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Computer Assistive Palm Reader

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Abstract: Palmistry, also known as palm reading or hand prediction, is the study of a person's personality, fortune, and future by examining his or her hands. Chiromancy is another name for it. Palmistry encompasses not just the reading of one's hand or palm, but also the reading of one's arm, finger, and fingernail. This system shows a digital image processing application that can be used in palmistry to predict people's personalities or future lives. Based on edge detection and recognition, a palmistry prediction system has been created. This developed system uses morphological operations as well. The system uses a decision tree classifier algorithm to identify specific features in the input images and extract principal lines from a human palm image. The most important line patterns in palmistry are summarised and used as models for fortune-telling palm reading. The model predicts a person's personality and displays the predictions based on palmistry knowledge and date of birth.
Keywords: Image Processing, Primary Lines Detection, Image Masking, Palmistry

I. INTRODUCTION

Palmistry has roots in Indian astrology, Chinese astrology, and Roma fortune-telling. Palmistry was highly regarded in India at the time, per the traditional record of frescoes in Indian ruins and words passed down from Brahmanism. Yoshiaki Omura, an acupuncturist, explains how it got its start in Hindu Astrology (known in Sanskrit as Jyotish). The Hindu sage Valmiki is believed to own written a book with 567 stanzas called The Teachings of Valmiki Maharshi on Male Palmistry, which was written several thousand years ago. The art of palmistry spread from India to China, Tibet, Egypt, Persia, and other countries. Palmistry spread from India to Greece, where Anaxagoras practised it. Aristotle (384–322 B.C.E.) is alleged to own discovered a treatise on palmistry on an altar to Hermes, which he then presented to Alexander the good (356–323 B.C.E.), who was fascinated by analysing the lines on his officers' hands to assess their character. A chapter from a 17th-century treatise, incorrectly attributed to Aristotle, is occasionally cited because the treatise in question.

Today, people try to use Palmistry to find out about their current life and what is also in their future. The human palm is that the most accurate representation of somebody's life within the past, present, and future. Many ancient civilizations studied humanity through the form, texture and contours within the hands. We can predict character traits, wisdom, career, marriage, and plenty of other aspects of somebody's life by reading their palm line. Palmistry may be a science that examines the human palm from various angles and draws conclusions about the person's personality. Palmistry is employed to produce guidance in life and shed light on personal issues like health, finances, and family. A palmist talks about oneself so as to assist him/her head of their future. The electronic computer can perceive the image from various peripheral devices and analyse it Image processing refers to the methods won't to provide perception to a computer. This palmistry prediction system, rather than traditional face-to-face chiromancy, allows users to submit their hand images and receive instant results. Palm detection is employed during a kind of applications, including personal identification and authentication, gesture recognition, and so on. The goal of this method is to find out about image processing technologies, specifically the canny edge detection algorithm, and to check palm print characteristics. because of its consistent and distinct characteristics, palm print is one amongst the more modern physiological biometrics. Palm prints provide one amongst the foremost powerful means of non-public identification and verification thanks to their rich texture information.

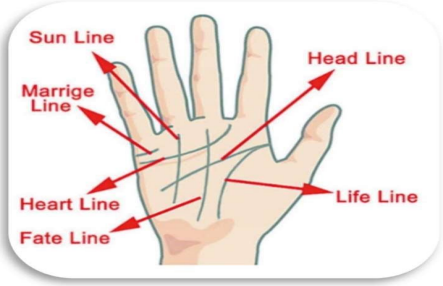


Fig.1 Primary Palm Lines

The Fig 1. Depicts the Primary Palm lines namely: Life Line, Head Line, Heart Line and other lines.

1) *Life Line:* The life line is the line on the palm that people are most interested in. It starts between the index finger and the thumb and runs all the way down to the base of the thumb and the wrist connection. The life line is frequently misinterpreted as revealing how long a person will live or when he or she will die. It does, however, reveal information about one's life experiences, interpersonal relationships, health, and physical and emotional well-being.

Table 1. Description of the Life Line

Type	Description	Life Line
Runs close to thumb	often tired	
Curvy	plenty of energy	
Long, deep	vitality	
Short and shallow	manipulated by others	
Swoops around in a semicircle	strength and enthusiasm	
Straight and close to the edge of the palm	cautious when it comes to relationships	
Multiple life lines	extra vitality	
Circle in line indicates	hospitalized or injured	
Break	sudden change in lifestyle	

- *Description:* The Table 1 illustrates the unique properties of Life Line according on its size, length, and other aspects.

