FINGERPRINT DETECTING USING LBP

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ABSTRACT

Local Binary Pattern (LBP) is an effective texture descriptor for images which thresholds the neighboring pixels based on the value of the current pixel. LBP features encode local texture information, which you can use for tasks such as classification, detection, and recognition. LBP descriptors efficiently capture the local spatial patterns and the gray scale contrast in an image.

There were many applications of LBP, but in this case, we are studying about Fingerprint detection using LBP. To collect information over larger regions, select larger cell sizes.

HOW DOES IT WORK?

There are some steps for calculating the LBP of a fingerprint, they are

- Image Acquisition
- Pre-Processing
- Feature Extraction
- Feature Matching
- Result

An image of a fingerprint is captured and it should undergo some changes as the removal of noise and enhancing the contrast of the fingerprint ridges and valleys. LBP is applied to the pre-processed image to extract the texture features of the fingerprint which involves the Gabor filter for texture analysis.

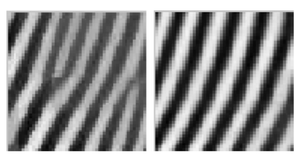

Figure 4: Sub Windows matching by Gabor filter

INTRODUCTION

The main approaches proposed in the literature for fingerprint automatic verification may be roughly classified as minutiae-based, correlation-based, or image-based.

- No other image-based approaches proposed gains performance comparable to the minutiae-based.
- Fingerprint is first divided into several sub-windows followed by segementation.
- Finally each sub-window is convolved with a bank of Gabor filters and LBP are calculated.

ALGORITHM

- Use 'imread' function to import fingerprint images.
- Apply the LBP operator to the image using the "extractLBPFeatures" function.
- Create a database that contains the details of fingerprints.
- Store the details after executing "extractLBPFeatures" into a matrix by "imread" function.
- To identify an unknown fingerprint, extract its LBP features using the "extractLBPFeatures" function.
- Compare the LBP feature of unknown data with the known database.

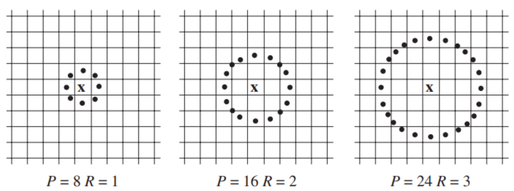

Figure 5: LBP neighbour sets for different (P, R)

RESULTS

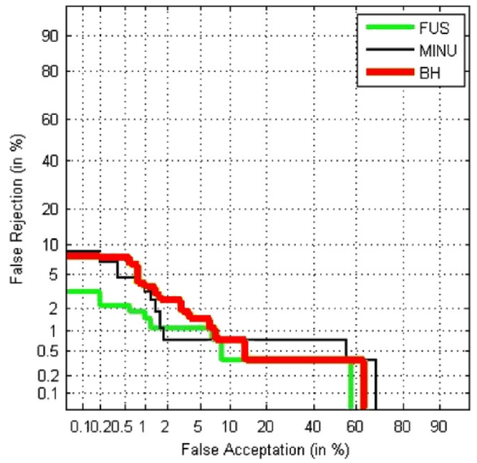

Figure 1: The DET curve obtained on DB2 by some tested approaches

Conducting the experiment on the four fingerprint databases each containing 800 images from 100 individuals. For the minutiae-based alignment and to implement the minutiae-based approach proposed by Tico and Kuosmanen, the minutiae were extracted from the fingerprint according to the approach proposed in the Matlab CUBS fingerprint toolbox2 (for the data sets DB1, DB3, and DB4); while for DB2 we used a more accurate commercial method.

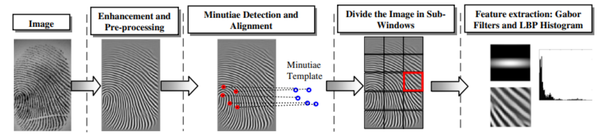

Figure 2: Schematic Procedure

FLOWCHART

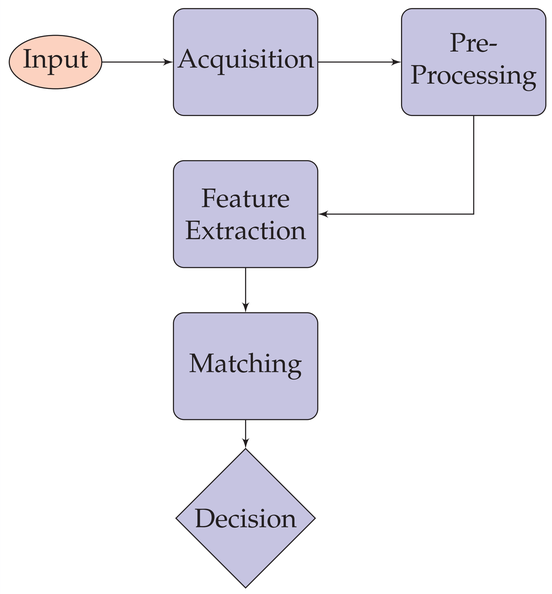

Figure 3: Flow Chart

CONCLUSION

- In this poster we detailed Local binary pattern(LBP) and their applications. In the present world, fingerprint detection is done by the usage of LBP.
- After performing the pre-processing of the image containing the fingerprint the Gabor filters are used for the texture analysis and later plotted on the histogram.
- The fingerprint matcher gains performance comparable to the well-known Tico's minutiae matcher.
- However, like any biometric system, LBP-based fingerprint detection also has limitations, such as sensitivity to image quality, noise, and distortions.
- Therefore, careful pre-processing and feature extraction techniques should be employed to ensure reliable and accurate fingerprint detection using LBP.

REFERENCES

[1] Loris Nanni and Alessandra Lumini. Local binary patterns for a hybrid fingerprint matcher. *Pattern Recognition*, 41:3461–3466, 11 2008.

FUTURE RESEARCH

Sub-window selection is an efficient approach in fingerprint verification where the fingerprint image is divided into smaller, overlapping regions for separate analysis and feature extraction, avoiding the computational expense of processing the entire image at once.

CONTRIBUTORS

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