.E.,Ph.D**,for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my phase-II project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Information Technology** who were helpful in many ways for the completion of the project.

ABSTRACT

In recent days, skin diseases are increased in humans. Skin diseases are caused by bacteria or due to infections. Some of the skin diseases are like ring worm, yeast infection, allergies etc. are increases and spread over skin day by day. So this type of diseases should be identified in its earlier stage to avoid spreading. It can be identified using some factors like clinical parameters which are considered for identifying the disease. The possible skin diseases in different ages are dermatitis in age 0-5 years, warts affects in 6-11 years age, and acne vulgaris in 12-16 years age. Dermatomyositis is a type of skin disease that affects children at age of 5-15 and adult at 40-60 age. Although computer-aided diagnosis (CAD) is used to improve the quality of diagnosis in various medical fields such as mammography and colonography, it is not used in dermatology, where noninvasive screening tests are performed only with the naked eye, and avoidable inaccuracies may exist. This study shows that CAD may also be a viable option in dermatology by presenting a novel method to sequentially combine accurate segmentation and classification models. Given an image of the skin, we decompose the image to normalize and extract high-level features. Using a neural network-based segmentation model to create a segmented map of the image, we then cluster sections of abnormal skin and pass this information to a classification model. We classify each cluster into different common skin diseases using another neural network model. Our segmentation model achieves better performance compared to previous studies, and also achieves a near-perfect sensitivity score in unfavorable conditions. Our classification model is more accurate than a baseline model trained without segmentation, while also being able to classify multiple diseases within a single image. This improved performance may be sufficient to use CAD in the field of dermatology.

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CHAPTER-1

1.1 AIM

The main aim of this system, early disease recognition, patient care and community services. When the quality of medical data is incomplete the exactness of study is reduced.

1.2 OBJECTIVE

The analysis accuracy is reduced when the quality of medical data is incomplete. Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks. However, those existing work mostly considered structured data. There is no proper methods to handle semi structured and unstructured. The proposed system will consider both structured and unstructured data. The analysis accuracy is increased by using Machine Learning algorithm.

1.3 SCOPE

In this work, our goal is to provide a tool to assist professionals and consumers in finding and choosing disease. To achieve this goal, we develop an approach that allows a user to query for disease that satisfy a set of conditions based on disease properties, such as disease indications.

CHAPTER-2

2.1 INTRODUCTION

There are different techniques to diagnose skin disease like Malignant melanoma i.e. melanoma skin tumors, Nonmelanoma i.e. squamous cell carcinoma, basal cell carcinoma, Acne, Genetic Diseases i.e. Sickle-Cell Anemia Genetic Skin Disorder, Fungal Diseases, Bacterial Diseases, Psoriasis and Leprosy. There are different techniques to diagnose these skin diseases. But the most useful and noninvasive method for diagnosis of different types of skin diseases is skin impedance measurement. The analysis is made with the measurement of skin impedance over a wide frequency range from 100 Hz to 1MHz. But this analysis for the infected skin and normal skin should be made at same frequency because at different frequencies skin impedance can be different. The measured skin impedance at same frequency of infected skin and normal skin is different, because of which we can diagnose skin disease. Above mentioned method used the non-invasive probe electrode system consists of two concentric electrodes attached to a ceramic plate. The outermost electrodes drive the voltage and inner is sink electrode gives output. In which source electrode provide small amount of current to skin and sink electrode gives input to the microcontroller. Length of the outermost electrode is nearly 10mm. Measurement of skin impedance can be used for depressions, anxiety, neurological diseases, and nerve lesions. It is also used for physiological measurements emotional disorders or lie detection. The various types of bioimpedance method include multiple frequency, single frequency and Bio impedance spectroscopy. SF-BIA is generally performed at a frequency of 50 kHz. At this frequency the current passes through both extracellular and intracellular fluid. Bio-impedance obtained at number of frequencies is analyzed in multiple-frequency bio-impedance analysis. Skin problems include melanoma lesions of the skin, nonmelanoma cancers such as squamous cell carcinoma, carcinoma of the basal cell, acne, and genetic illnesses like sickle-cell anaemia can all be diagnosed using a variety of techniques. Several example includes leprosy, psoriasis, infections caused by bacteria, and genetic skin conditions. Different methods can be used to identify these skin conditions. Skin resistance was evaluated for the study over a broad frequency spectrum, ranging compared to one hundred Hz to one megahertz.

CHAPTER-3

3.1 LITERATURE SURVEY

3.1.1 Segmentation and Classification of Skin Lesions for Disease Diagnosis.

In this paper, a novel approach for automatic segmentation and classification of skin lesions is proposed. Initially, skin images are filtered to remove unwanted hairs and noise and then the segmentation process is carried out to extract lesion areas. For segmentation, a region growing method is applied by automatic initialization of seed points. The segmentation performance is measured with different well known measures and the results are appreciable. Subsequently, the extracted lesion areas are represented by color and texture features. SVM and k-NN classifiers are used along with their fusion for the classification using the extracted features. The performance of the system is tested on our own dataset of 726 samples from 141 images consisting of 5 different classes of diseases. The results are very promising with 46.71% and 34% of F-measure using SVM and k-NN classifier respectively and with 61% of F-measure for fusion of SVM and k-NN.

3.1.2 Extraction of Skin Lesions from Non-Dermoscopic Images Using Deep Learning.

Melanoma is amongst most aggressive types of cancer. However, it is highly curable if detected in its early stages. Prescreening of suspicious moles and lesions for malignancy is of great importance. Detection can be done by images captured by standard cameras, which are more preferable due to low cost and availability. One important step in computerized evaluation of skin lesions is accurate detection of lesion region, i.e. segmentation of an image into two regions as lesion and normal skin. Accurate segmentation can be challenging due to burdens such as illumination variation and low contrast between lesion and healthy skin. In this paper, a method based on deep neural networks is proposed for accurate extraction of a lesion region. The input image is preprocessed and then its patches are fed to a convolutional neural network. Local texture and global structure of the patches are processed in order to assign pixels to lesion or normal classes. A method for effective selection of training

patches is used for more accurate detection of a lesion border. The output segmentation mask is refined by some post processing operations. The experimental results of qualitative and quantitative evaluations demonstrate that our method can outperform other state-of-the-art algorithms exist in the literature.

3.1.3 An Intelligent system to Diagnosis the Skin Disease.

Skin cancer is a major health issue affecting a vast segment of the population regardless the skin color. This affectation can be detected using dermoscopy to determine whether the visible spots on skin are either benign or malignant tumors. In spite of the specialists' experience, skin lesions are difficult to classify, reason for which computer systems are developed to increase the effectiveness of cancer detection. Systems assisting in the detection of skin cancer process digital images to determine the occurrence of tumors by interpreting clinical parameters, relying, firstly, upon an accurate segmentation process to extract relevant features. Two of the well-known methods to analyze lesions are ABCD and the 7-point check list. After clinically-relevant features are extracted, they are used to classify the presence or absence of a tumor. However, irregular and disperse lesion borders, low contrast, artifacts in images and the presence of various colors within the region of interest complicate the processing of images. In this article, we propose an intelligent system running the following method. The feature extraction stage begins with the segmentation of an image, for which we apply the Wavelet – Fuzzy C-Means algorithm. Next, specific features should be determined, among others the area and the asymmetry of the lesion. An ensemble of clusterers extracts the Red-Green-Blue values that correspond to one or more of the colors defined in the ABCD guide. The feature extraction stage includes the discovery of structures that appear in the lesion according to the method known as Grey Level CoOccurrence Matrix. Then, during the detection phase, an ensemble of classifiers determines the occurrence of a malignant tumor. Our experiments are performed on images taken from the ISIC repository. The proposed system provides a skin cancer detection performance above 88 percent, as measured by the accuracy. Details of how this performance fares when compared with other systems are also given.

3.1.4 Automatic segmentation of skin lesions from dermatological photograph.

Melanoma is the deadliest form of skin cancer if left untreated. Incidence rates of melanoma have been increasing, especially among young adults, but survival rates are high if detected early. Unfortunately, the time and costs required for dermatologists to screen all patients for melanoma are prohibitively expensive. There is a need for an automated system to assess a patient's risk of melanoma using photographs of their skin lesions. Dermatologists could use the system to aid their diagnosis without the need for special or expensive equipment. One challenge in implementing such a system is locating the skin lesion in the digital image. Most existing skin lesion segmentation algorithms are designed for images taken using a special instrument called the dermatoscope. The presence of illumination variation in digital images such as shadows complicates the task of finding the lesion. The goal of this research is to develop a framework to automatically correct and segment the skin lesion from an input photograph. The first part of the research is to model illumination variation using a proposed multi-stage illumination modeling algorithm and then using that model to correct the original photograph. Second, a set of representative texture distributions are learned from the corrected photograph and a texture distinctiveness metric is calculated for each distribution. Finally, a texture-based segmentation algorithm classifies regions in the photograph as normal skin or lesion based on the occurrence of representative texture distributions. The resulting segmentation can be used as an input to separate feature extraction and melanoma classification algorithms. The proposed segmentation framework is tested by comparing lesion segmentation results and melanoma classification results to results using other state-of-the-art algorithms. The proposed framework has better segmentation accuracy compared to all other tested algorithms. The segmentation results produced by the tested algorithms are used to train an existing classification algorithm to identify lesions as melanoma or non-melanoma. Using the proposed framework produces the highest classification accuracy and is tied for the highest sensitivity and specificity.

3.1.5 A Survey on skin texture analysis for medical diagnosis using Image processing Techniques.

Skin texture analysis is one of the challenging issues in the field of medical diagnosis. Various types of skin diseases are affecting human life like skin dryness, fungus, and allergic symptoms. The objective of this paper is to analyze the skin disease using texture analysis of skin image and by comparing the test image to a defined images or reference images. The matching of test and reference images compared that yields the percentage of skin diseases in the captured skin texture image.

3.2 EXISTING SYSTEM

In this article, existing method that uses computer vision based techniques to detect various kinds of dermatological skin diseases. We have used different types of machine learning algorithms for feature extraction and feed forward artificial neural network for training and testing purpose. The system works on two phases- first pre-process the colour skin images to extract significant features and later identifies the diseases. The system successfully detects 9 different types of dermatological skin diseases with an accuracy rate of 90%.