2) *Head Line:* The head line, also known as the wisdom lines, reveals a person's mental and psychological makeup, as well as their intellectual and intuitive abilities. This line starts just above the life line, between the thumb and index finger, and runs horizontally across the palm to the other edge. The head line can sometimes start right on the life line and extend out from there. This indicates that the person will have a strong will to control their thoughts over matter.

Table 2. Description of the Head Line

Type	Description	Head Line
Short line	prefers physical achievements over mental ones	
Curved, sloping line	creativity	
Separated from life line	adventure, enthusiasm for life	
Wavy line	short attention span	
Deep, long line	thinking is clear and focused	
Straight line	thinks realistically	
Donuts or cross in head line	emotional crisis	
Broken head line	inconsistencies in thought	
Multiple crosses through head line	momentous decisions	

- *Description:* The Table 2 describes the individual qualities of Head Line depending on their size, length, and other properties.

3) *Heart Line:* The heart line, also called the love line or the mensal line, indicates a person's emotional state as well as their emotional and physical relationships with others. It can also be thought of as a predictor of heart health. This line is above the life line and the head line. It starts under the index or middle finger and runs all the way to the pinky finger.

Table 3. Description of the Heart Line

Type	Description	Heart line
Begins below the index finger	content with love life	
Begins below the middle finger	selfish when it comes to love	
Begins in the middle	falls in love easily	
Straight and short	less interest in romance	
Touches life line	heart broken easily	
Long and curvy	freely expresses emotions and feelings	
Straight and parallel to the head line	good handle on emotions	
Wavy	many relationships,absence of serious relationships	
Circle on the line	sadness or depression	
Broken line	emotional trauma	
Smaller lines crossing through heart line	emotional trauma	

- *Description:* The Table 3 explains the individual characteristics of Heart Line based on the size, length and various other features.

II. MATERIAL AND METHOD

A. Dataset Collection

For the purpose of training and testing the model, we used approximately 200 palm images captured with high-resolution mobile phones. It's important to note that the creases and major palm lines are clearly visible, as shown in the examples below.

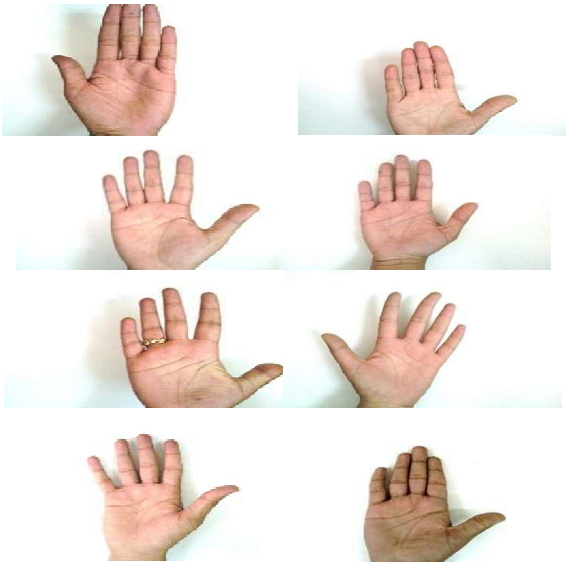


Fig 2. Palm Images

B. Methodology

The palmistry prediction model is created based on the classification.

