Efficient technique for Forgery detection using Key point based Scale Invariant feature transform

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Abstract: In current time various govt. and non govt. organizations are having desire to get large amount of data related to their customers to know their behavior. Numerous areas are under this data processing activities and currently the medical field and the news broadcasting are new additions to these fields. They are more reliable on the image data. For example, in the medical field the data related to the patient is in the form of CT images etc. As we are moving forward various image forging softwares are coming up which can forge the image to such extent where forgery detection will be very difficult. In current research paper, the proposed approach has been applied on the CCoMoFo dataset. These images are having single forgery. The proposed technique performance has been compared to the block based sub division technique. The performance has been evaluated by using various statistical parameters like true positive rate and false positive rate.

Keywords: CMFD, KPCMFD, CoMoFo.

I. INTRODUCTION

In this digital era, humans are moving towards the information world various no. of applications are being developed which are creating multimedia data in every second. These data of multimedia is used in plenty of applications. Major field which are using multimedia data is in the form of medical, news papers printing or some other ways of media management. As, the new and high technology devices are coming up, high resolution images are being extracted. These images are used for different real time applications. The image resolution is increasing different new softwares which are used for tampering the image. These images are tampered in such a way that seems very difficult to assume that the image has been tampered. Image tampering copy-move forgery is the most usable technique for the tampering the image. In copy-move forgery some critical component is cutted and paste at some other place, which is very difficult to identify, also the forged image looks to be similar to the original image. Till the time, no such automatic tool is available which can detect the forgery automatically. So there is need of different levels of researches to come up with new technique which can detect the forgery with higher level of efficiency.

1.1 Copy-Move Forgery

It is one of the popular technique where some unfavorable section of the image is removed from some place and pasted at some other place in same image. This means the original image has been tampered. It will create a wrong information at the end of the user. User seeing the image can create false information about the facts.

1.2 Methodology of Copy move forgery detection

There are various steps that are to be followed for the copy move forgery detection. This way forgery can be detected with some accuracy.

a. Pre-processing
b. Features extraction
c. Features matching
d. Post Processing

Pre-processing: It is the first step required for the copy move based forgery detection approach. It includes inputting the image from the local dataset take as a source. The dataset for the image includes CoMoFoD dataset. It includes various gray and colored image.

Features Extraction: In second stage there is features extraction phase. Where features are being extracted in two ways. One is by having sub division of the total image into various smaller parts. These smaller parts are extracted by incrementing one pixel along x-axis and taking b*b block of the image. This way the movement will be from x1…..xn. Similarly from y1…….yn. This way the image various sub parts are being extracted for the features. In second approach, the key point are being identified. These key points are also called as those points which builds the ROI. Features are for the ROI are being identified.

Features matching: It is the another step forward to the forgery detection. Here the extracted features either by the sub division or by the key point identification is matched to the other image segment. This process will goes on till all the components which are forged are being identified.

Post processing: It is used for those sub parts where the features are matched, those points are marked and identified as the forged segments. These segments are extracted as the segmented sub parts.

II. LITERATURE SURVEY

[1] Author in this paper has worked on keypoint identification of the forged area. Later on localized the forged area using region extraction technique.

[2] In this paper, author has surveyed various copy-move forgery detection techniques. These techniques fall in the category of keypoint and block based. Block based will sub divide the total image into various small blacks rather in the keypoint it is to extract the feature point of the particular region. Technique based on keypoint and blockbased may not be suitable for some types of forgeries like rotation, and scaling. this can be enhanced there on.

[3] In this paper, author has proposed a technique based combination of Dyadic Wavelet Transform (DyWT) and Scale Invariant Feature Transform (SIFT). Further more performance parameters can be taken to detect the performance of the current technique, also more emphasis has to laid on the pre processing steps.