3.2.1 Disadvantages

- Does not analyse the disease
- Less security
- There is no feedback system
- There is no correct recommended of drug.

CHAPTER-4

4.1 PROPOSED SYSTEM

In proposed system, KNN and Naïve Bayes techniques to detect various kinds of skin diseases. It can be identified using some factors like clinical parameters which are considered for identifying the disease. The possible skin diseases in different ages are dermatitis in age 0-5 years, warts affects in 6-11 years age, and acne vulgaris in 12-16 years age. Dermatomyositis is a type of skin disease that affects children at age of 5-15 and adult at 40-60 age. We are giving a suggestion of what kind of treatment you want and also showing life thread or not.

4.1.1 Advantages

- Easily analyze the disease
- High Security
- It gives Disease analyze result in short time
- Patients will get drug recommendation and treatment of diseases.

4.2 SYSTEM ARCHITECTURE

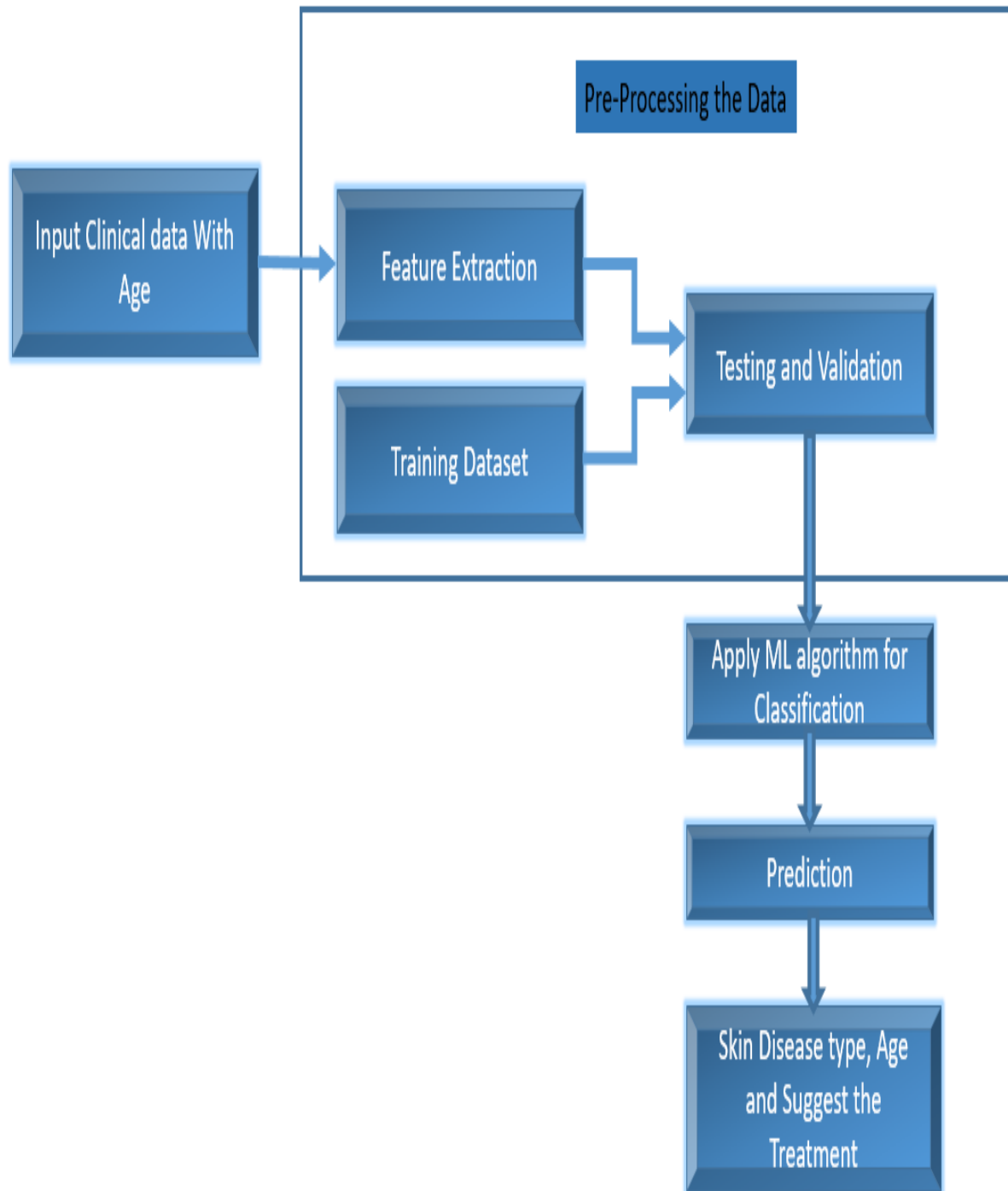


Fig-4.1: System Architecture

CHAPTER-5

5.1 ALGORITHM

USED K-NEAREST NEIGHBOR(KNN) CLASSIFICATION METHOD

K-NN is a type of instance-based learning, or lazy learning, where the function is only approximated locally and all computation is deferred until classification. The k-NN algorithm is among the simplest of all machine learning algorithms. The neighbors are taken from a set of objects for which the class (for k -NN classification) or the object property value (for k -NN regression) is known.

STEP 1: BEGIN

STEP 2: Input: $D = \{(x_1, c_1), \dots, (x_N, c_N)\}$

STEP 3: $x = (x_1, \dots, x_n)$ new instance to be classified

STEP 4: FOR each labelled instance (x_i, c_i) calculate $d(x_i, x)$

STEP 5: Order $d(x_i, x)$ from lowest to highest, $(i = 1, \dots, N)$

STEP 6: Select the K nearest instances to x : D_x^k

STEP 7: Assign to x the most frequent class in D_x^k

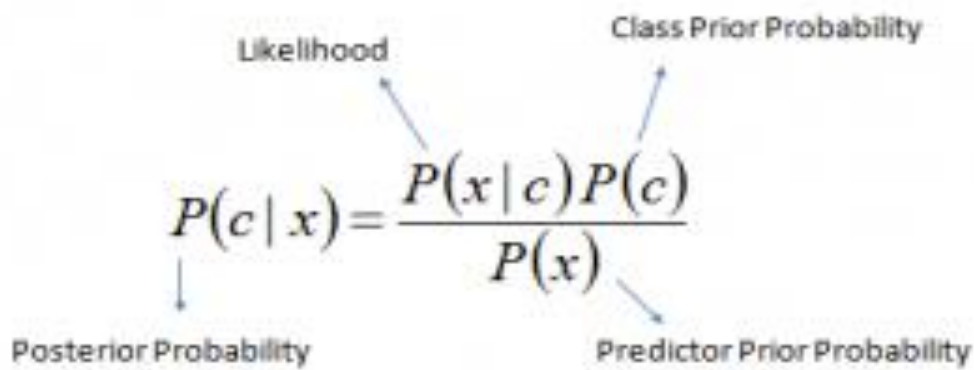
STEP 8: END

5.1.1 Naïve Bayes Algorithm

It is a classification technique based on Bayes' Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature. For example, a fruit may be considered to be an apple if it is red, round, and about 3 inches in diameter. Even if these features depend on each other or upon the existence of the other features, all of these properties independently contribute to the probability that this fruit is an apple and that is why it is known as 'Naive'.

Naive Bayes model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods.

Bayes theorem provides a way of calculating posterior probability $P(c|x)$ from $P(c)$, $P(x)$ and $P(x|c)$. Look at the equation below:



$$P(c | x) = \frac{P(x | c) P(c)}{P(x)}$$

Likelihood
Class Prior Probability
Posterior Probability
Predictor Prior Probability

$$P(c | X) = P(x_1 | c) \times P(x_2 | c) \times \dots \times P(x_n | c) \times P(c)$$

Equation 5.1: Naïve Bayes Equation

Above,

- $P(c|x)$ is the posterior probability of class (c , target) given predictor (x , attributes).
- $P(c)$ is the prior probability of class.
- $P(x|c)$ is the likelihood which is the probability of predictor given class.
- $P(x)$ is the prior probability of predictor.

5.2 Naive Bayes algorithm works

Let's understand it using an example. Below I have a training data set of weather and corresponding target variable 'Play' (suggesting possibilities of playing). Now, we need to classify whether players will play or not based on weather condition. Let's follow the below steps to perform it.

Step 1: Convert the data set into a frequency table

Step 2: Create Likelihood table by finding the probabilities like Overcast probability = 0.29 and probability of playing is 0.64.

Weather	Play
Sunny	No
Overcast	Yes
Rainy	Yes
Sunny	Yes
Sunny	Yes
Overcast	Yes
Rainy	No
Rainy	No
Sunny	Yes
Rainy	Yes
Sunny	No
Overcast	Yes
Overcast	Yes
Rainy	No

Frequency Table		
Weather	No	Yes
Overcast		4
Rainy	3	2
Sunny	2	3
Grand Total	5	9

Likelihood table				
Weather	No	Yes		
Overcast		4	=4/14	0.29
Rainy	3	2	=5/14	0.36
Sunny	2	3	=5/14	0.36
All	5	9		
	=5/14	=9/14		
	0.36	0.64		

Fig-5.1:Dataset

Step 3: Now, use Naive Bayesian equation to calculate the posterior probability for each class. The class with the highest posterior probability is the outcome of prediction.

Problem: Players will play if weather is sunny. Is this statement is correct?

We can solve it using above discussed method of posterior probability.

$$P(\text{Yes} \mid \text{Sunny}) = P(\text{Sunny} \mid \text{Yes}) * P(\text{Yes}) / P(\text{Sunny})$$

Here we have $P(\text{Sunny} \mid \text{Yes}) = 3/9 = 0.33$, $P(\text{Sunny}) = 5/14 = 0.36$, $P(\text{Yes}) = 9/14 = 0.64$

Now, $P(\text{Yes} \mid \text{Sunny}) = 0.33 * 0.64 / 0.36 = 0.60$, which has higher probability.

Naive Bayes uses a similar method to predict the probability of different class based on various attributes. This algorithm is mostly used in text classification and with problems having multiple classes.

5.2.1 The Pros and Cons of Naive Bayes

Pros:

- It is easy and fast to predict class of test data set. It also perform well in multi class prediction
- When assumption of independence holds, a Naive Bayes classifier performs better compare to other models like logistic regression and you need less training data.
- It perform well in case of categorical input variables compared to numerical variable(s). For numerical variable, normal distribution is assumed (bell curve, which is a strong assumption).