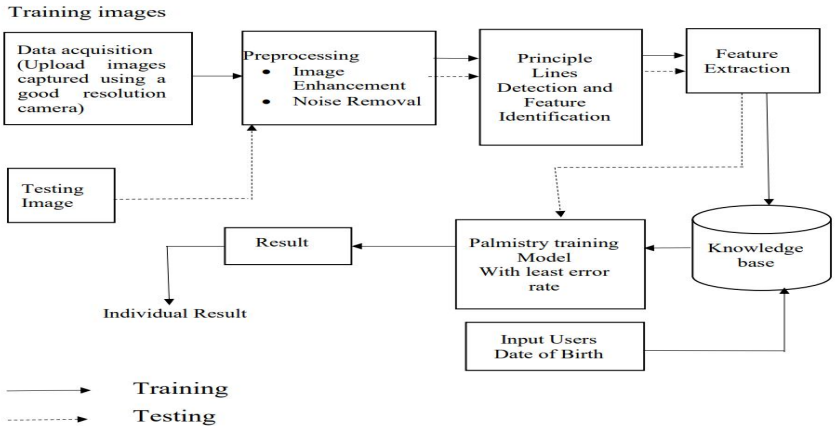


Fig 3. Proposed Methodology

1) *Data Acquisition:* Data acquisition in which the image will be captured using a high-resolution camera and will be uploaded to the system.
2) *Image Pre-processing:* Image pre-processing is where the uploaded image will be enhanced by using appropriate image enhancement techniques. The image enhancement is done to ensure clear visibility for the next process as it is known that some of the lines in the palm may be less intense and may have short breaks between them.
3) *Principle Line Detection:* Further, system detects the dominant lines of the palm followed by the extraction of dominant features using various operations. The image is then stored in the knowledge base which will be then compared with the palmistry model created by the admin which is certainly used to get the results of an individual.
4) *Testing:* The images will be pre-processed followed by principle lines detection and feature extraction after which the predictions will be obtained accordingly. Based on the classification, the palmistry prediction model is obtained. On the other side, date of birth is given as the text input. If the date of birth is in the correct format, then the result will be concatenated with the result obtained by the obtained model. Finally, the prediction will be displayed based on the date of birth and primary palm lines.

C. Implementation

1) Input Selection function

[file, pathname] = uigetfile('*.jpg','Load Image'); x=imread([pathname file]); x=imresize(x,[460 460]); x=imrotate(x,value);

Description: The uigetfile() is employed to load a picture within the .jpg format. Imread() be a function that reads a picture from a computer file or image by supplying the pathname of the file or image to be read. Imresize() employed to resize and rotate a picture within the appropriate axis in order to follow the next steps to complete more quickly and efficiently. Imrotate() is a function for rotating a selected picture in a certain direction.

2) Masking Function msk = bwareaopen(BW,P);

Description: bwareaopen(BW,P) eliminates all connected components (objects) from the binary image BW that have fewer than P pixels, leading to BW2. An area opening is the term for this procedure.

3) Concatenation function

msk2= imcomplement(msk); bin_img = 255 * repmat(uint8(msk2), 1, 1, 3); myfiltered=bin_img+ximg;

Description: The complement of a binary image, Black and white are reversed, with zeros becoming ones and ones becoming zeros. Each pixel value is subtracted from the class's maximum pixel value (or 1.0 for double-precision images) in the complement of an intensity or RGB image, In the output image, the difference is used as the pixel value. Dark regions appear lighter and light areas appear darker in the final image.

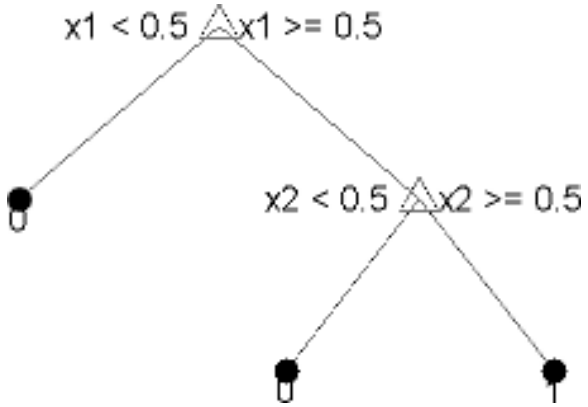
4) RGB image to Gray Conversion Function
Igray_s = rgb2gray();
Description: The rgb2gray() function converts the RGB image to a grayscale image I. The rgb2gray() function converts RGB images to grayscale by removing the hue and saturation information while keeping the luminance intact. rgb2gray can perform this conversion on a GPU if Parallel Computing Toolbox™ is installed.

4) Bot-hat function
imbothat(Igray_s, se);
Description: imbothat(I,SE) applies morphological bottom-hat filtering to the grayscale or binary image I and returns the filtered image J. Bottom-hat filtering computes the morphological closing of an image with imclose(), then subtracts the original image from the result.

5) Noise removal function
BW2=bwareaopen(BW, 50);
Description: Remove objects containing fewer than 50 pixels using bwareaopen function.

6) Region of Interest Selection
h = imfreehand
Description: imfreehand begins interactive placement of a freehand region on the current axes, and returns an imfreehand object.

