



Automated Medical Palmistry System based on Image Processing Techniques

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Abstract— *Palmistry is the art of characterization and foretelling the future through the study of the palm, also known as palm reading, or chorology. Palm lines and fingers are useful for recognizing the characteristics of a person and to foretell his future.*

This paper describes an Automated Medical Palmistry System (AMPS) as an application of digital image processing and analysis technique. This can be useful in healthcare domain to predict diseases for human being. The images of human palm form input to the system. Then, system applies digital image processing techniques on input images to identify certain features in the image and by using knowledge base of medical palmistry it analyzes certain features in image and predicts probable disease.

Keywords— *Palm Reader; Medical Palmistry; Automated Medical Palmistry System (AMPS); Image Processing and Analysis (IPAA); Palm Colour Detection*

I. INTRODUCTION

Palmistry is in itself a complete science which can forecast the future of an individual authentically. Medical palmistry is one branch of palmistry, which works on identification of probable diseases by observing nails and palm to indicate specific diseases, based on their position on lines, mounts and fingers. According to principles of medical palmistry, there are some symbols like Iceland, cross, star, square, grill, spot, and circle. If one or more of them is/are found on specific region of palm, or on specific line of palm, it indicates probability of disease of respective organ of body^{1,2}.

Apart from symbols, color and surface of palm and nails, shape of palm and fingers also plays important role in decision making. The color of palm and nail is observed carefully by many doctors to get assistance in disease identification. It is possible to observe color of palm and nail by naked eyes, but it may become subjective. Computer vision helps us to determine this color without any subjectivity³.

This paper presents an approach towards diagnosis of diseases based on Medical Palmistry. AMPS increases accuracy of such observations of palm and nails. AMPS applies digital image processing techniques on input palm images to identify certain features in the image using MATLAB. By using knowledge base of medical palmistry it analyzes certain features in image and predicts probable diseases and provides preventive measures for the same.

The rest of the paper is organized as – Section 2, covers the Review of Existing Systems which gives the overview of the existing systems used for medical palmistry. Section 3, presents the Symbols in Human Palm That Indicate Certain Diseases. Section 4 gives the Automated Medical Palmistry System which covers the idea and objectives of proposed system. Section 5, is about the Design and Implementation, it explains the design and module wise implementation of AMPS. Section 6, describes the Evaluation and Results. This section also explains the constraints of the AMPS. The paper ends with conclusion and the future scope.

II. REVIEW OF EXISTING SYSTEMS

A. Traditional Approach

Since ancient time, in many civilizations like Indian, Chinese, Persian, Egyptian, Roman and Greek, people used to get guidance about their present and future by means of Palmistry. “Palm Reader”, who is a human being used to predict attributes of human, like: health, psychology, intelligence, and lifestyle and other related entities based on his/her knowledge⁴.

B. Web based Approach

Various web applications are being developed for palmistry. In some web applications, “Palm Reader” is required. Here it is possible that image may be degraded during file transfer. Also human perception has limitation in image resolution, object identification and color perception⁴.

C. Mobile Application Based Approach

In case of Mobile Application based applications, sample images of palm are shown and users have to compare their own palm with the most suitable sample image. Predictions are displayed based on the selection of image by user. It is

user's responsibility to identify the nearest matching image. It is difficult for user to compare the given image with his/her own palm, because every person has different set of symbols and lines on palm. If user selects wrong image, then he/she may get wrong prediction, which may be not suitable to him/her

Using Image Processing and Analysis (IPAA) techniques, a system can be developed to overcome these limitation, and predict the disease/s based on medical palmistry automatically⁵.

III. SYMBOLS IN HUMAN PALM THAT INDICATE CERTAIN DISEASES

Fig.1 shows the list of Symbols on human palm which indicate specific diseases, based on their position on lines, mounts and finger's Island¹⁻³.

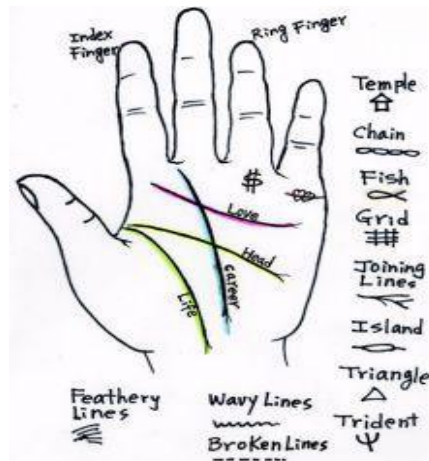


Fig. 1 List of symbols on Human Palm

Table 1 lists the symbols in human palm and describes prediction of diseases for the given symbol.