Cons:

- If categorical variable has a category (in test data set), which was not observed in training data set, then model will assign a 0 (zero) probability and will be unable to make a prediction. This is often known as “Zero Frequency”. To solve this, we can use the smoothing technique. One of the simplest smoothing techniques is called Laplace estimation.
- On the other side naive Bayes is also known as a bad estimator, so the probability outputs from predict_proba are not to be taken too seriously.
- Another limitation of Naive Bayes is the assumption of independent predictors. In real life, it is almost impossible that we get a set of predictors which are completely independent.

5.2.2 Applications of Naive Bayes Algorithms

- **Real time Prediction:** Naive Bayes is an eager learning classifier and it is sure fast. Thus, it could be used for making predictions in real time.
- **Multi class Prediction:** This algorithm is also well known for multi class prediction feature. Here we can predict the probability of multiple classes of target variable.
- **Text classification/ Spam Filtering/ Sentiment Analysis:** Naive Bayes classifiers mostly used in text classification (due to better result in multi class problems and independence rule) have higher success rate as compared to other algorithms. As a result, it is widely used in Spam filtering (identify spam e-mail) and Sentiment Analysis (in social media analysis, to identify positive and negative customer sentiments)
- **Recommendation System:** Naive Bayes Classifier and Collaborative Filtering together builds a Recommendation System that uses machine learning and data mining techniques to filter unseen information and predict whether a user would like a given resource or not.

5.3 SYSTEM REQUIREMENTS

5.3.1 Hardware Requirements

System : Pentium Dual Core.
Hard Disk : 120 GB.
Monitor : 15"LED
Input Devices : Keyboard, Mouse
Ram : 1GB.

5.3.2 Software Requirements

Operating system : Windows 7.
Coding Language : Java
Toolkit : Netbeans
DATABASE : MySql

5.4 CODING LANGUAGE INTRODUCTION

Java is one of the world's most important and widely used computer languages, and it has held this distinction for many years. Unlike some other computer languages whose influence has wearied with passage of time, while Java's has grown.

5.4.1 Application of Java

Java is widely used in every corner of world and of human life. Java is not only used in softwares but is also widely used in designing hardware controlling software components. There are more than 930 million JRE downloads each year and 3 billion mobile phones run java.

Following are some other usage of Java:

1. Developing Desktop Applications

2. Web Applications like Linkedin.com, Snapdeal.com etc
3. Mobile Operating System like Android
4. Embedded Systems
5. Robotics and games etc.

5.4.2 Features of java

The prime reason behind creation of Java was to bring portability and security feature into a computer language. Beside these two major features, there were many other features that played an important role in moulding out the final form of this outstanding language. Those features are;

In simple, Java is easy to learn and its syntax is quite simple, clean and easy to understand. The confusing and ambiguous concepts of C++ are either left out in Java or they have been re-implemented in a cleaner way.

Eg: Pointers and Operator Overloading are not there in java but were an important part of C++.

In Object oriented, the java everything is Object which has some data and behaviour. Java can be easily extended as it is based on Object Model.

In Robust, Java makes an effort to eliminate error prone codes by emphasizing mainly on compile time error checking and runtime checking. But the main areas which Java improved were Memory Management and mishandled Exceptions by introducing automatic Garbage Collector and Exception Handling.

In Platform Independent Unlike other programming languages such as C, C++ etc. which are compiled into platform specific machines. Java is guaranteed to be write-once, run-anywhere language.

On compilation Java program is compiled into byte code. This byte code is platform independent and can be run on any machine, plus this byte code format also provide security. Any machine with Java Runtime Environment can run Java Programs.

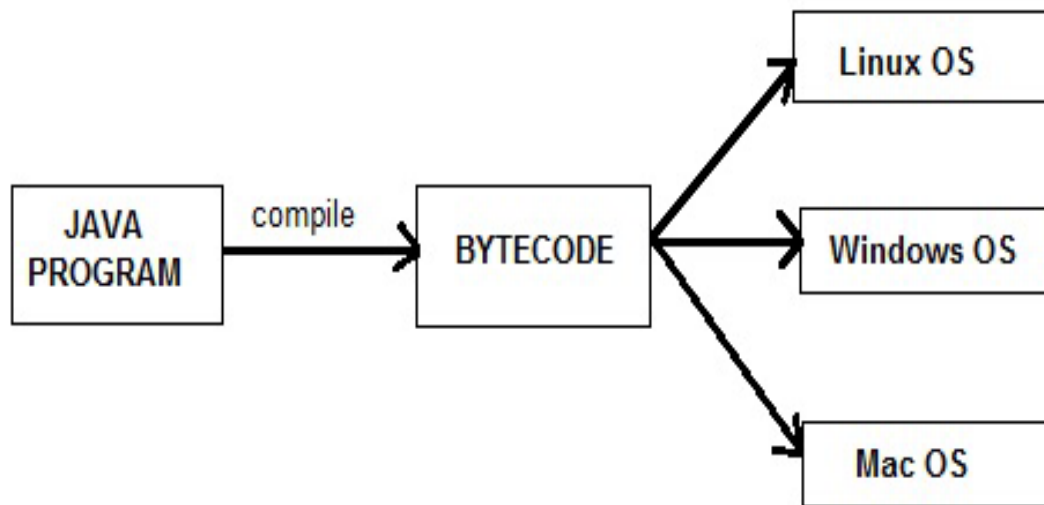


Fig-5.2:Program running platform

In Secure, When it comes to security, Java is always the first choice. With java secure features it enable us to develop virus free, temper free system. Java program always runs in Java runtime environment with almost null interaction with system OS, hence it is more secure.

In Multi-Threading, Java multithreading feature makes it possible to write program that can do many tasks simultaneously. Benefit of multithreading is that it utilizes same memory and other resources to execute multiple threads at the same time, like While typing, grammatical errors are checked along.

In Architectural Neutral, Compiler generates byte codes, which have nothing to do with a particular computer architecture, hence a Java program is easy to interpret on any machine.

In Portable, Java Byte code can be carried to any platform. No implementation dependent features. Everything related to storage is predefined, example: size of primitive data types

In High Performance, Java is an interpreted language, so it will never be as fast as a compiled language like C or C++. But, Java enables high performance with the use of just-in-time compiler.

5.4.3 Collection Framework

Collection framework was not part of original Java release. Collections was added to J2SE 1.2. Prior to Java 2, Java provided adhoc classes such as Dictionary, Vector, Stack and Properties to store and manipulate groups of objects. Collection framework provides many important classes and interfaces to collect and organize group of alike objects.

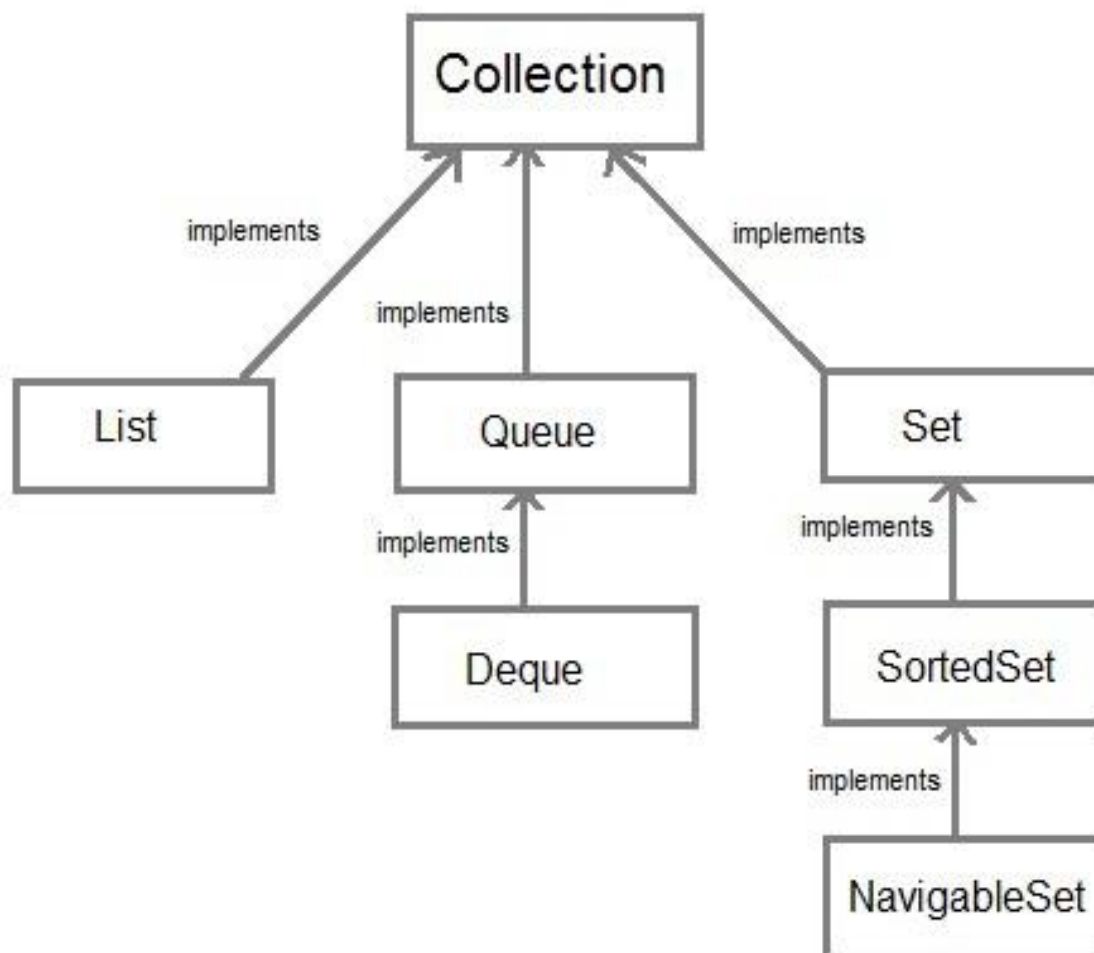


Fig-5.3:Collection Framework

5.4.4 Mysql

MySQL, officially, but also called "My Sequel" is the world's most widely used open-source relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases, though SQLite probably has more total embedded deployments. The SQL phrase stands for Structured Query Language.