7) Decision Tree Classifier
tree = fitctree(Tbl,ResponseVarName)
Description: Fitctree(Tbl,ResponseVarName) returns a fitted binary classification decision tree based on the input variables (also known as predictors, features, or attributes) and output (response or labels) in the table Tbl. ResponseVarName. Based on the values of a Tbl column, the binary tree returned separates branching nodes.
Decision trees, also known as classification trees and regression trees, are used to forecast data responses. Follow the decisions in the tree from the root (starting) node down to a leaf node to predict a response. The response is stored in the leaf node. Nominal replies, such as 'true' or 'false,' are provided by classification trees. Regression trees produce numerical results. The trees in the Statistics and Machine Learning Toolbox™ are binary. In each step of a prediction, the value of one predictor is checked (variable). Here's an example of a simple classification tree:

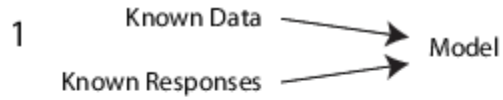


Based on two predictors, x1 and x2, this tree predicts classifications. Start with the top node, which is represented by a triangle (). The first step is to determine whether x1 is less than 0.5 If that's the case, look to the left branch to determine if the data is classified as type 0.
If x1 is greater than 0.5, however, take the right branch to the lower-right triangular node. The tree is checking to see if x2 is less than 0.5. If that's the case, look to the left branch to determine if the data is classified as type 0. If not, then follow the right branch to see that the tree classifies the data as type 1.

D. Supervised Learning

The aim of supervised, machine learning is to build a model that makes predictions based on evidence in the presence of uncertainty. As adaptive algorithms identify patterns in data, a computer "learns" from the observations., the computer improves its predictive performance.

A supervised learning method, for example, uses a known set of input data and known reactions to the data (output) and trains a model to make credible predictions for new data.



The complete collection of input data can be thought of as a heterogeneous matrix. The observations, examples, and instances rows of the matrix each contain a collection of measurements for a certain subject (patients in the example). The predictors, characteristics, and features columns of the matrix are variables that indicate a measurement taken on each subject (age, weight, height, etc. in the example). The response data can be thought of as a column vector, with each row containing the output of the matching observation from the input. We chose a classification technique and then handed the input and response data to it to fit or train a supervised learning model.

E. Fit a Model

fitctree()

tree = fitctree(Tbl,ResponseVarName)

tree = fitctree(Tbl,ResponseVarName) provides a fitted binary classification decision tree based on the table Tbl's input variables (also known as predictors, features, or characteristics) and output (response or labels). ResponseVarName. The binary tree that is returned separates branching nodes based on the values of a Tbl column.

