

A Scientific Analysis to Observe Uniqueness in Lip Print Pattern

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Abstract: Every individual have their unique identification like palm print, signature, finger print, face recognition, lip print etc.. here in this research one such effort is made to analyses lip print and identify the individual using their lip print. The wrinkle and grooves pattern on the lips has individual characteristics like tongue prints, face recognition, iris pattern, fingerprints. Cheiloscopy is a forensic investigation technique that deals with identification of humans based on lips traces. Image processing technique is used, lip print of the individual is captured, processed and analyzed for conclusion.

Keywords : Biometric, image processing, Lip print, pattern matching.

I. INTRODUCTION

Personal identification is essential in various natural disasters, civil, and criminal cases. Because of their uniqueness, finger print and DNA extraction are widely used for personal identification. With ever increasing demand to provide more authenticate means of evidence and personal identification there is always a huge need to discover new means and method for the same. At present biometrics is widely used as method of personal identification and it has been extended from finger prints to face recognition, iris pattern recognition. The biometrics works on comparing the record stored in the database and that collected. Nowadays lip prints are gaining importance in the personal identification as it can be collected easily from the individuals and crime spot. Lips are soft, visible, fleshy folds of mouth covered externally by skin and internally by mucous membrane. The mucous membrane shows numerous furrows and ridges which form characteristic pattern called Lip Prints. The study of lip prints is called as Chelioscopy. Lip prints can be noticed as early as 6th week of intrauterine life. Use of lip prints for personal identification dates back to 1932. It was first recommended by Edmond Locard, later Moyne Snyder was the first person who could solve a case with the help of lip prints collected from the crime spot. Suzuki and Tsuchihashi, did extensive study on lip prints and classified different patterns present on the human lips. Patterns on the lips rarely change, based on external factors like physical injury, exposure to hot or cold stimuli and pressure. Its permanence makes it reliable for forensic investigations. Majorly when clubbed with other evidence, it greatly adds for crime solving.



Fig.1 Image of Lip Print Sample

A. Prior Analysis:

Every individual can be identified uniquely by their face, iris, ears, tongue etc. in this research an effective method is been proposed to identify the person by their lip prints. Lips can be uniquely identified by their patterns. There are different challenges that need to be resolved before analysis.

1. Color of the lips: there are wide variations in the lips color from bright white to dark black (without any cosmetics).
2. Size of the lips: that is people of same age and gender may have small lips and some may have lengthier and think one. This would also get affected by the region of the lips that gets exposed.
3. Age factor: as the individual grow their lips size length color changes. The color thickness length size does not remain the same for the individual throughout their life.
4. Texture of the lips: The texture of the lips sometimes changes based on the weather, cosmetics or grooming essentials they use. Sometimes it changes based on the food.
5. One can observe some different patterns on the lips like lines, curves etc

B. Research Methodology and Results:

For this work lip prints is captured by applying lipstick and taking the impression on the paper.

Step-1: Capture image of the lips

Step-2: Resize the image to desired dimensions and pixel.

Step-3: Extract the desired region and analyses the patterns and save the analysis.

Steps-4: take the image pre-process compare the patterns.

Samples collected were not of standard size color and angles. Since the intensity of lipstick and the angle of opening and closing of mouth the size and thickness of the lips were not same. So to eliminate the color factor $L^*a^*b^*$ color space is used to and the obtained results are future processed.

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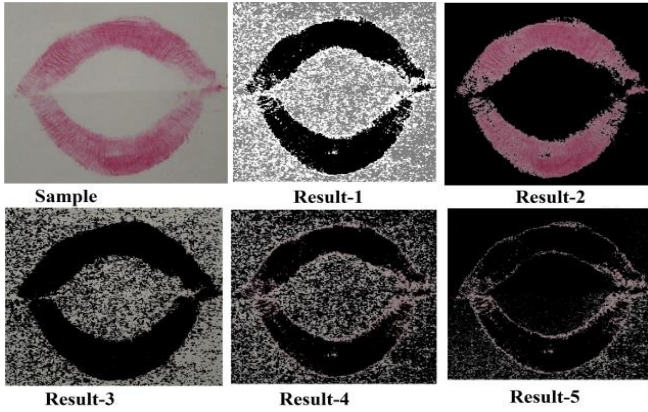


Fig.2 Sample and its results after color segmentation

The result-3 image is used as sample. To check for the pattern of the lip print, image is again taken from different people and only the lower portion of the lip prints is extracted and matched with the sample lip print lower portion to check for the difference in pattern, then the results are analyzed. Only the lower portion of the lip prints are compared to avoid the problem of mouth opening angle which may differ from person to person and time to time.

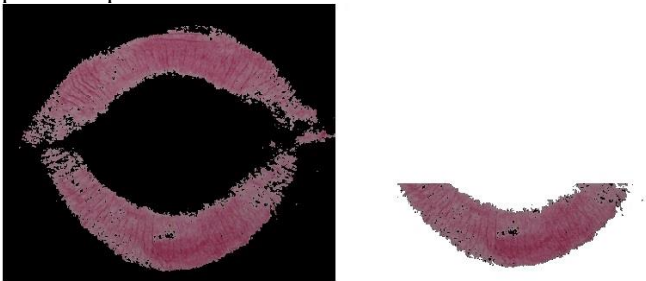


Fig.3 Sample and lower lip print pattern to be matched

The sample and the pattern image are compared and super imposed a tolerance threshold is set for comparison and the result is obtained.



Result:Lip printsMatched

Fig.4 Result-1

As one can observe the lower highlighted black region shows the percentage at which lip print matches.

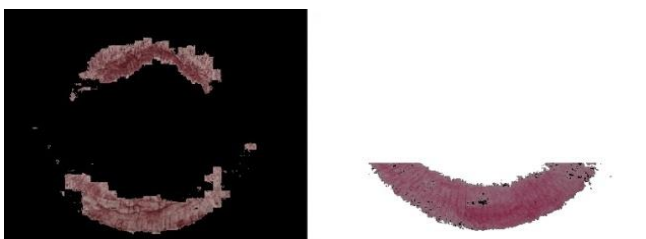


Fig.5 Sample and lower lip print pattern to be matched

Lower lip print image is matched against another processed lip print image. The result shows the mismatch in the pattern



Result: Lip print mismatched

Fig.6 Result

Another processed lip print image is matched against the lower lip print image and the Result-2 is obtained. Since there is huge miss match in the pattern it is reflected in light green color which shows there is a miss match in the pattern of the lip prints.

II. CONCLUSION

This can be used in identifying person by forensic department. For more accuracy combination of figure, palm, iris and lip print can be used for individual identification. Further can be improved to fetch a person complete detail by the pattern of the lip print available. By making future analysis and study one can identify the gender and age group of individual based on the lip print. This can be used in crime identification and user authentication. Lip print analysis can be used for bank details, device authentication as well.

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