The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation. MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack (and other 'AMP' stacks).

LAMP is an acronym for "Linux, Apache, MySQL, Perl/PHP/Python." Freesoftware-open source projects that require a full-featured database management system often use MySQL.

For commercial use, several paid editions are available, and offer additional functionality. Applications which use MySQL databases include: TYPO3, MODx, Joomla, WordPress, phpBB, MyBB, Drupal and other software. MySQL is also used in many high-profile, large-scale websites, including Wikipedia, Google (though not for searches), Facebook, Twitter, Flickr and YouTube.

5.5 REQUIREMENT ANALYSIS

Requirement analysis, also called requirement engineering, is the process of determining user expectations for a new modified product. It encompasses the tasks that determine the need for analysing, documenting, validating and managing software or system requirements. The requirements should be documentable, actionable, measurable, testable and traceable related to identified business needs or opportunities and define to a level of detail, sufficient for system design.

5.5.1 Functionality requirements

It is a technical specification requirement for the software products. It is the first step in the requirement analysis process which lists the requirements of particular software systems including functional, performance and security requirements. The function of the system depends mainly on the quality hardware used to run the software with given functionality.

In Usability, It specifies how easy the system must be use. It is easy to ask queries in any format which is short or long, porter stemming algorithm stimulates the desired response for user

In Robustness, It refers to a program that performs well not only under ordinary conditions but also under unusual conditions. It is the ability of the user to cope with errors for irrelevant queries during execution.

In Security, The state of providing protected access to resource is security. The system provides good security and unauthorized users cannot access the system there by providing high security.

The Reliability, It is the probability of how often the software fails. The measurement is often expressed in MTBF (Mean Time Between Failures). The requirement is needed in order to ensure that the processes work correctly and completely without being aborted. It can handle any load and survive and survive and even capable of working around any failure.

The Compatibility It is supported by version above all web browsers. Using any web servers like localhost makes the system real-time experience.

In Flexibility, The flexibility of the project is provided in such a way that is has the ability to run on different environments being executed by different users.

The Safety it is a measure taken to prevent trouble. Every query is processed in a secured manner without letting others to know one's personal information.

5.5.2 Non-Functional Requirements

The Portability, It is the usability of the same software in different environments. The project can be run in any operating system.

In Performance, These requirements determine the resources required, time interval, throughput and everything that deals with the performance of the system.

In Accuracy, The result of the requesting query is very accurate and high speed of retrieving information. The degree of security provided by the system is high and effective.

In Maintainability, Project is simple as further updates can be easily done without affecting its stability. Maintainability basically defines that how easy it is to maintain the system. It means that how easy it is to maintain the system, analyse, change and test the application. Maintainability of this project is simple as further updates can be easily done without affecting its stability.

5.5.3 Feasibility Study

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

The feasibility study investigates the problem and the information needs of the stakeholders. It seeks to determine the resources required to provide an information systems solution, the cost and benefits of such a solution, and the feasibility of such a solution.

The goal of the feasibility study is to consider alternative information systems solutions, evaluate their feasibility, and propose the alternative most suitable to the organization. The feasibility of a proposed solution is evaluated in terms of its components.

In Economical Feasibility, This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

In Technical feasibility, This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

In Social Feasibility The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity.

5.5.4 MODULES

- User Module
- Admin Module
- Disease prediction Module
- Best drug recommendation

i).User Module

In this Module, Patient can act as a user.

1.Login

This is the first activity that opens the website. User needs to provide a correct contact number and a password, which user enters while registering, in order to login into the app. If information provided by the user matches with the data in the database table then user successfully login into the app else message of login failed is displayed and user need to reenter correct information. A link to the register activity is also provided for registration of new users.

2.Registration

A new user who wants to access the website needs to register first before login. By clicking on register button in login activity, the register activity gets open. A new user registers by entering full name, password and contact number. A user needs to enter password again in confirm password textbox for confirmation. When user enters the information in all textboxes, on the click of register button, the data is transferred to database and user is directed to login activity again. Registered user then needs to login in order to access the app. Validations are applied on all the textboxes for proper functioning of the app. Like information in each textbox is must that is each textbox, either it is of name, contact, password or confirm password, will not be empty while registering. If any such textbox is empty app will give message of information is must in each textbox. Also data in password and confirm password fields must match for successful registration. Another validation is contact number must be valid one that is of 10 digits. If any such validation is violated then registration will be unsuccessful and then user needs to register again. Message that app will display when one of the field is empty. If all such information is correct user will be directed to login activity for login into the app.

ii).Admin module

In this module, admin can add and view new disease details and drug details. And then admin can view feedback provided by various users.

iii).Disease Prediction Module

Patient will specify the symptoms caused due to his illness. System will ask certain question regarding his illness and system predict the skin disease based on the symptoms and age specified by the patient and system will also suggest drugs based on the disease.

iv).Best Drug Recommendation

In this module we develop an app that allows a user to query for drugs that satisfy a set of conditions based on drug properties, such as drug indications, side effects, and drug interactions, and also takes into account patient profiles. In this we automate the suggestion of the alternative drugs. So that we can provide the medicine to diseases i.e. a preferred medicine .so the researcher will analysis the dosage of the drug and the symptoms.

5.6 SYSTEM DESIGN AND TESTING PLAN

5.6.1 Input Design

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

5.6.2 Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the
- Future.
- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
- Confirm an action.

CHAPTER-6

CONCLUSION

In this work a model for prediction of skin diseases is done using deep learning algorithms. It is found that by using the ensembling features and deep learning we can achieve a higher accuracy rate and also we can go for the prediction of many more diseases than with any other previous models done before. As the previous models done in this field of application were able to report a maximum of six skin diseases with a maximum accuracy level of 75%. By implementing deep learning algorithm we are able to predict as many as 20 diseases with a higher accuracy level of 88%. This proves that deep learning algorithms have a huge potential in the real world skin disease diagnosis. If even a better system with high end system hardware and software with a very large dataset is used the accuracy can be increased considerably and the model can be used for clinical experimentation as it does have any invasive measures. Future work can be extended to make this model a standard procedure for preliminary skin disease diagnosis method as it will reduce the treatment and diagnosis time.

REFERENCE

1. "Segmentation And Classification Of Skin Lesions For Disease Diagnosis", DOI: 10.1016/J.Procs.2015.03.090, 2015; Sumithra Ra, Mahamad Suhilb, D.S. Guruc.
2. Extraction of Skin Lesions from Non-Dermoscopic Pictures Using Deep Learning, Mohammad H. Jafari, Ebrahim Nasr-Esfahani, Nader Karimi, S.M. Reza Soroushmehr, Shadrokh Samavi, and Kayvan Najarian, ResearchGate, September 2016.
3. "An Intelligent System to Diagnosis The Skin Disease", Vol. 11, No. 19, October 2016, Manish Kumar and Rajiv Kumar.
4. Automatic segmentation of skin tumours from dermatological photographs, Waterloo, Ontario, Canada, Jerrey Glaister, 2013.
5. K. Indupriya et al., Volume 3 Issue 5, "A Survey on skin texture Analysis for Medical Diagnosis using image processing techniques", Dr. G. P. Ramesh Kumar, K. Indupriya, and others.
6. Doi, K. Computer-aided diagnosis in medical imaging: Historical review, current status and future potential. Comput. Med. Imaging Graph. 31, 198–211.
7. Trabelsi, O., Tlig, L., Sayadi, M. & Fnaiech, F., Skin disease analysis and tracking based on image segmentation. 2013 International Conference on Electrical Engineering and Software Applications, Hammamet, 1–7. <https://doi.org/10.1109/ICEESA.2013.6578486>.
8. Rajab, M. I., Woolfson, M. S. & Morgan, S. P. Application of region-based segmentation and neural network edge detection to skin lesions. Comput. Med. Imaging Graph. 28, 61–68. [https://doi.org/10.1016/S0895-6111\(03\)00054-5](https://doi.org/10.1016/S0895-6111(03)00054-5).
9. Lu, J., Manton, J. H., Kazmierczak E. & Sinclair, R., Erythema detection in digital skin images. In 2010 IEEE International Conference on image processing.
10. Sumithra, R., Suhil, M. & Guru, D. S. Segmentation and classification of skin lesions for disease diagnosis. Proced.Comput. Sci. 45, 76–85. <https://doi.org/10.1016/j.procs.2015.03.090> (2015).

APPENDIX

A.SCREENSHOTS

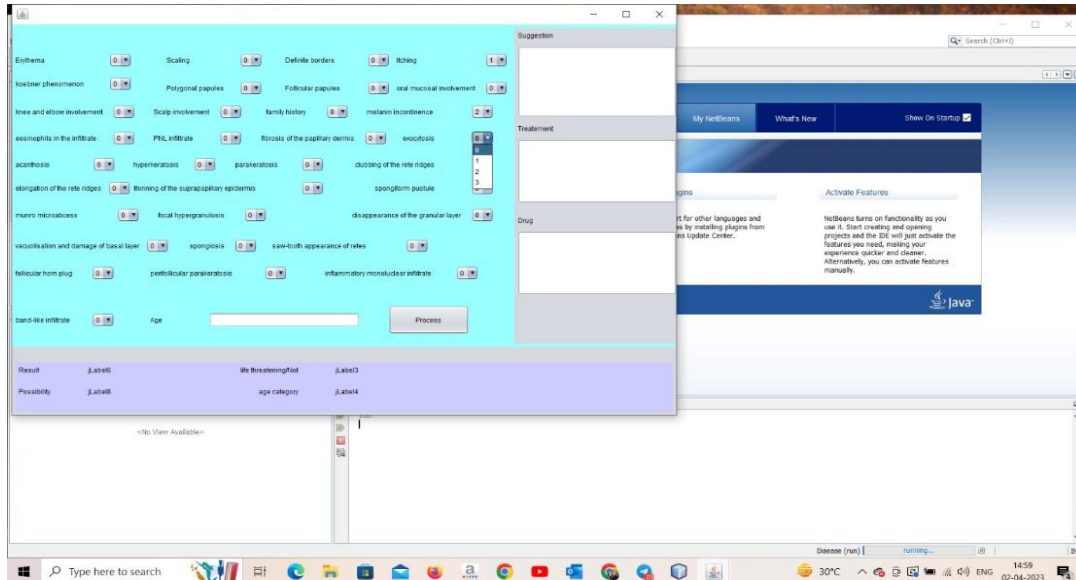


Fig-6.1: symptoms entering page

In this Fig-6.1, We need to enter a symptoms of patients in this output page to get prediction of suggestions, Treatment and drug.