III.RESULTS AND SISCUSSIONS

A. Image Pre-processing

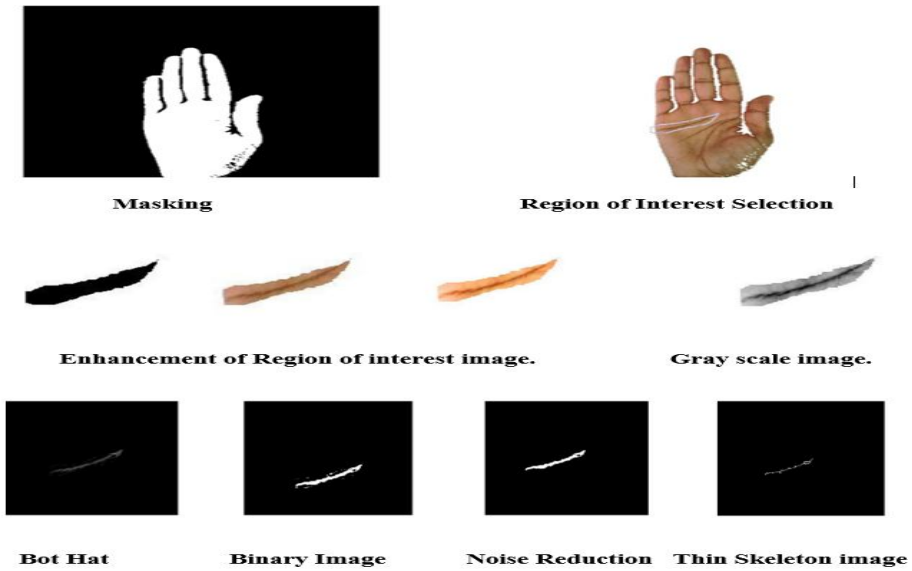


Fig 4. Image Pre-processing

- *Description:* Fig 4. Depicts the Image Pre-processing steps

B. Representation of Primary Palm Lines

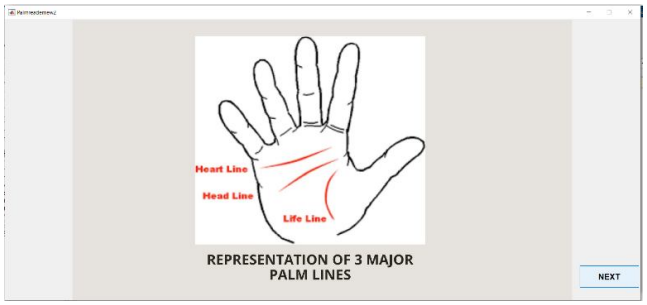


Fig 5. Identification of Palm Lines.

- *Description:* Fig 5 depicts the three major primary lines of the palm i.e., Heart Line, Head Line and Life Line. The user can click on the Next button to navigate to the next screen and start with image uploading process.

C. GUI Screen

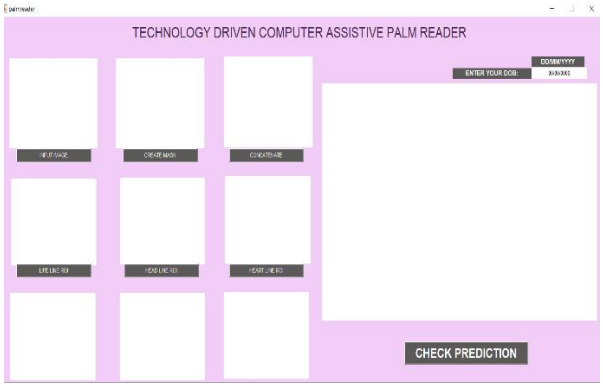


Fig 6. GUI Screen

- *Description:* The Fig 6 depicts the screen which shows the various operations to be performed starting with the image uploading process. Basically, in total there are 8 operations to be performed on this screen.

D. Image Masking

Fig 7. Image Masking

- *Description:* Fig 7 explains about the first three operations to be done. After user uploads his palm image ,the image masking will be done as the next step which is used for noise removal for the further process to be carried out smoothly followed by concatenation in which the Gray scale image will be again converted into original image enhancing the image.

E. Skeleton Image

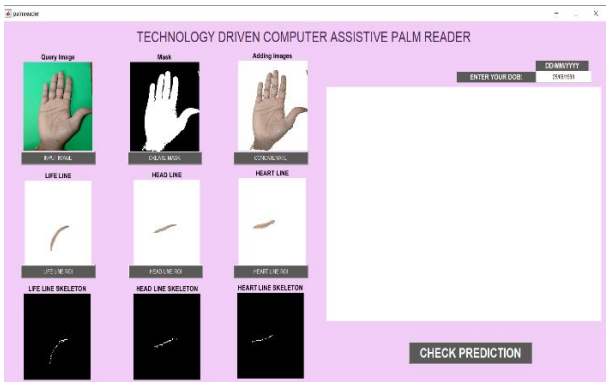


Fig 8. Thin Skeleton Image

- *Description:* The Fig 8 shows the process of the user to manually select the region of interest for all the three lines i.e., heart line, head line and life line after which it will be converted into thin skeleton image by undergoing through feature extraction process.

F. Prediction

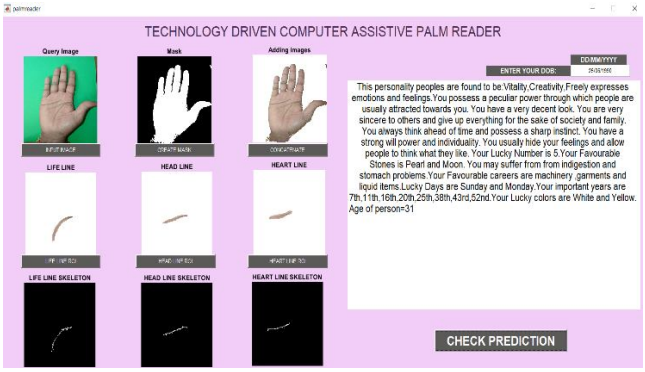


Fig 9. Prediction

- *Description:* Fig 9 depicts that, after the Thin Skeleton Image is obtained for all the three lines the user has to manually enter his Date of Birth and click on the CHECK PREDICTION button yielding him his characteristics in the output window.

