Implementation Of Offline Text-Independent Writer Identification Using SIFT and Partial Structure Model

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Abstract : A partial structure model approach to word spotting designed for manuscripts of handwritten text that includes minimal initial training. It can infer a generative word appearance model from a single instance and then use the model to retrieve similar words from given hand written page. Word segmentation is most critical pre-processing step for any handwritten document retrieval system, so they must be grouped together into word hypothesis before the recognition algorithm can be used. Our approach uses a set of both the local and global features that is motivated by the way of that human beings perform kind task using scale invariant feature transform. This approach can be used in many areas like as in training session script descriptors code constructed by clustering the script descriptors of the training samples. In the next enrolment session the script descriptors of the input handwriting image are adopted to form signature by looking up the script descriptors codeword and also utilized to generate orientation histogram. In future work temporal information like as place name can be identified through offline.

Keywords: Scale invariant feature transform (SIFT),word segmentation, SIFT descriptor signature, scale and histogram orientation, pattern classification.

1. INTRODUCTION

Line segmentation and word segmentation are the most critical pre-processing steps for any handwritten document recognition task. It is very important to find the proper writer of any anonymous handwriting documents. detection of handwriting has been imperative research topic in identification field since from several decades before in our study in this identification we have to find the global style of different people handwriting are distinctive, and also the sequence of strokes from the writer is on hand. In case of offline handwritten identification method written in document is captured by the help of equipment like scanner and also entire document is obtained as an image [9]. When the both of methods are evaluate, it has been determined that due the temporal information found with the offline approach, it is also better to that of offline method [10].

Writer's recognition system is to find the writers of the text among the number of anonymous writers using their handwriting image. In the human environment, It is very vital to search the proper writer of an anonymous writer document. However, when writing a document, the words are taken as an entire and the structures of the entire word are stable and have a strong discriminability for different writers, these involve offline handwriting identification system [11,12].

Thus, the offline handwritten recognition enjoys, first opinion by most of the investigate and recognition and also correctness, so it is widely used in pattern identification, image processing, and artificial intelligence. To overcome with these problems, this paper proposes a scale invariant feature transform (SIFT) Method used to find the key points based on structural of the handwritten images features and also extract their SIFT descriptors and the related scales and orientation from the writer region. The SIFT descriptors and SIFT orientation will be used in different ways in different stages, which having their own structural phenomenon of the entire words and is insensitive to the aspect ratio and different slant ratio of the characters in words. Handwriting images divided into minute fragments with a fixed window and then the extracted codebook like as dictionary based features to represent different writers [8]. Both the SIFT descriptor and SIFT orientation are very vital information of handwriting. In this work, the hierarchical Kohonen Self Organizing Map clustering algorithm has been used successfully for codebook generation.

1.1 The main objective of this paper summarized as follows.

- Partial structure model presents a novel approach to word spotting designed for manuscripts of handwritten text that requires minimal initial training .It can infer a generative word appearance model from a single instance and then use the model to retrieve similar words from given handwritten page.

- The Sift is used to find the key points and extract their SIFT descriptor(SDs), and the matching scales and orientation(SOs) from the word region. The SIFT descriptors and SIFT orientation will be used in different ways in the different stages.

- To extract the word level structural features of the handwriting image, we should segment the handwriting image into word regions.

- We need to use SIFT to find the key points of handwriting, their SIFT descriptors, and also orientations.

2. LITERATURE SURVEY

The uniqueness of a writers found by handwriting ,in this paper proposed the method for offline writer identification is processed, it uses no manual measuring on document details is needed, representing an advantage over interactive forensic feature identified. The characteristic is largely size invariant. A codebook contains large set of samples from wide range of writers, uses kohonen map for optical size of fragmented contours were performed and classification rate writing a range of kohonen map dimensions[3],proposed future id promising and could improved using better distance measures. Results in advantages is to allow graphic shape variation present in handwritten western script, that allows effective writer identification .drawback is, there is no exhaustive and world wide accepted list of allograph in western handwriting.