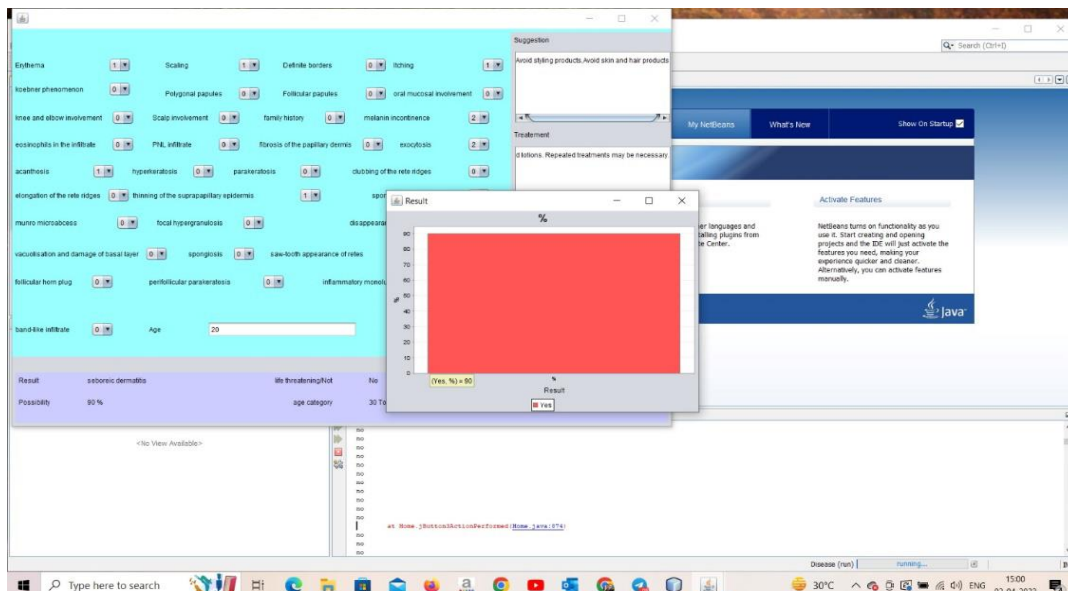


Fig-6.2: Prediction page

In this Fig-6.2, we can see the predictions, after entering a symptoms of patient in before page.

The screenshot displays a medical decision support system interface. The main panel on the left lists various clinical features with associated numerical values in red boxes. The right panel is divided into three sections: 'Suggestion', 'Treatment', and 'Drug'. The 'Suggestion' section provides advice on avoiding styling products and sun/hair products. The 'Treatment' section recommends self-care and medicated products. The 'Drug' section lists antifungal, steroid, anti-inflammatory, antibiotic, and immunosuppressive drugs. A 'Process' button is located at the bottom right of the right panel. The bottom of the interface shows a Windows taskbar with the date 02-04-2023 and time 15:00.

Feature	Value
Erythema	1
Scaling	1
Definite borders	0
Itching	1
Hebber phenomenon	0
Polygonal papules	0
Follicular papules	0
oral mucosal involvement	0
toes and elbow involvement	0
Scalp involvement	0
family history	0
metastatic involvement	2
eosinophils in the infiltrate	0
PMH infiltrate	0
thorosis of the papillary dermis	0
erythrocytes	2
acanthosis	1
hyperkeratosis	0
parakeratosis	0
clubbing of the nail ridges	0
elongation of the nail ridges	0
thinning of the suprapapillary epidermis	1
spongiform pustule	0
minor microabscess	0
focal hypergranulosis	0
disappearance of the granular layer	0
vacuolization and damage of basal layer	0
spongiosis	0
scale follicle appearance of ridges	0
follicular horn plug	0
perifollicular parakeratosis	0
inflammatory mononuclear infiltrate	0
band-like infiltrate	0
Age	

Suggestion

Avoid styling products. Avoid sun and hair products.

Treatment

Treatment involves self-care and medicated shampoo, creams and lotions. Repeated treatments may be necessary.

Drug

Antifungal, Steroid, Anti-inflammatory, Antibiotic, and Immunosuppressive drug.

20 Process

Result seborrheic dermatitis **life threatening?** no

Possibility 95 % **age category** 30 To 60

Fig-6.3 : Result of Suggestions, Treatment, Drug page

In this Fig-6.3, we can see the last result of patients suggestions, treatment and drug to get out from that disease.

B.Source Code

Login page.

```
import javax.swing.JOptionPane;
```

```
/*  
 * To change this license header, choose License Headers in Project Properties.  
 * To change this template file, choose Tools | Templates  
 * and open the template in the editor.  
 */
```

```
/**  
 *  
 * @author Satheeshkumar S  
 */
```

```
public class LoginPage extends javax.swing.JFrame {
```

```
    /**  
     * Creates new form LoginPage  
     */  
    public LoginPage() {  
        initComponents();  
    }
```

```
    /**  
     * This method is called from within the constructor to initialize the form.  
     * WARNING: Do NOT modify this code. The content of this method is always  
     * regenerated by the Form Editor.  
     */  
    @SuppressWarnings("unchecked")  
    // <editor-fold defaultstate="collapsed" desc="Generated Code"> //GEN-BEGIN: initComponents
```

```

private void initComponents() {
    jLabel2 = new javax.swing.JLabel();
    jLabel1 = new javax.swing.JLabel();
    jLabel3 = new javax.swing.JLabel();
    jTextField1 = new javax.swing.JTextField();
    jTextField2 = new javax.swing.JTextField();
    jButton1 = new javax.swing.JButton();

    jLabel2.setText("jLabel2");
    setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);

    jLabel1.setText("User Name");
    jLabel3.setText("Password");

    jTextField1.addActionListener(new java.awt.event.ActionListener() {
        public void actionPerformed(java.awt.event.ActionEvent evt) {
            jTextField1ActionPerformed(evt);
        }
    });

    jButton1.setText("Login");
    jButton1.addActionListener(new java.awt.event.ActionListener() {
        public void actionPerformed(java.awt.event.ActionEvent evt) {
            jButton1ActionPerformed(evt);
        }
    });

    javax.swing.GroupLayout layout = new
    javax.swing.GroupLayout(getContentPane());
    getContentPane().setLayout(layout);
    layout.setHorizontalGroup(
        layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

```

```

        .addGroup(layout.createSequentialGroup())
            .addGap(40, 40, 40)

    .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.TRAILING,
    G)

        .addComponent(jLabel3)
        .addComponent(jLabel1))
        .addGap(67, 67, 67)

    .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING,
    G, false)

        .addComponent(jTextField1)
        .addComponent(jTextField2, javax.swing.GroupLayout.DEFAULT_SIZE,
    136, Short.MAX_VALUE))
        .addContainerGap(105, Short.MAX_VALUE))
        .addGroup(javax.swing.GroupLayout.Alignment.TRAILING,
    layout.createSequentialGroup()

            .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
    Short.MAX_VALUE)
            .addComponent(jButton1)
            .addGap(90, 90, 90))
        );
    layout.setVerticalGroup(
        layout.createSequentialGroup()
            .addGroup(layout.createSequentialGroup()
                .addComponent(jLabel1)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(jTextField1,
    javax.swing.GroupLayout.PREFERRED_SIZE,
    javax.swing.GroupLayout.DEFAULT_SIZE,
    javax.swing.GroupLayout.PREFERRED_SIZE))
                .addGap(37, 37, 37)
            )
    );
}

```

```

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

        .addComponent(jLabel3)

        .addComponent(jTextField2,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED,    80,
Short.MAX_VALUE)

        .addComponent(jButton1)

        .addGap(49, 49, 49))

);

pack();
} // </editor-fold> // GEN-END: initComponents

private void jTextField1ActionPerformed(java.awt.event.ActionEvent evt) { // GEN-
FIRST:event_jTextField1ActionPerformed

    // TODO add your handling code here:

} // GEN-LAST:event_jTextField1ActionPerformed

private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) { // GEN-
FIRST:event_jButton1ActionPerformed

    // TODO add your handling code here:

    String uname=jTextField1.getText().toString();
    String pwd=jTextField2.getText().toString();
    if(uname.equals("admin") && pwd.equals("admin"))
    {
        Menu m=new Menu();
        m.show();
        this.setVisible(false);
    }
    else

```

```

        {
            JOptionPane.showMessageDialog(null,"Invalid User" ,"Alert Box" ,
JOptionPane.INFORMATION_MESSAGE);
        }
    }//GEN-LAST:event_jButton1ActionPerformed

/**
 * @param args the command line arguments
 */
public static void main(String args[]) {
    /* Set the Nimbus look and feel */
    //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code
(optional) ">
    /* If Nimbus (introduced in Java SE 6) is not available, stay with the default look
and feel.
    *
    * For details see
    http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html
    */
    try {
        for (javax.swing.UIManager.LookAndFeelInfo info :
javax.swing.UIManager.getInstalledLookAndFeels()) {
            if ("Nimbus".equals(info.getName())) {
                javax.swing.UIManager.setLookAndFeel(info.getClassName());
                break;
            }
        }
    } catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(LoginPage.class.getName()).log(java.util.logging.
Level.SEVERE, null, ex);

    } catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(LoginPage.class.getName()).log(java.util.logging.
Level.SEVERE, null, ex);

    } catch (IllegalAccessException ex) {

```

```
java.util.logging.Logger.getLogger(LoginPage.class.getName()).log(java.util.logging.  
Level.SEVERE, null, ex);
```

```
    } catch (javax.swing.UnsupportedLookAndFeelException ex) {
```

```
java.util.logging.Logger.getLogger(LoginPage.class.getName()).log(java.util.logging.  
Level.SEVERE, null, ex);
```

```
    }
```

```
//</editor-fold>
```

```
/* Create and display the form */
```

```
java.awt.EventQueue.invokeLater(new Runnable() {
```

```
    public void run() {
```

```
        new LoginPage().setVisible(true);
```

```
    }
```

```
});
```

```
}
```

```
// Variables declaration - do not modify//GEN-BEGIN:variables
```

```
private javax.swing.JButton jButton1;
```

```
private javax.swing.JLabel jLabel1;
```

```
private javax.swing.JLabel jLabel2;
```

```
private javax.swing.JLabel jLabel3;
```

```
private javax.swing.JTextField jTextField1;
```

```
private javax.swing.JTextField jTextField2;
```

```
// End of variables declaration//GEN-END:variables
```

```
}
```