G. Invalid Date of Birth Entry

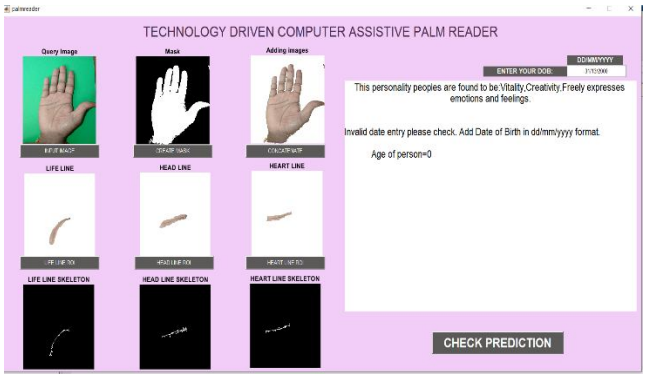


Fig 10. Invalid DOB entry

- *Description:* The Fig 10 shows the alert messsage on the sceen when the user enters wrong date of bieth input.

H. Decision Tree

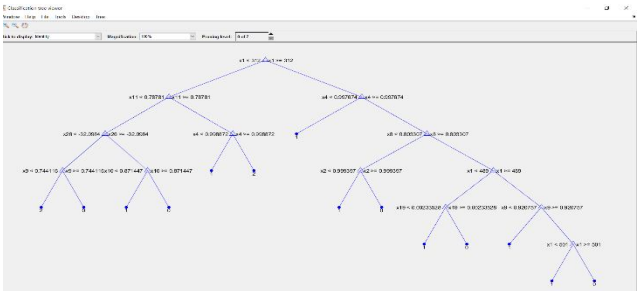


Fig 11. Represents Decision Tree of Life Line

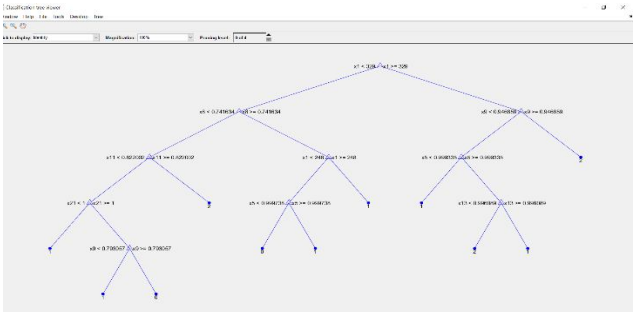


Fig 12. Represents Decision Tree of Head Line

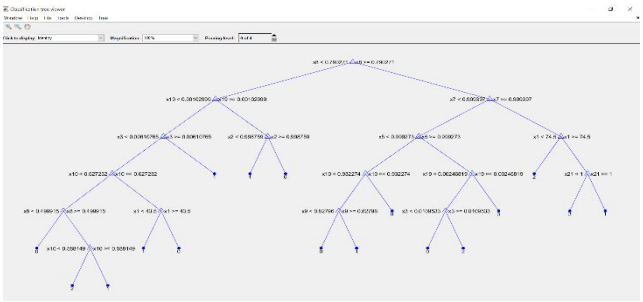


Fig 13 Represents Decision Tree of Heart Line

Description: Fig 11, 12, 13 represents each line's decision tree is produced by following the procedure given below: Every part of branches will be having destination labels. The destination labels basically depend on the user end. The values which range between 0 to 1 are basically the normalized values which we get after the feature extraction process for all the three lines. At the root node the first decision will be checked and based on the comparison the tree will get split. The results can be obtained either at the first level itself or at the higher levels. We have defined 4 classes for life line and three classes respectively for head line and heart line. X1 X2 are basically the trained data modules. So, if a particular value falls in a particular range upon checking a decision, then it will get splitted into further branches depending upon the labels specified. In decision trees the particular decision is usually based on the feature factors considered. For example, if x9 falls in that particular value range after comparison then we can say that it falls in class 2

IV. CONCLUSIONS

The Application built on the Computer Assistive Palm Reader will be able to tell the characteristics and personality of a person. The literature review helped us understand the drawbacks of the existing systems. As compared to other palm reading applications, models and traditional face-to-face palm reading, this system is where the users palm images are uploaded and the readings are done immediately. Our aim is to present a solution that can help user to get person's personality, career choices and health by taking in consideration the primary lines and date of birth and will also help people in saving time and money by uploading a picture of their palm and getting results accurately and precisely.