[4] In this paper, author has proposes a solution based on failure of existing algorithm for matching the two segments of the same area having same features. It will be having various failure rates. Current research paper uses the features of the JPEG for the matching purpose. Current approach does not uses the various geometrical transformations which includes rotations, scaling, shearing etc. these can be incorporated to enhance the work

[5] In this paper author has proposed a coherency sensitive hashing based approach to create feature correspondence in the image. In order to achieve fast copy move based forgery detection the current research can be enhanced by using forgery detection using local bidirectional coherency error refinement.

[6] In this paper author has proposed a approach which includes sub divide the total image into sub parts. each part will be fixed sized blocks. DCT has been applied one each block. Each block is represented as cosine block and its features are being extracted. While this paper has used the technique for removal of blur and noisy images for the detection of the copy move forgery. This technique can be enhanced further by simply including all types of noises.

[7] Author in this paper has proposed a approach based on local binary pattern variance over the low approximation components of stationary wavelet. This work can be enhanced by using affine transformation technique.

[8] In this paper, author proposed a technique for the detection of the copy paste area in the image by using local Binary Pattern Histogram Fourier features for each overlapping block. This procedure can be used for detection of multiple forgery area in the image.

[9] In this paper, author has proposed a technique for clustering the region based on the density. Similar density areas will be clustered together to check for the copy-paste based forgery. This proposed algorithm can be enhanced for identification of the multiple forgeries in the image.

[10] A CMFD technique consisting of oriented Features from Accelerated Segment Test and rotated Binary Robust Independent Elementary Features (Oriented FAST and rotated BRIEF) as the feature extraction method and 2 Nearest Neighbour (2NN) with Hierarchical Agglomerative Clustering (HAC) as the feature matching method is proposed. This proposed approach can be improved by detecting small sized object and symmetric scaling.

III. PROPOSED WORK

The method proposed in this paper is based on recognition of the key points in the image. This key point is the region of interest. For whom the key point is to be matched. It includes various steps.

a. Input the image from the local dataset taken as CoMoFoD. This includes various images of type colored and black and white images.
b. Preprocess of the image includes identification of the key point from the image. These key points are high resolution points which are having disc value greater than 10. These objects are clearly distinguishable objects.
c. Segregate these objects and compare these objects to each other for the forgery detection.
d. Identify the features of the objects and compare the features of these objects for the objects similarity.
e. Indentify the level of the true positive and false positive ratio for the object.