This paper presents Arabic handwriting of the text independent writer identification ,that has already been developed in the recent years on basis of western script. In this paper test involves 350 writers and it uses a IFN/ENIT datasets for experiment. Results shows by combining both allographic features and textural features yield to high identification rates of writers for datasets involving hundreds of writers[5]. Observations from previous studies on western script has been conformed also Arabic handwriting. Finally statistical method have a generic nature and stimulate stable and robust results.

Automatic signature verification presents valuable results in the field of high profitable and in research area. In this it selects more than 300 references for researchers. Its main advantages over several national and international institute formats and in biometric traits ,signature occupy a important and special role.[4].This helps in both commercial and scientific point of view, The analysis of individual characteristics is an important research area that includes not only those features produced by normal people. but also generated by those who suffer from disabilities.

As per new archaeology proposed a method called texture-based features. The proposed Textures of handwriting style method reduces a space between lines, words and characters, which producing a texture that keeps features thus avoiding the difficulty of segmentation. Experimental results shows the number of writers not an important impact on overall error rate, but in false acceptance of the verification system involves a major role. In this proposed method shows the false acceptance decreases as the number of writers increases[6]

Existing system is noted that the joint probability of the angle combination of two 'hinged' edge fragmentation outperform other individual features.

Combining features may improve the performance. In this paper we proposed a partial structure model.
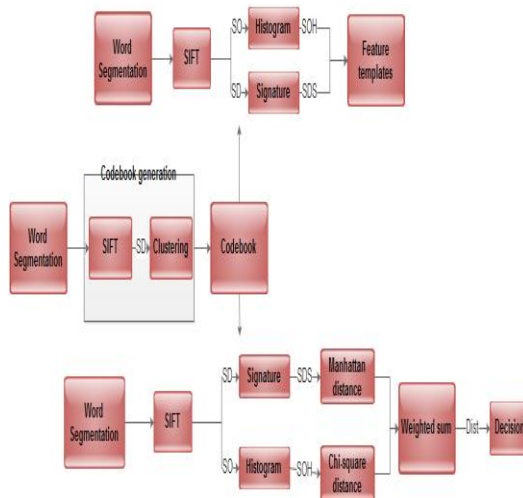
Figure 2.1: The functioning of SIFT method architecture

Above figure 2.1 shows the architecture of the proposed method of identification of words. The proposed technique presents a novel approach to word spotting designed for manuscripts of hand written text, that requires minimal initial training. It can Infer a generative word appearance model from a single instance and then use the model to retrieve similar words from given hand written page. A simple process derives derive a model of the form just described from a binary word image. First ,thin the image to a medial skeleton of single pixel width using a suitable algorithm. Select all points that are endpoints or junctions of skeleton to populate the set of nodes. Greedily add to these selections additional skeleton points as far away as possible from existing selections but no more than distance d, such that when finished each skeleton point lies at most d/2 away from one more selected points. The parameter d should be set to some significant fraction of the meant stroke width (80% for example) so that disks of link placed at their centres will overlap to approximate the original image. Each selected point becomes the

default location of a node. The tree structure is induced by selecting the node closest to the centre of mass as root, and greedily adding whichever node is nearest to the growing tree, as a child of the closest node already added.

Partial-structure model offer several attractive features for word spotting. Because they are generated automatically from one or more query image, they do not require large training sets to perform well. They need not be applied only at the word level; both fragments of words and multi-word phrases can also serve. Although using multiple word instances as a query may add some robustness to variation in form, the method performs well even with a single example.

Models generated from online input may also be interesting, because the temporal information from the online word may be transferable to offline data. It will be interesting to see what applications can be devised for this new handwriting word model

We consider each scanned character of the document written by person as a color bit map image. The image of a character is now changed to gray level shows in figure 2.2 (a) after that must convert to gray level image to binary image shown in figure 2.2(b).

Fig 2.2 (a): Gray Level Image (b): Binary Image

Now, We determine the image after the edge detection method and key point extraction. Edge detection and dilated image shown in figure 2.3.
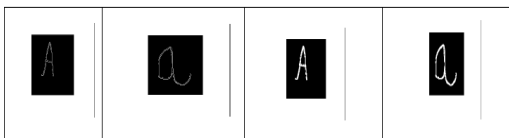
Fig 2.3(a): Edge detection Fig 2.3(b): Dilate image

The evaluation of SIFT flow using human annotation, left: the probability of one human annotated flow lies within radius (r)distance to the SIFT flow shows in figure 4. The SIFT descriptors and SIFT orientation will be used in different ways in different stages.In Training stage,Enrollment stage and identification stages.