TABLE I SYMBOLS IN HUMAN PALM & PREDICTION

Symbols	Prediction
Chain	Lack of concentration, fluctuating alternation
Spot	Bright red spot on the line of head indicates a shock or injury from some blow or fall
Triangle	Creative, success in scientific research
Feathery line	Anxiety and worry
Square	Detention or incarceration
Island	Inherited heart disease, headache, dissipation of energy
Fish	Sinusitis type of problem, incident of drowning
Star	Injury on head, sudden death, poisoning at age specified
Grid	Being stuck or stifled
Broken lines	Disappointment and rejection, injury to head
Dot	Acute illness or accident
Tassel	Weakening of mental clarity, deteriorating heart condition
Traverse line	Obstacles and failures in one's career
Grille	On the mount of venues indicates probability of problems with reproductive system
Star	Star on the mount of moon indicates probability of ascites, or urinal diseases.

In additions to these symbols/marks there are some other patterns like cross, circle, etc. They are more related to nature and psychology of a person rather than physical characteristics⁶.

IV. AUTOMATED MEDICAL PALMISTRY SYSTEM

Based on the limitations mentioned in the review of existing system. AMPS proposes a new system with following improvements:

1. No palm-reader required:

All the predictions based on palm image are done by the system only, so there is no need of sending image to a palm reader and hence the probability of image distortion is reduced.

2. Comparison of palm with sample image is eliminated:

The proposed system takes image of a palm as input and gives prediction as output. Since the system processes the image and extracts features accurately, it reduces the probability of wrong prediction and provides optimal solution.

Automated Medical Palmistry System allows users to diagnose the diseases in human body by taking image of users palm as input. Then, system applies digital image processing and analysis techniques on input images to identify certain features in the image. By using knowledge base of medical palmistry it analyzes certain features in image and predicts probable disease. Thus, user can rely on predictions done by the system.

V. DESIGN AND IMPLEMENTATION

The main function of the AMPS is to take as an input, the image of human palm, process it and as an output, predict diseases, using knowledge of medical palmistry. The architecture of the system is shown in Fig. 2.

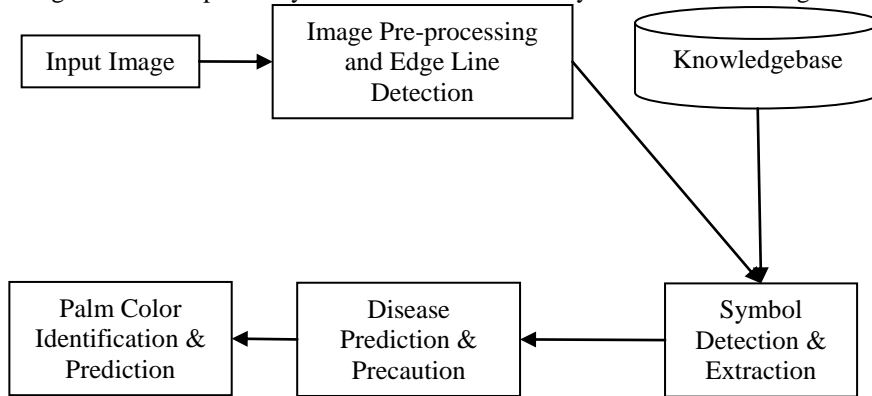


Fig. 2 AMPS Design

A. Input Image

The image of palm is captured by the camera/web-cam with 300dpi resolution in .jpg format and is provided as input to AMPS. Fig.3, shows the sample input image.



Fig. 3 Input Image

B. Image Pre-processing and Edge, Line Detection

The input image is pre-processed by applying enhancement techniques like contrast intensification, noise leaning. The Region of Interest (ROI) is determined and lines and edges within the ROI is extracted. The image obtained is saved for further functioning. Following steps are charted during Image Pre-processing and edge, line detection⁷⁻⁹:

- Palm Area marking is done based on gray image segmentation.
- Then, Gray Image Distribution from a fixed rectangle area is taken.
- After that, Gaussian distribution is applied to mark the whole area with $5 \cdot \sigma$.
- Segmented palm image is then enhanced with edge distance based Distance Image algorithm.
- Next, Hessian based Frangi filter is applied for enhancing and detecting lines, this filter will enhance and detect the vessel-like objects, to increase processing speed, a box filter is applied from SURF algorithm to replace Hessian matrix.

Fig.4, shows the output after preprocessing and edge, line detection.



Fig. 4: Output after Pre-Processing and Edge, Line Detection

C. Symbol Detection and Extraction

The output image obtained at step 2 is further used to detect and extract symbols form it. The symbols are detected using template matching as follows:

- Function `corrMatching` is used which performs Template Matching using Correlation Coefficients

- corrMatching takes following Inputs:
 - “frameImg” stores gray or color frame image,
 - “templateImg” stores gray or color template image, and
 - “thresh” stores threshold to decide the region rejection or detection, thresh = 0.5 is the default value.
 E.g. if the region has \Rightarrow corrCoef > thresh, then the corrMatching accepts it as detection, Otherwise rejects it as a false alarm.
 - corrMatching gives following Output:
 - “corrScore” is a 2D matrix of correlation coefficients and
 - “boundingBox: is given as \Rightarrow [upperLeftPixel.y upperLeftPixel.x height width]
- Fig.5, shows the output after Symbol Detection and extraction stage



Fig. 5: Output after Symbol Detection

D. Disease Prediction and Precautions

Based on symbols detected, disease prediction is done. Also, precautionary measure for the same is provided. In this stage each symbol is assigned to a Boolean variable (i.e. flag value is set to 1 if symbol is detected). If the value is found to be 1, its corresponding prediction and precautionary measures are displayed in a text box. If other symbols are also detected, then its prediction and precaution is concatenated with the previous result^{3-6, 8-11}. Fig.6, shows the Output of Disease Prediction & Precautions stage respectively.