IV. FLOWCHART

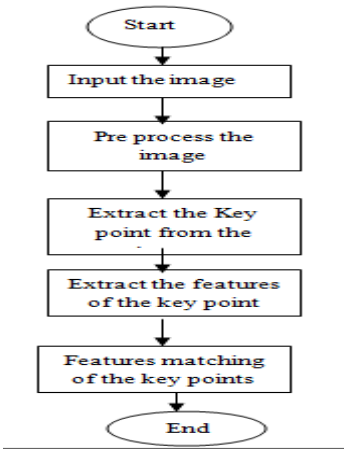
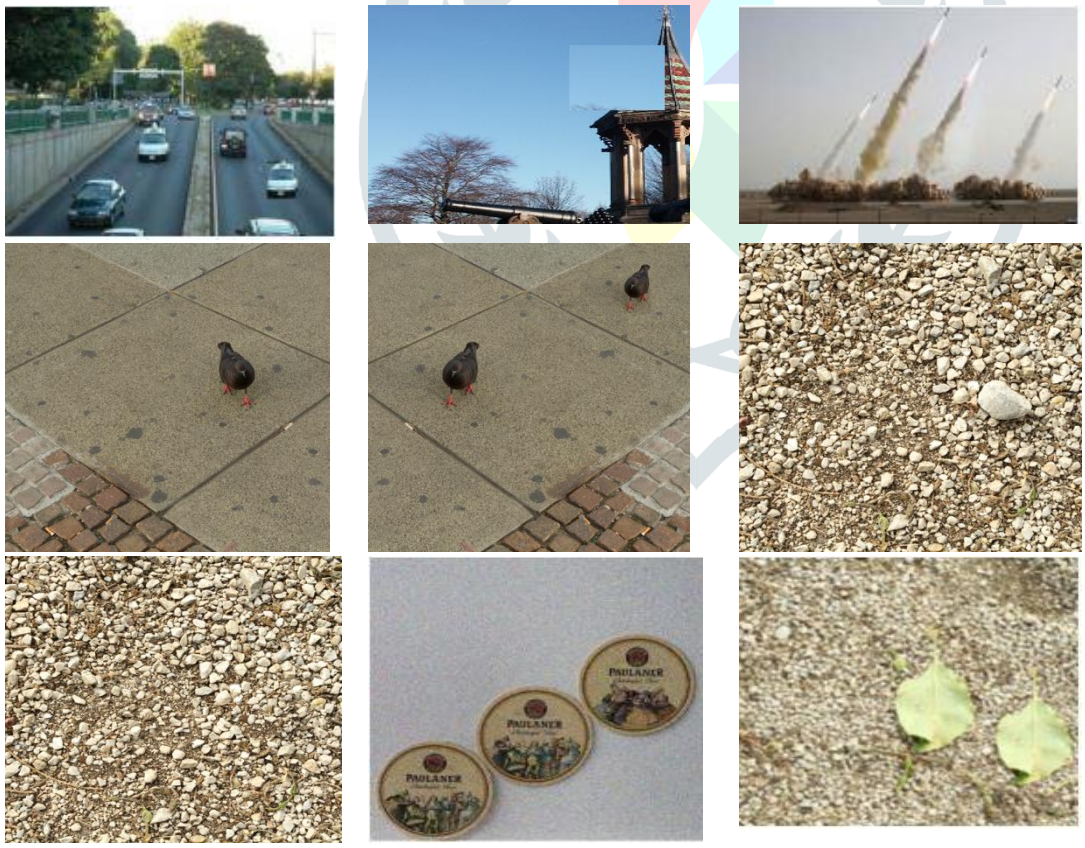


Fig. 1 Flowchart

V. ALGORITHM

```
Procedure(input_img)
    I=read(input_img)
    I1=convert_gray(I)
    I2=convert_bw(I1)
    Pixel_metrix(m,n)=I2
    Key_point(m1,n1)=identify(pixel_metrix)
    ff=matching(key_point)
        If(ff=true)
            Write("present")
            Mark(key_point)
        End if
    Features(count)=extract_features(key_point)
end
```

d. Dataset images



VI. RESULTS

a. Experimental setup

Matlab 2015 has been used as a tool for recognizing the forged image and then segmenting the forged part from the original image. It provides large library for the image processing.

b. Dataset

The dataset of CoMoFoD is taken for the image forgery detection. This dataset is the standard dataset having colored and gray images.

c. Parameters

There are various parameters on the basis of which the comparison of the performance of the existing and proposed has been compared.

i. True Positive rate
ii. False Positive Rate
iii. Time of the evaluation

e. False positive rate comparison

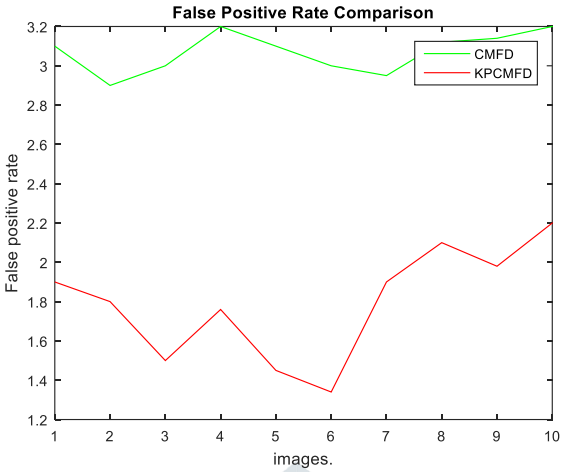


Fig.2 False positive Rate comparison

Fig. 2 shows the false positive rate for the existing and proposed system. Where proposed system has better false positive rate. Red line shows that for the all dataset images has less percentage of the pixels has been identified as false for the forgery detection.