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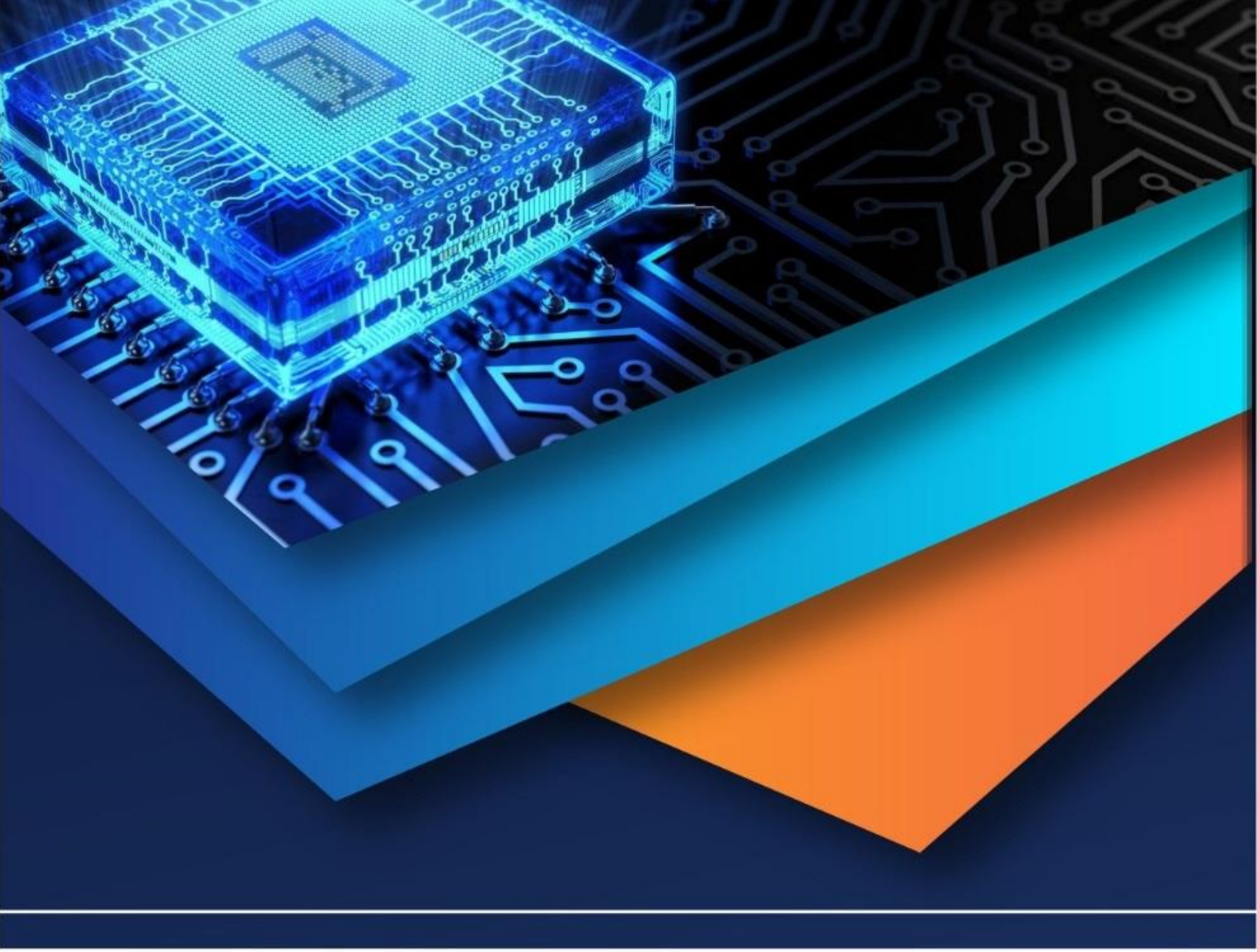

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