Algorithm:

1. **Conversion of original image to binary image.**

   The handwritten image I converting into word segmentation , the process of converting image to binary image using Otsu's algorithm is as shown below.

1) computes histogram and probability of each probability of each intensity level.

2) Set up initial $\omega_i(0)$ and $\mu_i(0)$.

3) Step through all possible thresholds t=1…. Maximum intensity.
   1. Update ω_i and μ_i
   2. Compute $\sigma_b^2(t)$.

4) Desired threshold corresponds to the maximum $\sigma_b^2(t)$.

5) We can compute two maxima that is $\sigma_{b1}^2(t)$ and $\sigma_{b2}^2(t)$.

6) Desired threshold

$$\frac{threshold_1 + threshold_2}{2}$$

2. **SIFT (Scale invariant feature transform) method.**

Scale invariant feature transform algorithm (or SIFT) is an algorithm ,the mechanism shown in figure 2.4. In SIFT algorithm in computer vision to detect and describe the features in images. The

lower's method for image feature generation transforms an image into a large collection of feature vectors, each of which is invariant to image translation, scaling, and rotation, partiality invariant to illumination changes and robust to local geometric distortion.
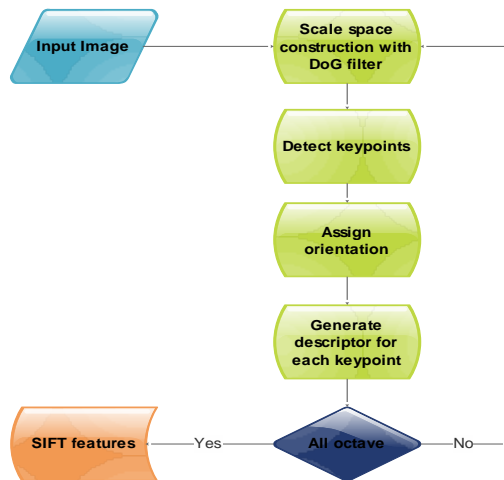

Figure 2.4: Mechanism of SIFT method

Sift works in different extraction process that as shown below.

- Sift algorithm uses Difference of Gaussians which is an approximation of LoG. Difference of Gaussian blurring of an image with two different σ.
- Let it be σ and $k\sigma$.this process is done for different octaves of the image in Gaussian Pyramid. It is represented in below figure 2.5 image.
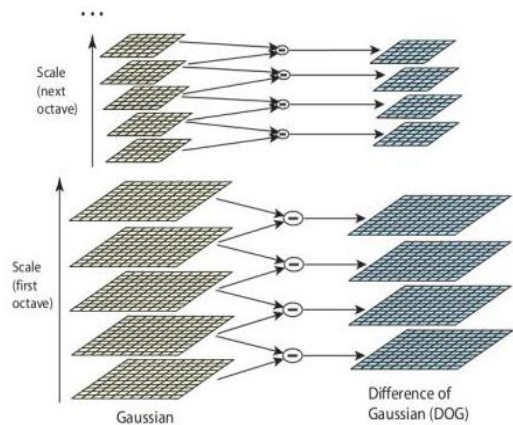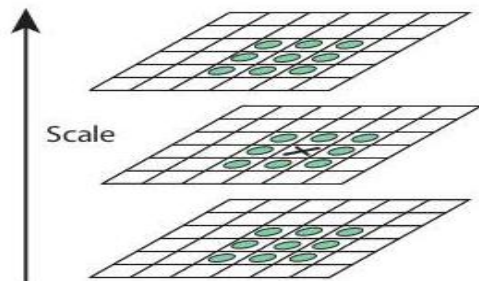

Figure 2.5: Gaussians pyramid

Figure 2. 6: Representation of local extrema key points

Above figure 2.6 shows the local extrema key points, the search for local extrema key point is best representation shown in above shown scale. Once potential key points locations are found, then they have to be refined to get more accurate results. Eliminates any low contrast key points and edge key points and what remains is strong interest points. Now key points descriptor is created. Several measures are taken to achieve robustness against illumination changes, rotation etc. Key points between two images are matched by identifying their nearest neighbors.