Table 1 False Positive rate

False Positive Rate base	**3.1**	**2.9**	**3**	**3.2**	**3.1**	**3**	**2.95**	**3.12**	**3.14**	**3.2**
False Positive Rate Proposed	1.9	1.8	1.5	1.76	1.45	1.34	1.9	2.1	1.98	2.2

f. True positive rate comparison

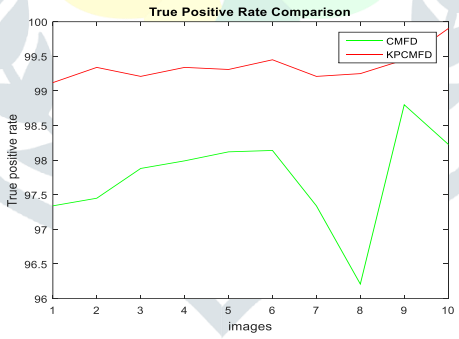


Fig. 3 True Positive Rate

Fig. 3 shows the true positive rate comparison for the all the dataset images. The comparison for the base technique as CMFD and the proposed technique as KPCMFD has been compared. Graph shows that all the images in respect to the true positive rate has shown the better performance compared to the base technique.

Table 2 True positive rate comparison

True Positive Rate Proposed	**99.12**	**99.34**	**99.21**	**99.34**	**99.31**	**99.45**	**99.21**	**99.25**	**99.45**	**99.9**
True Positive Rate base	97.34	97.45	97.88	97.99	98.12	98.14	97.34	96.21	98.8	98.23

g. Time of evaluation

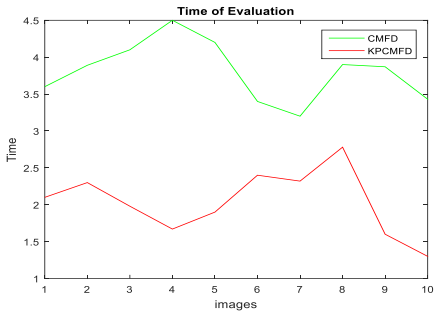


Fig. 4 Time of evaluation comparison

This fig. 4 shows the comparison of the CMFD and the KPCMFD techniques on the parameter of the time of the evaluation. The proposed system has lower time of the evaluation for the forgery detection compared to the base technique.

Table 3 Time of the evaluation

Time Base	**3.6**	**3.89**	**4.1**	**4.5**	**4.2**	**3.4**	**3.2**	**3.9**	**3.87**	**3.43**
Time Proposed	2.1	2.3	1.98	1.67	1.9	2.4	2.32	2.78	1.6	1.3

VI. CONCLUSION

In present time images are used as the source of the information. Different types of applications exists which are generating the images data such as medical data. This kind of data is easy to understand and also easy to extract the useful facts from the data. On the other hand, several other applications are coming up which are being used for forging the image. This forging will make this source of the data to be less reliable because the forgery in the image is hard to detect by naked eyes. Many researchers are researching on this issue how efficiently the forgery of the image can be detected. In current research key point based forgery detection is taking place where instead of sub dividing the total image into various small sections only key points are being identified. These key points will be matched based on the features extraction so, the better performance can be evaluated. Different parameters are being used for measuring the performance of the forgery detection technique. The proposed approach results in better performance in terms of various statistical parameters comparing to the existing approach.

VIII. FUTURE WORK

Currently there are various applications which are used for the forging the image but they requires efficient way for the forgery detection. Presently, there are several levels of research which has been done on different techniques for the single forgery detection. In future, multi forgery detection technique will be considered as main area of research.

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