

Literature review of Image forgery detection techniques from 2015 to 2019

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ABSTRACT

The field of image forensics has matured with the development of nascent techniques to catch the image forgeries done with the applications and tools developed over a period of time. A large number of literature is produced in this field within a short span of time due to its importance both in daily life, and to achieve long term social benefits. The number of scholars has also increased many a folds. Literature presenting reviews on image forgery techniques holds importance for the scholars' endeavoring in the field of image forgery detection. The updating the literature review also is an important aspect of the field with the fast developments in the field. The author presents literature review of research papers on image forgery published in reputed journals from 2015 to 2019 to bring in light the latest tools, techniques and algorithms in the field of image forgery detection. The paper concludes with identification of latest tools, techniques and algorithm available in the field of image forensics in chronological order.

Keywords – Image forensic, Literature Review, Forgery Detection, Tools, Techniques

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I. INTRODUCTION

Image forgery occurred when the first image was created. Image forgery was firstly done in 1860s. When digital scanners and cameras prevailed were not in use, image editing was implemented by using tools such as airbrushing to manipulate image with different traditional art method. Traditional era the image is manipulated during the process of printing. As new technologies are being innovated, digital images are becoming popular and analogue image editing method has worn out.

1. Type of image forgeries

Digital images can be used as a proof against crimes, and any person can make changes in digital image to hide or remove important information with the help of different types of editing soft wares available like Adobe Photoshop, Corel draw etc. Changes that can be made on images are given below:

(1) Image Retouching, (2) Image Splicing, (3) Image Morphing, (4) Image Enhancing, (5) Copy move, (6) scaling, (7) cropping, (8) geometric transformation, (9) selective color change, (10) merging another image or a part of same or different image.

II. STEPS OF IMAGE FORGERY DETECTION

Steps of Image Forgery Detection to identify a forged region of an image are:

1.1. Pre Processing

In Pre-processing, features of an image are improved by image color conversion, dimension reduction, re sizing. This step is same for both block based and key-point based method.

1.2. Feature Extraction

In this step features of an image are extracted using methods like DCT based, DWT based, SIFT, SURF etc. On the basis of these extracted features, matching is performed for detection. In block based techniques, feature vectors are extracted for each block and in key point based methods feature vectors are computed for key points.

1.3. Matching

It determines copied area of an image by using threshold. If the value of matching blocks and key points are high then the desired threshold then those portion of the image are considers as forged.

1.4. Filtering

In detection process there is chance of false matching and these false matching can lead to determination of false forged region, to overcome this problem filtering is used in this step. As a result false matching of an image region is reduced.

1.5. Post Processing

To save or collect matches post processing is done. In post processing morphological operations are performed.

III. LITERATURE REVIEW

Intense literature review has been done in the paper from year 2015 to 2019 to bring in light

different techniques, algorithms and tools used by different authors.

Year	Author Name	Paper	Journal	Methods	Conclusion	Parameters
2015	Reshma P.D Arunvinod h C	“Image Forgery Detection Using SVM Classifier”	IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems ICIECS’15	detecting digital image forgery using “ illuminant color ”	An improved forgery detection method that makes use of machine learning classifiers. A semi-automatic forgery detection method based on illuminant color is used. In this method there is no interference of human when data is trained as machine can train data more efficiently than humans.	
2015	Qi Yan, Rui Yang, Jiwu Huang	“Copy-Move Detection of Audio Recording With Pitch Similarity”	ICASSP 2015	Method based on “ pitch similarity ” to detect copy-move forgeries.	Copy-move detection method of digital audio recording is proposed. Based on comparison of pitch sequences, duplicated segments in the audio can be detected and located.	TRP, FPR and Cost
2015	Qing Wang, Rong Zhang, Ke Qing	“Passive Detection of Tampered JPEG Image Based on First Digit Statistics”	2015 International Conference on Intelligent Information Hiding and Multimedia Signal Processing	“ novel probability model ” based on the first digit statistics of DCT coefficients And “ combined Bayes theorem ” .	a new forensic algorithm for detecting double JPEG compressed images has been proposed. The statistical features of the first digits of the AC coefficients are applied to detect and locate the tampered region using Bayes’ approach. In future machine learning is used to improve the efficiency of this method.	Accuracy , compression
2015	Guangchen Cao, Ying Chen, Gaigai Zong Ying Chen	“Detection of Copy-move Forgery in Digital Image Using Locality Preserving Projections”	2015 8th International Congress on Image and Signal Processing (CISP 2015)	Locality preserving projection (LPP)	The sub block image based on locality preserving projection algorithm to replace the image block gray information copy-move passive forensics method is used.	Complexity and testing time

