

Signature Verification System using Different Algorithms

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Abstract- In our paper, we proposed a system for signature verification based on pixels and strokes. Nowadays signature is a basic and important verification system for every individual. Everyone has a unique signature and every individual can differ from others. In many areas, this verification system is offline and not so accurate. Online verification is very efficient than the offline one. We use pixel-based method, Harris algorithm and surf to verify whether the signature belongs to the particular person or not. Our proposed system is presented to check signature using pixels, strokes etc. It is efficient enough to compare signatures easily. There is a system using only a single signature they say that it is efficient but everyone may not keep the perfect signature for the first time they may be in a hurry or in a bad mood while signing. So there may be some difference.

The main need of this system is if we use human analysis for signature verification then the humans cannot differentiate between the original and fake one and this system can differ them because it takes so many things into consideration like index points, corners point signature thickness at different points so someone cannot fool this system so easily

Keywords — Index points, Corner points, Harris algorithm pixel-based method, surf algorithm, strokes.

1. INTRODUCTION

In, Today's era Signature verification is very important for many official works like bank account creation, Project validation, bigger official works, and tenders etc. And nowadays signature morphism has become a major and dangerous problem. There is one method using which we can check whether it is a real one or a fake one. It cannot be done by human verification because humans cannot find minute details in the signature and check them whether it is real or not. So we came up with an idea using which the signature can be verified online precisely.

In our system we take 5 to 6 sample signatures from the user and based on them it will form a duplicate or sample signature to compare. In our proposed system first Harris algorithm will be applied where it detects the corner points in the signature and marks them and then it will compare the images. If they are matching it will continue to the next step otherwise it will just stop there and algorithm shows error or signature is not matching. If signature proceeds to next step then it goes to surfing algorithm and then their algorithm finds the index points and algorithm verifies whether they are matching or not then the signature or image will proceed to pixel-based method where the densities of black pixels

and white pixels are found then these densities will be verified with the input signature black and white pixel densities. In the pixel-based method, even small or minute mistakes can be found.

This is the basic idea or structure of how our proposed model works.

2. EXISTING SYSTEM

In the existing system, They need only one pre-given signature to verify whether the given input signature is a true one or not. Here comes the first disadvantage where if they use a single signature let's assume that the user may be in a hurry and he signed it in a hurry sometimes that lead to improper or imperfect signatures so in this condition this system fails to compare them perfectly whereas in our system it takes 5 to 6 signatures let us assume the same condition that a person is in hurry in that situation he might sign one or two improperly but any one of them will be correct so it compares the new signature with duplicate one's if it matches to any one of them it will be considered as correct one or else wrong one. And they used SRSS for signature verification it is an efficient one no problem in that. In the SRSS method, the major role is played by the sigma lognormal model and stroke and target wise determination methods to verify the signatures.

3. PROPOSED SYSTEM

In our proposed system we used Harris algorithm, surf algorithm, pixel-based method.

Harris Algorithm

It is also known as the Harris corner detection method. Its basic working principle is it compares two images or signatures and finds a good patch it means a corner point which is different from remaining points or very distinctive. There are two types of patches they are good patch and a bad patch they can differ as a good patch consists there should be only one patch in the second frame that looks similar to the patch in first frame and a bad patch means that there are many similar patches in the second frame from the first frame. A corner can be defined as a junction of contours. We can recognize the point using by seeing the intensity of it shifting of intensity should yield a large difference in its appearance the shift of intensity could be found using $E(u,v)=\sum W(x,y)[I(x+u,y+v) - I(x,y)]^2$

$W(x,y)$ is window function.

$I(x+u,y+v)$ is shifted intensity.

$I(x,y)$ is intensity.

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Harris corner can be defined as

$$R = \text{Det } M - k \text{Trace}^2 M$$

Where

$$\text{Det}(M) = \lambda_1 \lambda_2$$

$$\text{Trace}(M) = \lambda_1 + \lambda_2$$

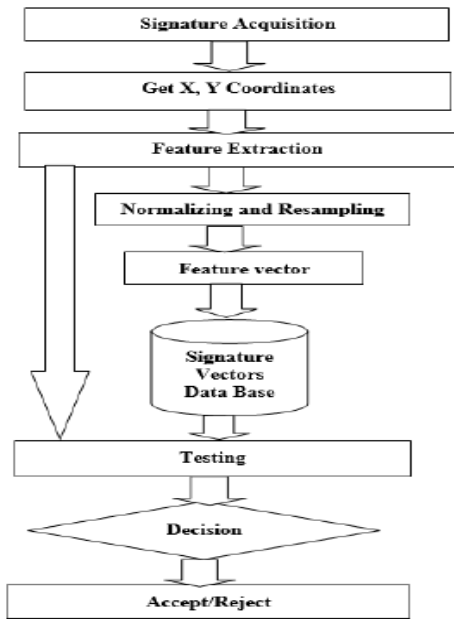


Fig 3.1 system flow

Surf Algorithm

Its full form speeds up robust Features. Well, the process of execution may be the same as the Harris algorithm but it can point some other details where Harris algorithm is missing SURF approximates LoG with Box Filter. It divides the images into small boxes. SURF algorithm adds a lot of features to improve the speed. These boxes are compared in both the images whether they are matching or not. Based on the results it can be determined as a real or fake one. This can be able to compare different points from Harris algorithm.