Naive Bayes classifier.

```
import java.util.ArrayList;
```

```
public class NaiveBayes {
```

```
    //holds the mean values for each attribute in the yes class
```

```
    //holds the standard deviation values for each attribute in the yes class
```

```
    private double attributes[];
```

```
    private double yesMean[];
```

```
    private double yesStdDev[];
```

```
    private double noMean[];
```

```
    private double noStdDev[];
```

```
    private double pYes;
```

```
    private double pNo;
```

```
    public NaiveBayes(ArrayList<Person> training) {
```

```
        int size = training.get(0).getAttributes().length;
```

```
        yesMean = new double[size];
```

```
        noMean = new double[size];
```

```
        yesStdDev = new double[size];
```

```
        noStdDev = new double[size];
```

```
        double y = 0; //Number of yes examples in training set
```

```
        double n = 0; //Number of no examples in training set
```

```
        for(Person p : training) {
```

```
            attributes = p.getAttributes();
```

```
            if(p.getOutcome() == Outcome.yes) {
```

```
                y++;
```

```

        for(int i = 0; i < attributes.length; i++) {
            yesMean[i] += attributes[i];
        }
    }
    else {
        n++;
        for(int i = 0; i < attributes.length; i++) {
            noMean[i] += attributes[i];
        }
    }
}

for(int i = 0; i < attributes.length; i++) {
    yesMean[i] = yesMean[i] / y;
    noMean[i] = noMean[i] / n;
}

for(Person p : training) {
    attributes = p.getAttributes();
    if(p.getOutcome() == Outcome.yes) {
        for(int i = 0; i < attributes.length; i++) {
            yesStdDev[i] += Math.pow(attributes[i] -
yesMean[i], 2);
        }
    }
    else {
        for(int i = 0; i < attributes.length; i++) {
            noStdDev[i] += Math.pow(attributes[i] - noMean[i],
2);
        }
    }
}

```

```

        for(int i = 0; i < attributes.length; i++) {
            yesStdDev[i] = Math.sqrt((yesStdDev[i])/(y-1));
            noStdDev[i] = Math.sqrt((noStdDev[i])/(n-1));
        }

        pYes = y/(y+n); //probability of any given example being yes
        pNo = n/(n+y); //probability of any given example being no
    }

    public Outcome Test(Person test) {
        double pYesGivenE = 1.0;
        double pNoGivenE = 1.0;
        double attributes[] = test.getAttributes();

        for(int i = 0; i < attributes.length; i++) {
            pYesGivenE *= getProbability(attributes[i], yesMean[i],
yesStdDev[i]);
            pNoGivenE *= getProbability(attributes[i], noMean[i],
noStdDev[i]);
        }
        pYesGivenE *= pYes;
        pNoGivenE *= pNo;

        if(pNoGivenE > pYesGivenE) {
            return Outcome.no;
        }
        else {
            return Outcome.yes;
        }
    }

    private double getProbability(double x, double mean, double stdDev) { //using
an assumed normal distribution

```

```
double denominator = stdDev * Math.sqrt(2*Math.PI);
double exponent = -1 * ( (Math.pow(x - mean, 2)) / (2*Math.pow(stdDev,
2)) );

double probability = (1/denominator) * Math.pow(Math.E, exponent);
return probability;
    }
}
```

AI-BASED LOCALIZATION AND CLASSIFICATION OF SKIN DISEASE

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Abstract-

In recent days, skin diseases are increased in humans. Skin conditions are brought on by illnesses or germs. The prevalence of certain skin conditions, such as ringworm, yeast infections, allergens, etc., is rising daily. In order to stop the proliferation of these illnesses, it is therefore important to detect them early. Some variables, such as clinical characteristics taken into account for recognising the illness, can be used to recognise it. Dermatitis in children ages 0 to 5, warts are children ages 6 to 11, and acne vulgaris in children ages 12 to 16 are among that potential skin illnesses. Dermatomyositis is a skin ailments that can affect people of all ages, including kids around aged of five and fifteen and people around the ranges of forty and sixty..

Keywords – Skin Disease, Classification, Segmentation, Treatment, Medicines.

1.INTRODUCTION

Skin problems include melanoma lesions of the skin, nonmelanoma cancers such as squamous cell carcinoma, carcinoma of the basal cell, acne, and genetic illnesses like sickle-cell anaemia can all be diagnosed using a variety of techniques. Several example includes leprosy, psoriasis, infections caused by bacteria, and genetic skin conditions. Different methods can be used to identify these skin conditions. Skin resistance was evaluated for the study over a broad frequency spectrum, ranging compared to one hundred Hz to one megahertz. However, since the skin obstruction can change over various frequency ranges, this study for infected skin and normal ones needs to be carried out at the same rate. Infection skin and flawless skin were examined for skin resistance at the same frequency.

Because normal skin and sick skin have different recorded skin impedances while tested at the same frequency, we can identify skin illnesses. The Two concentric electrode are affixed to a ceramic plate as part of the non-invasive probing electrode system used in the aforementioned approach. While the outside electrodes drive the voltage, the inner electrode serves as a sink electrode that provides output. In this case, the source electrode supplies a little quantity of current to the skin while the sink electrode feeds information to the microcontroller. The longest electrode is over 10mm long. Skin resistance measures can be used to identify nerve lesions, depression, anxiety, and neurological diseases.

It is also used for physiological evaluations, emotional issues, and lie detection. Some of the several types of bioimpedance methods include multi frequency range, single frequency & bio impedance spectroscopy. The standard frequency utilised by SF-BIA is 50 kHz. At this frequency, the current moves across both extracellular & intracellular fluid. The examination of bio-impedance measured at many frequencies is known as multiple-frequency bio-impedance.

Although CAD or computer-aided diagnosis is employed to enhance a precision of diagnosis in a number of medical specialties, including colonography and mammography, it is not used in dermatology considering non-invasive examinations are carried out using only the human eye and there may be mistakes that could have been avoided. This study presents a novel technique for progressively integrating accurate classification and segmentation models, proving that CAD can be a practical choice in dermatology. We examine the skin image to find important components and normalise the image. Applying an alternate artificial neural network model, we classified each cluster into various prevalent skin disorders.

This classification model performs better than earlier experiments and produces a sensitivity score that is almost perfect under challenging conditions. As a starting network developed without segmentation and able to recognise

several illnesses in a one image, our categorization method is high accurate. This improved performance might be enough for the dermatology area to use CAD. By using this project we can easily find the type of disease and suggestion of Disease and Drug to recover it. By using the AI algorithm we will get the prediction level high and it is also true because we will be using the trained dataset for this project.

2. LITERATURE SURVEY

In this paper, a new technique for autonomously segmenting and classifying cutaneous tumours is suggested. Before being divided to separate disease regions, skin pictures are first screened to remove unwanted filaments and background noise. A region growing technique using automatic seed point initialization is used for segmentation. The findings of measuring the segmentation performance using various well-known metrics are noteworthy. The extracted lesion regions are then represented using colour and texture attributes. The SVM and k-NN algorithms are combined for the collection of features-based categorization. On our very own gathering of 726 samples from 141 photos representing 5 various categories of disorders, the algorithm's efficacy is evaluated. [1].

One of the most deadly cancers is melanoma. If caught early enough, it is incredibly treatable. It is crucial to first check worrisome lesions and moles for cancer. Images taken with standard cameras, which are more preferred due to their accessibility and cheap cost, can be used for detection. Accurate lesion region detection, or the division of a picture into two areas as injury and typical skin, is a crucial step in the computerised assessment of skin lesions. Due to obstacles like lighting variation and poor contrast between lesions & healthy skin, accurate segmentation can be difficult. In this paper, a deep neural network-based method for precise lesion region extraction is suggested [2].

Regardless of skin tone, skin cancer is a serious health problem that affects a large portion of the populace. Dermoscopy can be used to identify this condition and decide whether the skin sores that are noticeable are harmless or dangerous cancers. Despite the expertise of the experts, skin lesions are challenging to categorise, which is why computer systems are being developed to improve the efficacy of cancer detection. Systems that help with skin cancer detection analyse digital images to identify tumours by interpreting clinical parameters, first depending on an accurate segmentation process to extract pertinent features. ABCD and the seven-point check list are two of the popular techniques for analysing defects[3].

Melanoma is the deadliest type of skin cancer and will kill you if you neglect it. Melanoma incidence has been rising, particularly in young adults, but if caught early, the

prognosis is good. Unfortunately, it would take too much time and money for dermatologists to screen every patient for melanoma. Images of skin lesions must be used to assess a person's melanoma risk using an automated algorithm. The system allowed dermatologists to make diagnoses without the use of specialised or pricey tools. Finding the skin disease in the digital photography presents a challenge when deploying such a system. The majority of currently used skin lesion segmentation algorithms are made for pictures captured with a unique tool called a dermatoscop[4].

One of the more difficult problems in the area of medical diagnosis is the analysis of skin texture. Various skin diseases, including skin that is dry, fungus, and allergy symptoms, have an impact on human existence. This paper's goal is to assess skin disease using skin image texture analysis what's more, by standing out the test picture from a bunch of characterized pictures or reference pictures. It is possible to calculate the amount of skin conditions contained in the skin texture photograph by comparing trial and reference photos[5].

Medical imaging professionals employ computer-based systems called computer-aided diagnosis (CAD) to help them make diagnoses. In many medical specialties, including colonoscopy and mammography, CAD has become a standard tool[6].

Fuzzy c-means, enhanced fuzzy c-means, and K-means were tested, and they generated correct positive rates for dividing skin conditions of about 83%[7].

To find optimal threshold for a isodata clustering algorithm for segmentation of skin lesions. Clustering skin disease has the intrinsic drawback of being weaker than noise. The selection of the centroid that can generalise the data cluster is a key component of clustering methods[8].

Using segmentation erythema in a skin sample and the radial basis of the kernel function, SVMs may divide nonlinear hyperplanes[9].