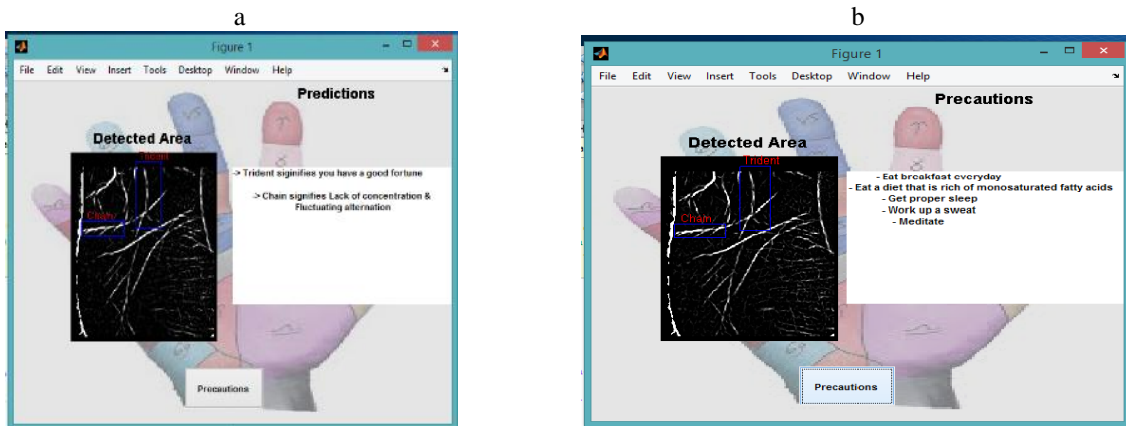


Fig. 6. (a) Output of Disease Prediction; (b)Output of Disease Precautions

E. Palm color identification and prediction

In this step, RGB image of palm is taken as input and is processed to identify the color of palm. Based on the no of red pixels in the image, prediction is made on the health of a person. Fig.7, shows the Output of Palm Color Detection & Prediction.

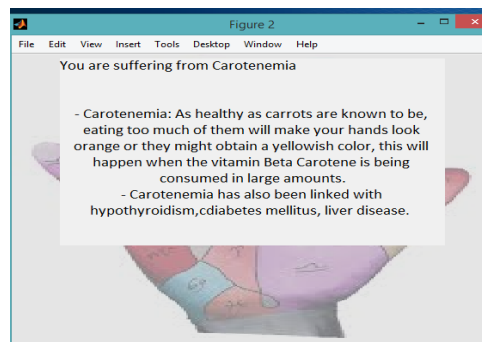


Fig. 7. Output of Palm Color Detection & Prediction

VI. EVALUATION AND RESULTS

A. Benefits of AMPS

1. AMPS can be very useful to human being to get indication of disease in advance.
2. It can save cost of treatment as well as physical and psychological suffering of the person.
3. Doctors can use this model to have assistance in disease identification.

B. Results

Out of ten test images, the system predicted for 8 correctly. In the other two it made a cumulative of 6 mistakes. Thus in a test bed of approximately 100 images of different people, it predicted for 94 out of 100 images correctly thus producing an accuracy of about 94%. Thus it can be projected that, given a leeway of 1%, the system will deliver a 95% accuracy.

The secondary aspect of the system, which is the speed, was also statistically studied. The system predicted an output for 20 images in about 300 seconds. This translates to roughly 15 seconds per image which is around the well accepted median of 15 seconds per image which most commercial software adhere to.

VII. CONCLUSION

This paper proposes a new approach in the field of Medical Palmistry with the help of Digital image processing and analysis technique. AMPS allows users to diagnose the diseases in human body by taking image of users palm as input. Then, system applies digital image processing and analysis techniques and uses knowledge base of medical palmistry on input images to identify certain features in the image. In this paper, prediction is made on several symbols (see Table 1) for 100 palm images. The experimental results demonstrate that AMPS is reliable if the images represent a distinct view of the palm and are of 300dpi resolution or more.

Scope of AMPS can be further extended by trying out AMPS for images of different type of people, increasing the number of symbols to be detected and show the future of an individual along with medical prediction. Also AMPS can outspread to embrace numerology and graphology methods for prediction.

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