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A Novel Approach for Hand Analysis Using Image Processing Techniques

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***Abstrac*- Palmistry is the art of characterization and foretelling the future through the study of the palm, also known as palm reading, or chirology. With the help of palm lines and fingers one can know the characteristics as well as can foretell the future of a person but still this field is not much technically developed and a person has to analyze hands personally. In this paper we propose a ratio based system to characterize persons on the basis of their palm width-length and their finger length. We applied image processing techniques to generate and analyze the results.**

Keywords- Palmistry, Palm-width (Pw), Palm-length (Pl), Finger-length (Fl), Jupiter ruled, Saturn ruled, Sun ruled, Mercury ruled.

I. INTRODUCTION:

Palmistry is popular since ancient age. There are examples of stone-age showing human interest in palmistry. Emperor of china used hand and thumb prints to seal documents. In our Vedas also there is information available on palm analysis. Palmistry is the knowledge of reading and analyzing palm lines, fingers and getting results [6].

This field is not yet technically rich. With the help of this paper we are trying to make a system intelligent enough to generate the results. The system comprises of three basic components- existing palmistry knowledge, derived algorithms and image processing.

Human palms have some common characteristics in the form of mountains known as planets. The finger's length corresponding to the planet represents the strength of that planet for that person. Every planet has its own predefined qualities and when a person is ruled by the planet he inherits the qualities of the planet. Apart from planets, person's palm width-length, palm-length ratio and finger-length also tells about person's qualities and his nature.

So, with the help of palmistry one can know somebody's personality type, his characteristics, hidden skills, fortune and about the profession suits best to him. Till now the palmistry is a practical knowledge and we have no systemized approach to read hands. We don't have a system which can read human hand and characterize them on the basis of their finger length - palm length and their ratios.

With the help of image processing and ratio based algorithms mentioned below, one can characterize people and may know their personality type as well.

1. Palm-width and Palm-length ratio Algorithm
2. Palm-length and Finger-length Ratio Algorithm
3. Finger length ratio Algorithm

The paper is organized as follows:
In the current section we have given the introduction to the basics of palmistry and the challenges which are faced while analysing hands. In section 2 we discuss about the literatures related to palmistry and image processing. In section 3 we propose a new approach to analyze palms and get results based on palmistry. Section 4 consists of experimental results performed. Finally conclusion is being given in section 5 followed by references.

II. FUNDAMENTALS

The system proposed in this work is novel as we are using traditional knowledge of palmistry and making it systemized and computer readable. Earlier researchers have done work in getting edges from pictures and we are taking help from these works and applying our ratio-system.

In this work we are trying to integrate palmistry knowledge with Image processing. So, we have used image processing knowledge to extract lines, then palmistry knowledge to get results. For image processing we are trying mainly line detection and curve detection. We found that for line and curve detection Hough Transform is most efficient algorithm. Hough transform makes an array and works as a matrix, so its functioning is easy. With the help of Hough transform we extract outlines of hand and lines on palm from the given hand print and then system will analyze those lines with the lines in our database [1], [2].

In order to help Hough-Algorithm to work better, we first apply *Canny-Algorithm.* It detects edges accurately so, it makes things easier for Hough-algorithm [3], [4].Then next

step followed is pattern matching for getting boundaries of palm [5]. Pattern of input palm image is matched with the palm image templates maintained in the database pixel by pixel and by taking difference between both images (pixel by pixel) we get one out of three possible results: less match, more match and exact match. The third possible result i.e. exact match is practically impossible and the first possible result i.e. less match is not suitable for our method, so we consider the second possible result i.e. more match. The second possible result is suitable for our system as we are only concerned for pattern of palm that gives the idea of boundaries of palm. Once we get boundaries of palm we apply pixel addition and difference methods to compute pixel distances [11] and thereof palm width (Pw), palm length (Pl), and finger length (Fl). Using Pw, Pl, and Fl we compute the ratios, later used in the proposed ratios based system discussed in next section.

In palmistry field some palmists have given their logics about fingers' length, palm length-width and its effect on person's personality, as every person has some unique characteristics and different nature and that is ruled by his hand, his hand-type, finger length and ruling planet [6], [10]. So, by integrating that existing knowledge we are proposing our ratio-system, which will perform a ratio-based analysis on palm and fingers and generate a result based on palmistry[7], [8].

III. Proposed Solution Approach:

The proposed system for hand analysis works in two separate approaches. The first approach is ratio based system and second approach is based on finger length comparison.

A. Ratios Based System Approach

With the help of ratio based system characterization of personalities may be achieved. The proposed system work in two steps.