2015	Ms. Jayshri Charpe	“Revealing Image Forgery through Image Manipulation Detection ”	Proceedings of 2015 Global Conference on Communication Technologies(GCCT 2015)	The proposed technique for the detection of contrast-enhanced image is based on “ contrast calculation ”.	Author presented a contrast-enhanced image based on contrast calculation because it is robust against a compression as compare to other methods.	Robust against low medium and high JPEG compression.
2015	Chi-Man Pun,Xiao-Chen Yuan,Xiu-Li Bi	“Image Forgery Detection Using Adaptive Over-Segmentation and Feature Point Matching ”	10.1109/TIFS.2015.2423261, IEEE Transactions on Information Forensics and Security	“ Adaptive Over-Segmentation and Feature Point Matching ”	Author presented an Adaptive Over Segmentation features that is more efficient than existing methods. Future work could focus on applying the proposed forgery detection scheme based on adaptive over-segmentation and feature-point matching on other types of forgeries such as splicing or other types of media, for example, video and audio.	geometric transforms, JPEG compression, and down-sampling
2015	Jiansheng Chen, Xiangui Kang, Ye Liu, and Z. Jane Wang	“Median Filtering Forensics Based on Convolutional Neural Networks ”	IEEE SIGNAL PROCESSING LETTERS	“ Convolutional Neural Networks ”	This paper proposed a median filtering forensic method based on deep learning. The contributions are outlined as follows: Different from exiting conventional median forensics techniques, the feature extraction and classification steps are unified in a modified CNN-based model with adding a filter layer, and hierarchical feature representations are learned. This purposed technique is better than existing techniques to achieve accuracy.	Accuracy
2015	Amir Bidokhti,Shahrokh Ghaemmaghami	“Detection of Regional Copy/Move Forgery in MPEG Videos using Optical Flow ”	International Symposium on Artificial Intelligence and Signal Processing	“ Optical Flow ” in MPEG videos is proposed.	In this paper, authors propose a passive method for video forgery detection which relies on inconsistencies in optical flow coefficients. Secondary periodic trends are signs of copy/move forgery.	--

2015	Chen-Ming Hsua , Jen-Chun Leeb , and Wei-Kuei Chena	“An Efficient detection algorithm for Copy-Move Forgery”	2015 10th Asia Joint Conference on Information Security	“ Gabor filter ” applied on each block.	This paper proposes an effective method for detecting duplicated regions based on the histogram of Gabor magnitude which is more efficient to work against many parameters.	distorted by translation, rotation, JPEG compression, blurring, brightness adjustment
2015	M. F. Fahmy* and O. M. Fahmy	“A Natural Preserving Transform Based Forgery Detection Scheme”	2015 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT)	“ PRNU and NPT ”	This paper describes a computationally simple and efficient forgery detection technique. It doesn't require the computational burden of evaluating a threshold for every forged image to check whether it is forged or not. The proposed scheme makes use of morphological operations to identify forged locations whether copy-paste or copy-move. Cases of weakly correlated fingerprints have also been dealt with using Natural Preserving Transform NPT.	Accuracy, Performance
2015	Shunquan Tan* and Shengda Chen† and Bin Li	“GOP Based Automatic Detection of Object-based Forgery in Advanced Video”	Proceedings of APSIPA Annual Summit and Conference 2015	“ GOP structure ”	This paper proposed an approach for automatic identification of object-based forged video which encoded with advanced frameworks based on its GOP. They regard the object based forgery in video frames as image tampering in the motion residuals, and employ the feature extractors which are originally built for frequency domain image steg-analysis to extract forensic features from the motion residuals.	Accuracy and Performance
2015	Fahime Hakimi, Mahdi Hariri, farhad GharehBaghi	“Image Splicing Forgery Detection Using Local Binary Pattern	International Conference on Knowledge Based Engineering and Innovation	“ Local Binary Pattern and Discrete Wavelet Transform ”	In this paper author applied a method on CASIA tempered image detection evaluation database and Columbia uncompressed image splicing detection evaluation database and this method shows that it is more	Accuracy

		and Discrete Wavelet Transform”			efficient and obtain more accuracy than other.	
2015	Ruizhe Li, Chang-Tsun Li, and Yu Guan	“Incremental Update of Feature Extractor for Camera Identification”	ICIP	“ extension based on Candid Covariance-free Incremental PCA (CCIPCA) ”	In this paper author presented a method to overcome the shortcoming of PCA DE noising that was proposed to extract a feature set with much lower dimensionality from the original noise residual. In order to improve the reliability of this estimated feature extractor, in this work, two strategies are applied to optimize the training samples. When facing the real-time online identification, our CCIPCA-based feature extraction method is an effective extension which can significantly reduce the computational complexity while preserving the identification accuracy.	Identification accuracy, performance, cost
2015	Matthias Carnein, PascaSchottle, Rainer Bohme	“Forensics of High-Quality JPEG Images with Color Subsampling”	2015 IEEE International Workshop on Information Forensics and Security (WIFS)	“ DCT ”	In this paper, author presented a concept of block convergence and extended it to color images to reliably detect prior JPEG compressions with high quality factors. This is achieved by observing the convergence behavior for macro-blocks and either ignoring or preventing possible spill-over effects due to chrominance subsampling, this method gives high accuracy to against forgery. Future work should derive a better theory for the convergence path and the distribution of stable block.	True detection rate, Off by two ratio, accuracy
2015	Mandeep Kauri, Savita Gupta	“Evaluation of Image Forensic Cues for Fusion”	2015 Third International Conference on Image Infonnation Processing	“ Fusion with an additional cue ”.	The paper evaluates the performance of a two passive-blind methods on standard tampered image dataset. The fusion of cues is analyzed and is found to increase the detection accuracy. The experiment	Reliability, accuracy