Five distinct groups of skin lesions were segmented and classified using a combined linear SVM and k-NN classifier[10].

3. PROPOSED WORK

KNN and Nave Bayes techniques are used in the proposed system to identify a variety of skin conditions. Clinical characteristics, for example, which are taken into consideration when recognising the illness, can be used to recognise it. Dermatitis, which can affect people aged 0 to 5, warts, which can affect people aged 6 to 11, and acne vulgaris, which can affect people aged 12 to 16, are the three potential skin illnesses. Children and adults with dermatomyositis, a form of skin condition, range in age

from 5 to 60. We are giving a suggestion of what kind of treatment you want and also showing life thread or not.

In This Architecture we can find idea about, how the project is going to work, how the algorithms classifies and the result of our project.

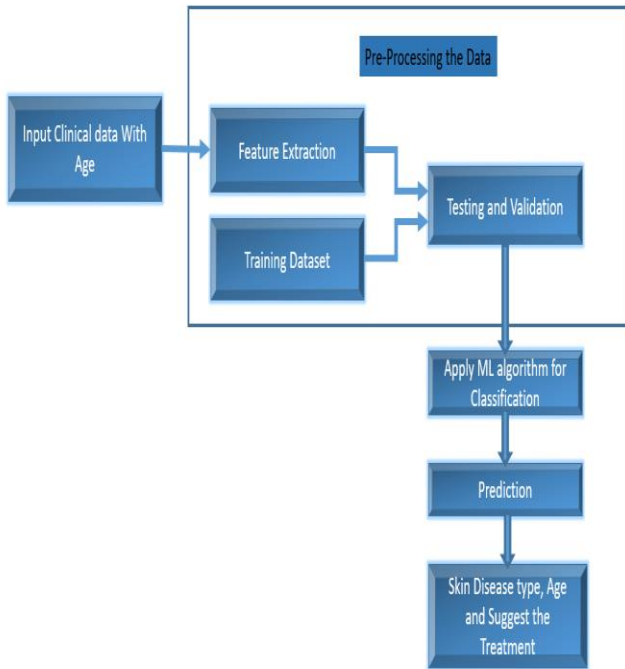


Fig.1. System Architecture

3.1 K-Nearest neighbours algorithm(KNN) Used.

Instance-based learning, also known as idle learning, takes the form of K-NN, where all calculations are postponed until after classification and a function can only be locally approximated. One of the simplest machine learning techniques is the k-NN algorithm. In k-nearest neighbours (k-NN) regression and classification, From a group of things for which a class as well as trait value is previously known, one peer was chosen.

STEP-1-: Begin.

STEP-2-: Enter input : $D = (x_1, c_1), \dots, (x_N, c_N)$.

STEP-3-: The next case to be classified is $x = (x_1 \dots x_n)$.

STEP-4-: Solve a and d FOR each one of labelled occurrence (x_i, c_i) (x_i, x)

STEP-5-: Sort d (x_i, x) in the range of 1 to N, starting with the lowest value.

STEP-6-: Assign the most popular subject in $D^k \times x$ to x.

Step-7-: Finish.

3.2 Naive Bayes Algorithm.

It is a technique for categorise data that is based on the independence of predictions and the Bayes Theorem. By definition, a naive Bayes classification system works under the assumption that the presence of a single trait in a class has no bearing on the presence of any other qualities. If a fruit is red, spherical in shape, and possesses a diameter of approximately 3 inches, it may be classified as an apple. Despite the fact that some of these characteristics are contingent upon others or Depending on the presence of other traits, the presence of any one of these features increases the likelihood that the fruit in question is an apple, hence the name "Naive."

This model was easy to build and quite useful for large data sets. In addition to being simple, Naive Bayes is renowned for outperforming even the most complex classification algorithms. From $P(c)$, $P(x)$, and $P(x|c)$, the Bayes equation can be used to get the Bayesian probability $P(c|x)$.

$$P(c|x) = \frac{P(x|c)P(c)}{P(x)}$$

Likelihood
Class Prior Probability
Posterior Probability
Predictor Prior Probability

$$P(c|X) = P(x_1|c) \times P(x_2|c) \times \dots \times P(x_n|c) \times P(c)$$

Eq 1: Naïve Bayes Equ.

3.3 Naive Bayes Algorithm Works.

Let's take an example to better understand it. A workout data set regarding the weather is provided below, along with the objective variable "Play" (which denotes the possibility of a playing). Now we must categorizing whether The players will be participate in the games based on the weather. Let's carry it out by performing the following:

Step 1: make a frequency table using the data..

Step 2 : Build a likelihood table by computing probabilities, such as the possibility of an overcast day is 0.29 and the likelihood of the game is 0.64.

Weather	Play
Sunny	No
Overcast	Yes
Rainy	Yes
Sunny	Yes
Sunny	Yes
Overcast	Yes
Rainy	No
Rainy	No
Sunny	Yes
Rainy	Yes
Sunny	No
Overcast	Yes
Overcast	Yes
Rainy	No

Frequency Table		
Weather	No	Yes
Overcast		4
Rainy	3	2
Sunny	2	3
Grand Total	5	9

Likelihood table				
Weather	No	Yes		
Overcast		4	=4/14	0.29
Rainy	3	2	=5/14	0.36
Sunny	2	3	=5/14	0.36
All	5	9		
	=5/14	=9/14		
	0.36	0.64		

Fig 2:dataset

Step-3: Next, For the likelihood of each class, apply the naive Bayesian formula. The result of a prediction is the categorization with the highest posterior likelihood.

Problem: People are going to play outdoors in the heat, which is a problem. Does this assertion hold up?
Using the recently discussed posterior probability approach, we can find a solution.

$P(\text{Yes} | \text{Sunny})$ is equal to $P(\text{Yes} | \text{Sunny}) * P(\text{Yes}) / P(\text{Sunny})$.

$P(\text{Sunny} | \text{Yes}) = 3/9 = 0.33$, $P(\text{Sunny}) = 5/14 = 0.36$, and $P(\text{Yes}) = 9/14 = 0.64$ are the values in this case.

The chance is now $P(\text{Yes} | \text{Sunny}) = 0.33 * 0.64 / 0.36 = 0.60$, which is higher.

This technique frequently employs a same method to estimate the likelihood of various categories according to various attributes when dealing with difficulties involving text classification and problems with many classes.

3.4 Naive Bayes algorithm application.

- Naive Bayes is a rapid classifier that is ready to pick up new information. It might therefore be used for real-time prediction.
- This method is well known for its proficiency at predicting numerous classes. Here, we can forecast the likelihood of several target variable kinds..
- The naive Bayes classification algorithms, that function well in multiclass settings and adhere to the independence requirement, are extensively used in text classification as well as spam filtering and analysis of sentiment. They also out perform other algorithms in terms of success rate. At a result, it was commonly applied in the filtering of spam (to identify junk e-mail) as well as the sentimenting analysis (to identify both favorable and adverse consumer emotions) in social media analysis.
- Recommendation System: A recommendation system may filter unseen data and predict weather the user will discover a given resource interesting or not by integrating Naive Bayes Classifiers with Collaborative Filtering.

4. PERFORMANCE ANALYSIS

In This Performance analysis we can see the screenshots I have attached below, in this we can analyse the output how it works and predicts.

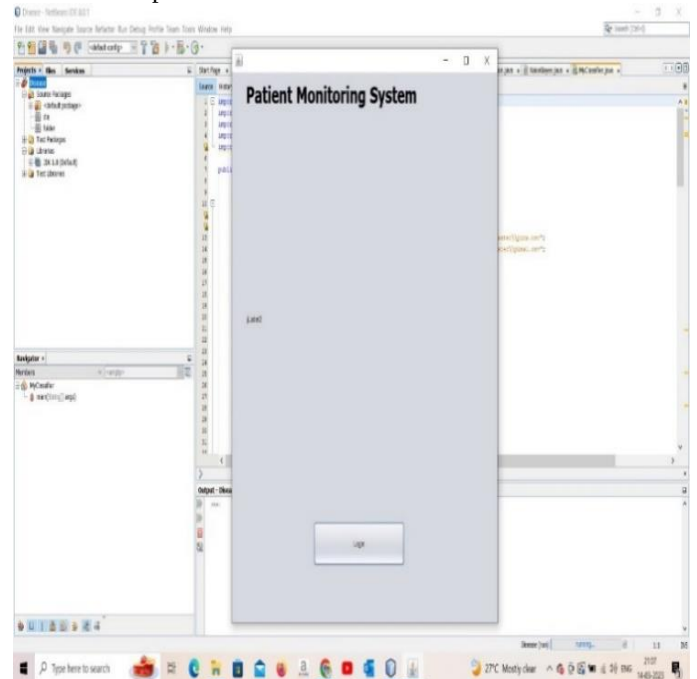


Fig 3: Login Page

In Figure [3], it is showing a Login page for patient Monitoring System. In every applications is there a login page, because it checks the data of patient in database. If the login credentials is found in database then it gives correct data of patient.

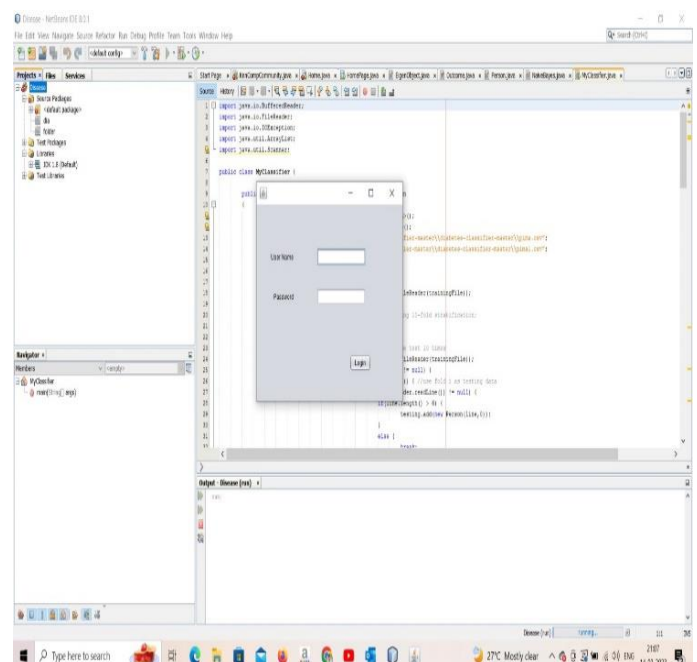


Fig 4: Entering a login details

In above Figure [4], it is showing a page of entering a user name and password of user to assess the patient data from database. If user name and password matches the database then it will shown data of patient.