Step 1: Compute the Palm-width and Palm-length ratios i.e. Pw/Pl as shown in Fig. 1. Based on the ratios computed, the palm images are categorised in either of two categories: Square or rectangular using following conditions.

Case 1: If (Pw/Pl) > 0.8 then square palm
Case 2: If (Pw/Pl) < 0.8 Rectangular palm

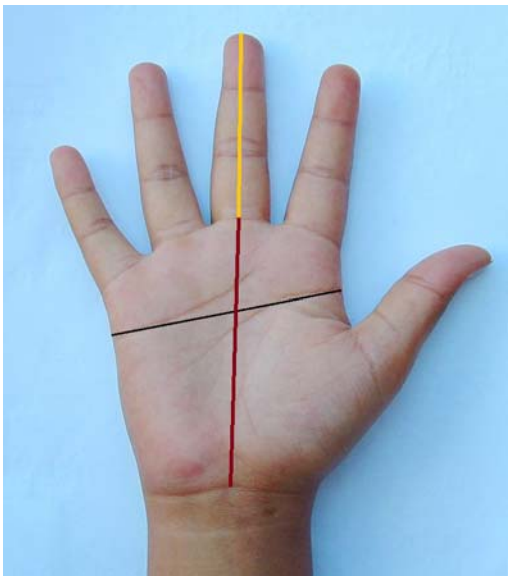

Fig. 1. Palm Image showing width- length and finger length

Step 2: Once the input palm images are characterized in square or in rectangular palm category, then they are further subdivide into four sub-categories based on the ratios between palm-length (Pl) and Finger-length(Fl) i.e. Pl/Fl as follows:

I. Square palm + Short fingers
II. Square palm + Long fingers
III. Rectangular palm + Short fingers
IV. Rectangular Palm + Long Fingers

The division of palm images into above four sub-categories are based on following conditions:

Case1: If (Fl/Pl) < 0.9 then Square hand +Short fingers
Case2: If (Fl/Pl) > 0.9 then Square hand + long fingers
Case3: If (Fl/Pl) < 0.8 then Rectangular Hand + Short fingers
Case4: If (Fl/Pl) > 0.8 then Rectangular hand + Long fingers

Based on above sub-categorization following analysis is performed and thereof positive as well as negative characteristics are drawn for a given palm-image.

1. Square palm + short fingers

   Positives:- Reliability, orderliness, tolerance, constructive attitude.
   Negatives: - Insensitive, materialistic, overcautious, dislike changes.

2. Square palm + long fingers

   Positives: - independent, self starters, political mind.
   Negatives:- Dislikes superiors, find difficult to work under another's flag.

3. Rectangular + Short fingers-

Positives:- High energy, work best under pressure, enthusiastic, expansive, work well in short term goals.
Negatives:- Destructive behaviour, cruel, self centred, don't like criticism, need deadlines.

4. Rectangular + Long fingers-

Positives:- Sensitive, intuitive, compassionate, do well in sales and public relations.
Negatives: - Less friendly, depressive, amoral.

So, with the help of this ratio system one can characterize the human palm in above four sub-categories. Now we will apply our ratio system on fingers and get different personality types of different people on the basis their finger lengths.

B. Finger Length Comparison Based Approach

This approach is based on the length of finger's partitions. As in normal cases every finger has three partitions. The length of each partition for every finger is computed. Let these lengths are a1, a2, a3 and so on as shown in fig 2. The thumb is excluded while analysing the hand using this approach.

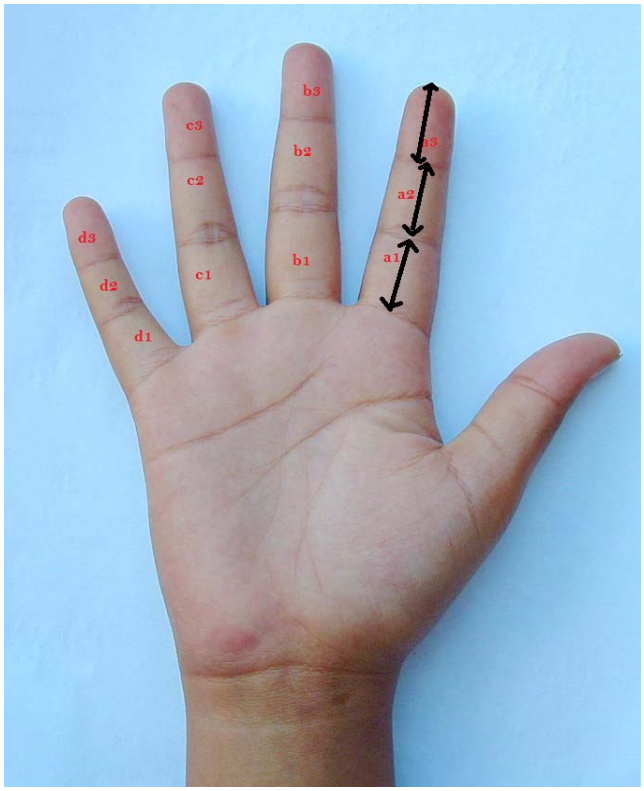

Fig. 2. Palm Image showing Finger's partition length

Using the partitions lengths following comparisons are made and thereof conclusions are drawn.

