Feature Extraction Parameters For Signature Based Forgery Detection

R.Anit Nancy[1], A.S.Aileen Jocy[2], A.Lasipa[3], G.Bharatha Sreeja[4]
[4] Assistant Professor
[1, 2, 3, 4] Pet Engineering College,Vallioor

Abstract- *Signature verification is done to identify whether the given signature is genuine or forgery. So, signature verification has become a wide area of research for the last 5-10 years. The main aim of signature verification is to avoid forgery. In order to identify the original signature several feature extraction methods have been developed. Before feature extraction some process is carried out in the signature called preprocessing. Preprocessing is done to avoid unwanted signals and noises. Only after preprocessing the image is ready for feature extraction. Some of the preprocessing methods are thinning, dilation, noise removal, rotation. In this paper, we present different feature extracting methods.*

I. INTRODUCTION

The features are the most important thing in any type of images. Forgeries are identified using these features. The image consists of several types of features. In this paper, we discuss about the different types of features. Nowadays, forgeries were taking place everywhere, to avoid this features were extracted and the process like preprocessing, classification is done.

II. LITERATURE REVIEW

In this paper, a detailed explanation is given about the features present in an image. The different types of features and how it can be extracted and measured is mentioned very clearly in this paper. The referred papers gave a lot of information about the feature extraction and some of the very common and important features are explained below.

III. PROPOSED SYSTEM

Proposed system gives a brief explanation about methods followed in the feature extraction process. The block diagram diagram is given below. Different types of preprocessing is carried out so that making the image ready for feature extraction.

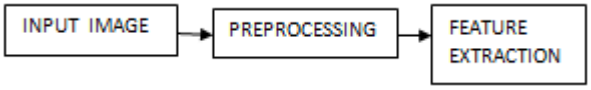

fig. Block diagram of proposed method

a. preprocessing

Preprocessing is the first step in any image processing. It makes the image ready for the next step. Thinning is used for reducing the thickness of the image. Noise removal is done using the median filter. Dilation is done to compensate the existing gaps. Rotation is done to remove the common features [1].

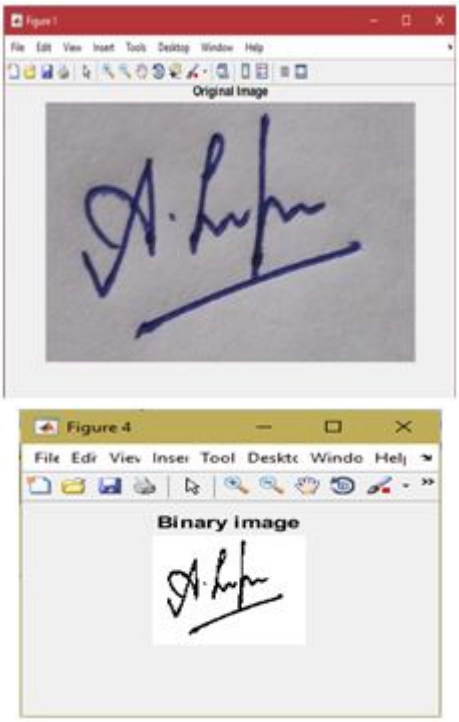

Fig. original image and preprocessed image

b. feature extraction

Feature extraction is done for extracting valuable features from an image which is common. The features may be geometric feature, global or local features and geometric

features. The global feature is the one which describes the whole image. It resembles the shape of the image. The geometric features are calculation based. It may some formulae in order to extract the feature. The geometric feature is a mathematical expression. But it is better to extract geometric features. The statistical feature depends on the intensity of pixels in an image. The feature extraction methods are classified as low level feature and high level feature extraction. The low level feature deals with lines, corners, edges etc, while the high level features are built over the low level features because it recognizes the common objects and shapes in the image [6].

Structural features

Area

$$A(S)=\iint I(x,y)dydx \quad \ldots\ldots(1)$$

The above equation gives the area of region. Every pixel in the image contributes towards the measurement [4].

Perimeter

The perimeter is a structural property which is defined by list of co-ordinates and is the sum of distances between the co-ordinates. The perimeter measurement can become distorted by the fractal nature of certain boundaries [4].

Centroid

The geometrical centre of body or image is called centroid. The centroid represents the point which is designated by the mean of the coordinates. If the boundary of image is irregular, calculus is used to find the mean [4].

Diameter

The distance around a selected region is called the circumference. The distance across a circle through the center is called the diameter. is the radius of the circumference of a circle [4].

Eccentricity

Eccentricity is a mathematical parameter denoted by 'e'. Eccentricity is a value that differs for parabola, hyperbola and ellipse. The eccentricity value is 0 for circle, 1 for parabola, between 0 and 1 for ellipse and greater than 1 for hyperbola [2].