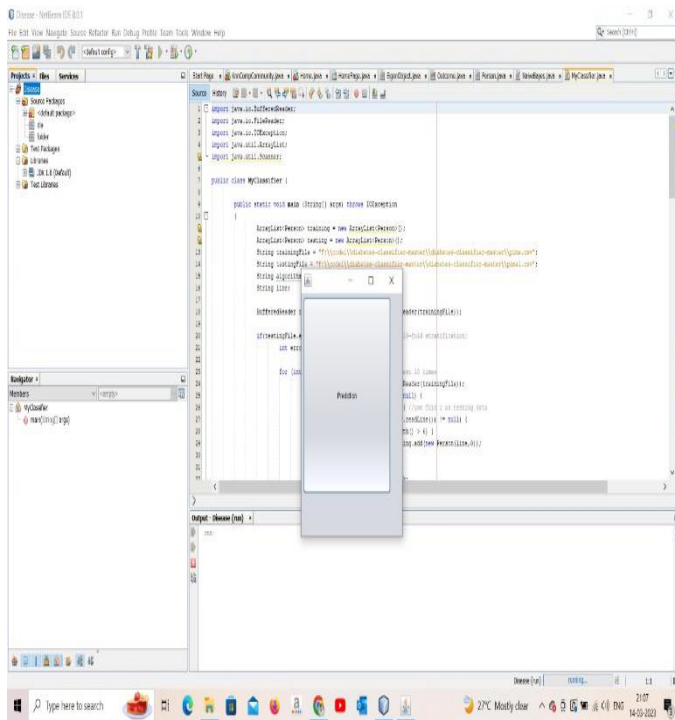


Fig 5: Prediction page

In above Figure [5], it is showing a prediction page of disease, name of diseases, treatment of diseases and recommended drug for the disease. So in this page it is showing prediction level of diseases.

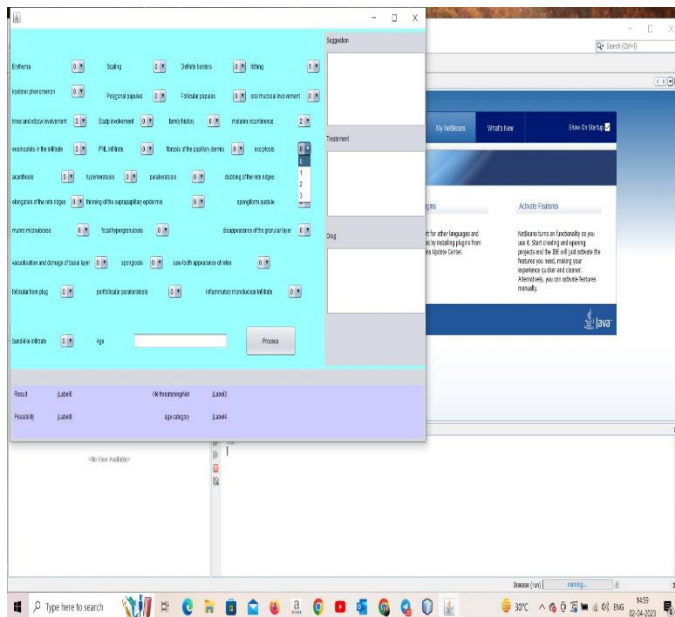


Fig 6: Symptoms entering page

In above Figure[6], To receive predictions of proposals, treatments, and medications, we must enter the symptoms of the patient on this output page.

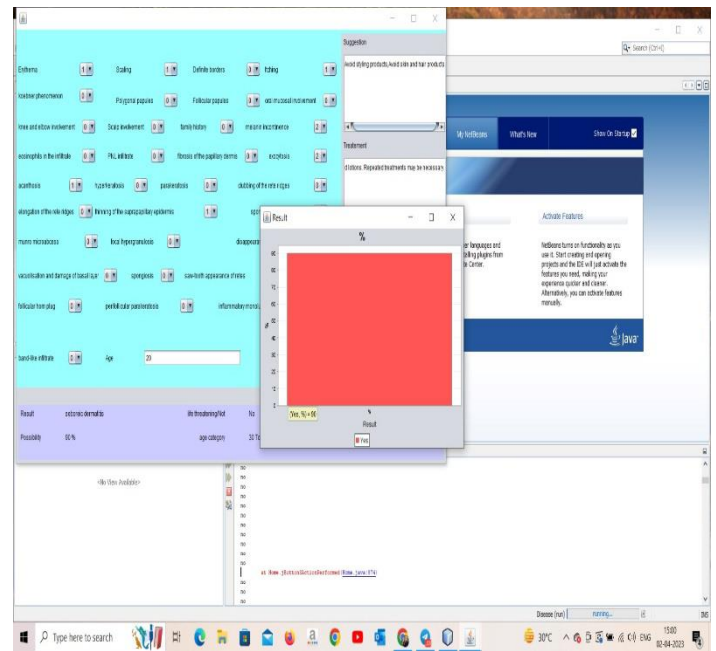


Fig 7: Prediction page.

In above Figure[7], After entering the patient's symptoms on the previous page, the predictions are displayed.

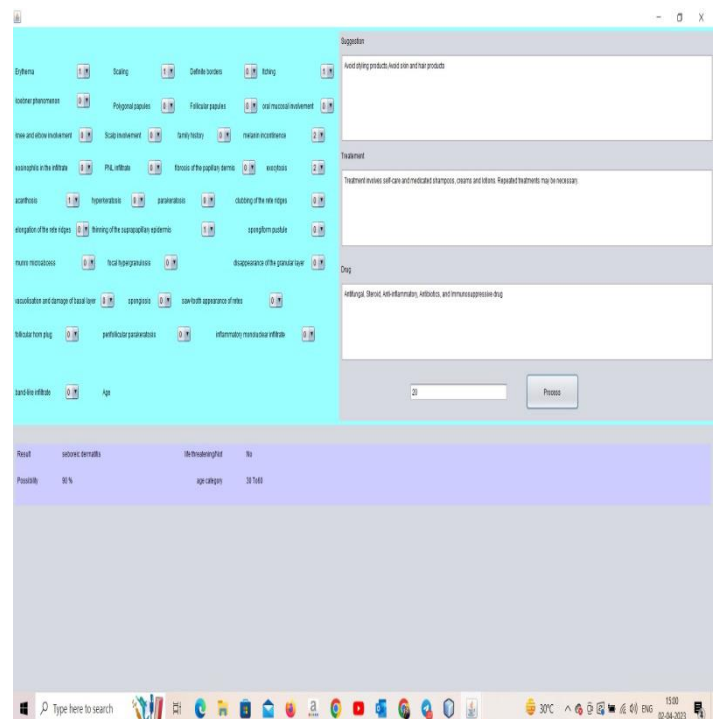


Fig-8:Result of Suggestions, Treatment, Drug page.

In above Figure[8], The final outcome of patient advice, medication, and treatment to recover from that illness is visible.

5. CONCLUSION

The development of a model for the forecast of cutaneous illnesses in this research makes use of deep learning methods. In comparison to any other previous models, it has been found that by combining characteristics and deep learning, we can improve precision and predict a larger number of illnesses. As the earlier models created for this application could only report up to six different skin diseases with a maximum degree of 75% precision. We can predict up to 20 different illnesses using a single deep learning system. more accurate 88% grade. This shows the huge potential for deep learning algorithms to diagnose skin conditions in the actual world. The precision can be greatly increased by utilising even more sophisticated hardware and software, as well as a sizable dataset, and the model can be used for remedial experiments because it doesn't require any intrusive treatments. Further work can be done to standardise this approach for early skin disease identification as it will reduce the delay between diagnosis and therapy.

REFERENCES

- [1] "Segmentation And Classification Of Skin Lesions For Disease Diagnosis", DOI: 10.1016/J.Procs.2015.03.090, 2015; Sumithra Ra, Mahamad Suhilb, D.S. Guruc.
- [2] Extraction of Skin Lesions from Non-Dermoscopic Pictures Using Deep Learning, Mohammad H. Jafari, Ebrahim Nasr-Esfahani, Nader Karimi, S.M. Reza Soroushmehr, Shadrokh Samavi, and Kayvan Najarian, ResearchGate, September 2016.
- [3] "AN INTELLIGENT SYSTEM TO DIAGNOSIS THE SKIN DISEASE", Vol. 11, No. 19, October 2016, Manish Kumar and Rajiv Kumar.
- [4] Automatic segmentation of skin tumours from dermatological photographs, Waterloo, Ontario, Canada, Jerrey Glaister, 2013.
- [5] K. INDUPRIYA et al., Volume 3 Issue 5, "A SURVEY ON SKIN TEXTURE ANALYSIS FOR MEDICAL DIAGNOSIS USING IMAGE PROCESSING TECHNIQUES", Dr. G. P. RAMESH KUMAR, K. INDUPRIYA, and others
- [6] Doi, K. Computer-aided diagnosis in medical imaging: Historical review, current status and future potential. Comput. Med. Imaging Graph. 31, 198–211.
- [7] Trabelsi, O., Tlig, L., Sayadi, M. & Fnaiech, F., Skin disease analysis and tracking based on image segmentation. 2013 International Conference on Electrical Engineering and Software Applications, Hammamet, 1–7. <https://doi.org/10.1109/ICEESA.2013.6578486>.
- [8] Rajab, M. I., Woolfson, M. S. & Morgan, S. P. Application of region-based segmentation and neural network edge detection to skin lesions. Comput. Med.

Imaging Graph. 28, 61–68. [https://doi.org/10.1016/S0895-6111\(03\)00054-5](https://doi.org/10.1016/S0895-6111(03)00054-5).

[9] Lu, J., Manton, J. H., Kazmierczak E. & Sinclair, R., Erythema detection in digital skin images. In 2010 IEEE International Conference on image processing.

[10] Sumithra, R., Suhil, M. & Guru, D. S. Segmentation and classification of skin lesions for disease diagnosis. *Proced.Comput. Sci.* 45, 76–85. <https://doi.org/10.1016/j.procs.2015.03.090> (2015).