Pixel Based Method

In the pixel-based method, individual image pixels will be analyzed with the spectral information that they contain. In the pixel-based method, image segmentation is done it is done in the form of pixels. Here the pixel density of a certain pixel is determined and also in which colour the pixel is present these conditions are determined and then black pixel density and white pixel density will be calculated then the same things are calculated in the input signature then both the pixel densities and the colors of the pixels are compared in both the images. This is the basic working for a pixel-based method.

$$d_p = \sqrt{w_p^2 + h_p^2}$$

This formula is used to find diagonal representation.

$$PPI = \frac{d_p}{d_i}$$

This formula is used to find the pixels per inch

4. SYSTEM WORKING

Here first the basic and the required features like pixel densities, Index points, Corner points, x,y coordinates, pixel densities are extracted or calculated from the given signature and the signature present in the database then one after the algorithms are checked like first Harris algorithm is checked for both the signatures.

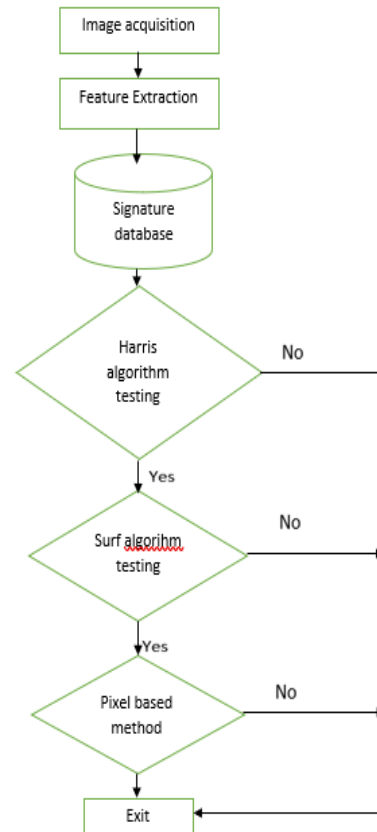


Fig 4.1 System Architecture

Then if they are correct and matching then the signatures are passed to the surf algorithm if not it will go to exit and return reject. In Harris algorithm, corner points are verified. Then in surf algorithm, the index points are verified from both the images if they match they are passed to the pixel-based method if not it will go to the exit and returns reject. In the pixel-based method, the white and black pixel densities are calculated then the densities are compared in both the images if it matches it will go to the exit and returns accept if not matches it will go to the exit and returns reject. This is how our proposed system works.

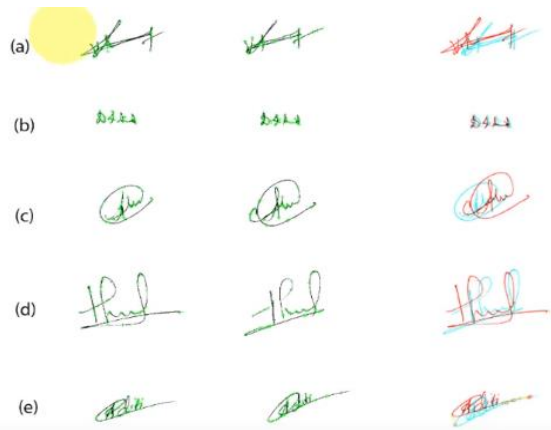


Fig 4.2 Signature Division based on three algorithms

5. RESULTS AND DISCUSSIONS

Well the whole process going in this proposed system is to reduce duplicate signatures and there is a sample in fig 4.2 how the three methods Harris algorithm, Surf algorithm, Pixel based method produce their results after verifying the signature and determined whether signature is true one or not from these results. As now a days signature is one of the major person identification method available for all size of companies for low cost. This project might come handy to many banking sectors and small scale companies.

6. CONCLUSION

In our project, we have developed an efficient signature verification system.

In this project, we used Image processing which is one of the most trending and most used domain nowadays for functions like image detection, fingerprint verification etc. This project helps in controlling human errors in signature verification and also makes the signature verification accurate, easy and faster. It also makes the work easier for understanding and executing it by anyone without any knowledge of image processing. If any bank or any company uses this system the customers will feel much more secure and trustworthy. Thus, we propose that this system brings a change in the working of several banks, companies etc.

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