Skewness

Skewness measures the asymmetry of distribution. It can range from minus infinity to positive infinity. The term skewness refers to something that is out of line or distorted on one side. If the asymmetric tail extends to the right it is called "positively skewed" and if the asymmetric tail extends to the left it is referred to as "negatively skewed" [2].

Kurtosis

Kurtosis is a measure of flatness distribution, it describes whether the data is flat or peaked. The three different types of kurtosis are [2]

- Mesokurtic curve
- Leptokurtic curve
- Platykurtic curve

Mesokurtic curve

It is a normal or moderate type of curve. The mesokurtic curve drawn from the frequency distribution is neither so flat nor so peaked. The value of kurtosis is 0 (k=0).

Leptokurtic curve

The frequency distribution of Leptokurtic curve is more peaked. The value of kurtosis is greater than 0 (k>0).

Platykurtic curve

The frequency distribution of platykurtic curve is flat. The value of kurtosis is lesser than 0 (k<0).

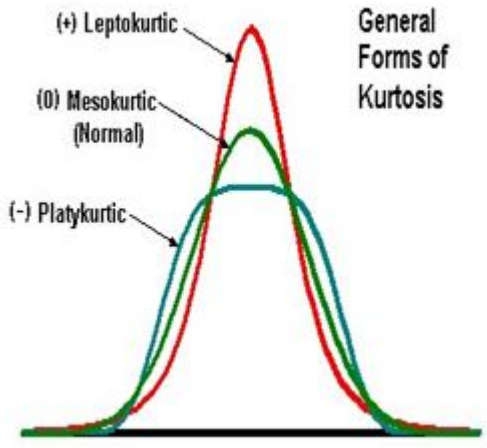

Fig. general forms of kurtosis

Pixel density

Pixel density is the total number of black pixels within each segment in the image [3].

Pixel distribution

It is used to represent the pixel geometric distribution in a cell. It is the distribution of colors in an image [3].

Table 1.1 Features extracted for original signature

Sign	Area	Centroid Coordinate		Kurtosis	Skewness
Sign1	29.547	7.0596	6.0725	5.0893	2.0222
Sign2	82.213	11.2455	10.5826	4.2397	1.7999
Sign3	85.893	7.5118	7.2875	7.3673	2.3673
Sign4	83.071	8.1067	9.5891	7.1307	2.0324
Sign5	84.998	7.9247	7.5718	5.9128	2.2165
Sign6	79.462	11.9340	10.0444	3.5905	1.6095
Sign7	81.520	10.3327	9.8765	4.5683	1.8890
Sign8	77.351	15.2351	14.4353	2.7890	1.3375
Sign9	83.950	9.6495	8.4319	5.1451	2.0360

Table1.2 Features extracted for forged signature

Sign	Area	Centroid coordinate		kurtosis	skewness
Sign1	82.672	7.8561	7.0028	6.4451	2.3335
Sign2	82.705	13.5419	12.4907	3.3136	1.5210
Sign3	54.940	9.9308	10.6656	4.2763	1.8100
Sign4	79.216	8.6466	8.2323	5.4033	2.0984
Sign5	85.347	8.5629	7.2335	6.1124	2.2611
Sign6	81.755	10.9857	9.4210	4.0716	1.7526
Sign7	82.803	7.7244	9.0642	5.7199	5.7199
Sign8	82.825	13.6840	10.0515	4.7900	1.9468
Sign9	83.704	10.5323	7.5891	5.4190	2.1021

Color features

It is one of the most widely used visual feature used in image classification. The advantages of color features are robustness, effectiveness, implementation simplicity, computational simplicity [4]. RGB colors are called primary colors. The color feature has low storage requirements because the color histogram size is smaller than the image size, assuming color quantization. The histogram describes the distribution of colors and focus on the whole image or within the interest of image. The histogram is invariant to rotation, translation and scaling of an object but the histogram does not contain semantic information, and two images with similar color histograms can possess different contents [5].

Shape features

Shape is an important feature in image processing. Shape feature is used to find the similarities between the extracted features. The shape feature can be classified as region based and contour based. In region based it concentrates on the whole image whereas in contour based it concentrates on local features like boundary segments [4].

IV. CONCLUSION

The different types of features are extracted in this paper. The features are the most essential part of a image which is used to find the matching of template and the duplicate. The features give the exact information of the image which is to be processed. There is a lot of future research work in feature extraction of images and advanced type of feature extraction methods are also in process. It is believed that the advancements in feature extraction will provide more clarity to the image.

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