RESULTS

Our research work on this paper signify the process for writer's handwritten recognition by making use of improved feature extraction method and also partial structure model offers attractive features for spotting . the spotting design for manuscripts of handwritten text that requires word appearance model from a single instance and then use the model to retrieve similar words from given hand written page. Model works well in temporal information and identifying the place of the text and that must display the state and district of that identified text.

Training Stage:
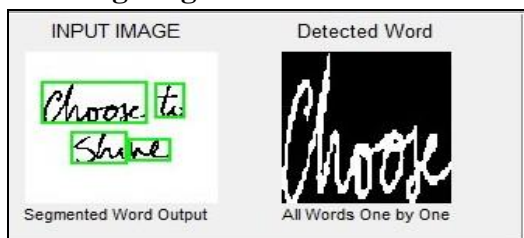
Enrollment and Identification of Key points:
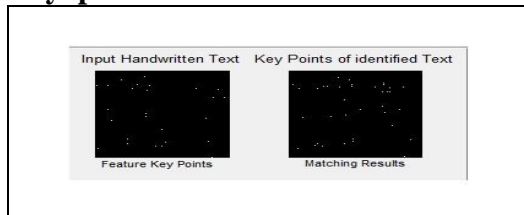
CONCLUSION

This paper proposed a novel method SIFT and partial structure for identifying writers individuality ,in which the two SIFT features that is, SDS and SOH are extracted from handwriting images to characterize the writer's individuality. SIFT algorithm which produces various features accurately. The proposed system computes the frequency of the local structural features occurred in a handwritten image. The proposed partial structure method works well even when the amount of handwriting is little. In conclusion, the proposed method outperforms the state of the art approaches and is very promising work in the form of identification of temporal information like place and corresponding state and district name of identified text that can be transferable from online data to offline text.

RFERENCES

[1] V. Pervouchine and G. Leedham, "Extraction and analysis of forensic document examiner features used for writer identification," *Pattern Recognition.*, vol. 40, no. 3, pp. 1004–1013, Mar. 2007.

[3] L. Schomaker and M. Bulacu, "Automatic writer identification using connected-component contours and edge-based features of uppercase Western script," *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 26, no. 6, pp. 787–798, Jun. 2004.

[4] R. Plamondon and G. Lorette, "Automatic signature verification and writer identification—the state of the art," *Pattern Recognition.*, vol. 22, no. 2, pp. 107–131, Feb. 1989.

[5] M. Bulacu and L. Schomaker, "Text-independent writer identification and verification using textural and allographic features," *IEEE Trans. Pattern Anal. Mach. Intel.*, vol. 29, no. 4, pp. 701–717, Apr. 2007.

[6] G. Louloudis, N. Stamatopoulos, and B. Gatos, "ICDAR 2011 writer identification contest," in *Proc. Int. Conf. Document Anal. Recognition.* Beijing, China, 2011, pp. 1475–1479.

[7] R. Hanusiak, L. Oliveira, E. Justino, and R. Sabourin, "Writer verification using texture-based features," *Int. J. Document Anal. Recognit.* vol. 15, no. 3, pp. 213–226, Sep. 2012.

[8] Siddiqi and N. Vincent, "Text independent writer recognition using redundant writing patterns with contour-based orientation and curvature features," *Pattern Recognition.*, vol. 43, no. 11, pp. 3853–3865, Nov. 2010.

[9] R. Plamondon and S. N. Srihari, "On-Line and Off-Line handwriting recognition recognition
– A complete survey", IEEE Transaction on pattern Recognition and Machine Intelligence, 22 (1) 63-84 (2000).

[10] Kauleshwar Prasad, D. C. Nigam, Ashmika Lakhotiya and Dheeren Umre,"Character Recognition Using Matlab's Neural Network Toolbox", International Journal of u- and e-
Service, Science and Technology, 6 (1) (2013)

[11] J. Pradeep, E. Srinivasan and S. Himavathi, "Diagonal based feature extraction for handwritten alphabets recognition system using neural network", International Journal of Computer Science & Information Technology (IJCSIT), 3 (1) 27-38 (2011)