Case1: IF (a1+a2+a3) > (c1+c2+c3) && (a1+a2+a3) > (b1+b2+b3/2)
Conclusion :– Jupiter ruled person.

Case2: IF (c1+c2+c3) > (a1+a2+a3) && (c1+c2+c3) > (b1+b2+b3/2)
Conclusion: – Sun ruled person.

Case3: IF (a1+a2+a3) = (c1+c2+c3) && (a1+a2+a3), (c1+c2+c3) < (b1+b2+b3/2)
Conclusion: – Saturn ruled person.

Case4: IF (a1+a2+a3) = (c1+c2+c3) && (a1+a2+a3), (c1+c2+c3) > (b1+b2 + b3/2) && (d1+d2+d3) > (c1+c2 + c3/2)
Conclusion: – Mercury ruled person.

After analysing the above results the following characteristics of different persons ruled by different planets are derived.

1. *Jupiter ruled*- leading ability, position seeking, want position first –money second
2. *Sun ruled*- creative, want a good public image, showy nature, and want to look good, flashy life style.
3. *Saturn ruled*- money minded, deep thinkers, love loneliness.
4. *Mercury ruled*- good speakers, tricky mind, business minded.

IV EXPERIMENTAL RESULTS:

We implemented the proposed method in Matlab software. Palm image in jpeg format is taken as input (as shown in Fig 3). Edge detection is performed using canny filter to identify the edges of palm as shown in Fig 4. After the edge detection we matched the input image pattern with palm image templates from database to classify with which, the input image matches by maximum. Then we get a pattern of palm and palm boundaries to calculate desired lengths (Pw, Pl, Fl) by applying pixel by pixel matching with our database images. For images matching >70% is considered as suitable to generate desired pattern. After edge detection and pattern matching Hough Transform and pixel distance computation is applied, to compute palm-width (Pw), palm-length (Pl), and finger length (Fl) and their ratios (Pw/Pl and Fl/Pl). Once these parameters in form of Pw, Pl, Fl, Pw/Pl, and Fl/Pl are generated then the system takes the available information with respect to these data, already stored in database to generate personality type based on Palmistry facts. We tested our approach for palm images of well known personalities like Dalai Lama, Sir Arthur Salivan, Sara Bern Heart, William Whitley, General Sir Redvurse Buller, Benazir Bhutto and so on and found that the result produced by our system are

matching with the known characteristics about these personalities.

Fig. 3. Input Palm Image

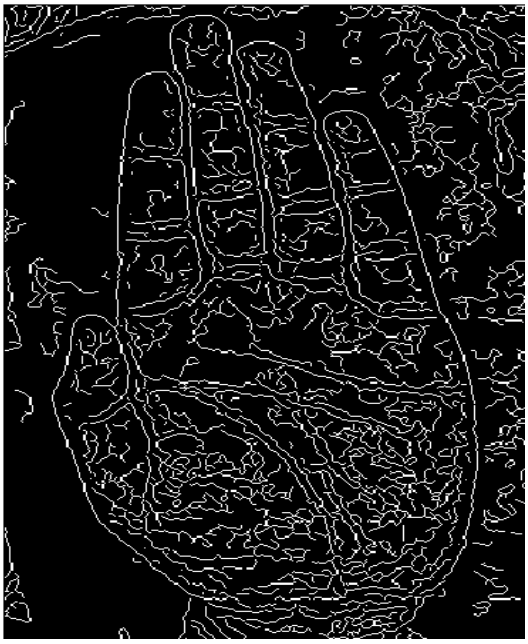

Fig. 4. Output Palm Image showing Edges extracted using canny filter

V. CONCLUSION:

Palm length-width and finger length are very important characteristics of a palm and in this paper we have proposed a novel approach for getting palmistry results based on these characteristics with the help of image processing. In this paper we have proposed two approaches ratio based system approach and finger length comparison based approach. The ratio base approach helps to identify the basic characteristics of a person in the form of positive and negative characteristics whereas the finger length base approach help to identify different personality types ruled by different planets. With this approach one can make computer intelligent enough to read and analyze hands and generate results.

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