					shows that classifier performance is greatly affected by multiple tampering operations, presence of conflicting traces, image type etc. In future many forensic tools are placed in purposed architecture to improve the reliability.	
2015	Kalyani Khuspe, Vanita Mane	“Robust Image Forgery Localization and Recognition in Copy-Move Using Bag of Features and SVM”	2015 INTERNATIONAL CONFERENCE ON COMMUNICATION, INFORMATION TECHNOLOGY (ICCICT)	“ Mirror invariance feature transform (MIFT), a vector quantization technique maps histogram vector (bagof-words),SVM ”.	The proposed system is using effective set of key point-based features, such as MIFT features, which not only acquires the attributes of SIFT features but also is invariable to mirror reflection transformations for discovering copy-move image forgeries that has produced promising results. Subsequently, clustering is carried on the set of images after computing the MIFT features and the centroid of each cluster is chosen to develop the codebook and the security is based on the codebook. This method is more accurate than existing techniques I.e. SIFT.	Accuracy, FPR and TRP
2015	Cheng-Shian Lin,Chien-Chang Chen, Yi-Cheng Chang	“An Efficiency Enhanced Cluster Expanding Block Algorithm for Copy-Move Forgery Detection ”	2015 International Conference on Intelligent Networking and Collaborative Systems	“ Cluster enhanced method ”	IN this paper, author Purposed a Cluster enhanced method which is compared with Expanding Block algorithm to improve the efficiency of computational time.	TPR, FPR, computation time
2015	Ashwini V. Malviya, Siddharth A. Ladhake	“Copy Move forgery detection using low complexity feature extraction ”	2015 IEEE UP Section Conference on Electrical Computer and Electronics (UPCON)	“ low complexity feature extraction ”.	In this paper, author emphasizes on the color contents of the forged image. For forgery detection, features based on ACC, HSV and Color Moment are used. These purposed methods are compared with DCT, DWT and SVD and it shows better results than compared techniques.	Performance, scaling Translation
2015	E. Ardizzone,	“Copy-Move	IEEE Transactions	“ novel hybrid ”	In this paper, author proposed methods are	Translation,

	A. Bruno, and G. Mazzola	Forgery Detection by Matching Triangles of Keypoints ”	on Information Forensics and Security	approach”	halfway between block and point based methods, and aim to analyze the structure of the objects in the scene, represented as a mesh of triangles. With respect to block based methods, our methods can find, with a very high precision, the tampered areas of the images, also in case of geometric transformations, but they are able to recover only parts of the pixels of the region, that are in most cases enough to detect the shape of the copied objects. In future this method is use to detect the other type of transformation and also to recover the missing matches.	scalin g and Rotati on
2015	Elham Mohebbian , Mahdi Hariri	“Increase The Efficiency Of DCT Method For Detection Of Copy Move Forgery in Complex And Smooth Images”	International Conference on Knowledge Based Engineering and Innovation	“Discrete cosine transform s (DCT)” .	Authors presented DCT method and this shows better result in pre-processing process. Effectiveness of this purposed method is that it is work on smooth and complex image.	Comp ressi on, Gaussi an blur, adapti ve white Gaussi an noise
2015	Pakpoom Mookdarsanit, Lawankorn Soimart , Mahasak Ketcham , Narit Hnoohom	“Detectin g Image Forgery using XOR and Determina nt of Pixels for Image Forensics ”	2015 11th International Conference on Signal-Image Technology & Internet-Based Systems	“XOR and Euclidean distance” .	In this paper, author presented a XOR to improve the speed and error detecting rate. This method can integrate with trigonometry for solving the geometric correction such as rotated images. Detecting the forgery can use the real image for comparison from the internet.	Speed, rotatio n
2015	Abdullah M. Moussa	“A Fast and Accurate Algorithm for Copy-Move Forgery Detection ”	2015 IEEE	“KD Tree”	The Purposed algorithm is compared with SURF and the result of purposed algorithm is better than SURF.	Rotati on and scalin g
2015	Sandeep Kakde	“A Review of	IEEE Sponsored	“Passive techniques	In This paper, author reviews five broad	--

		Image Forgery Techniques and their Detection ”	2nd International Conference on Innovations in Information, Embedded and Communication systems (ICIIECS)2015	”.	categories of image forgery techniques i.e. physic based technique, block based technique, cloning, and pixel based technique, geometric based. These techniques are in use today but in future new forgery techniques will be devised due to strong photo editing tools will be available that may take this detection criteria into account.	
2015	Beste Ustubioglu1 , Gul Muzaffer1 , Guzin Ulutas1 , Vasif Nabiyev1 and Mustafa Ulutas	“A Novel Keypoint Based Forgery Detection Method Based on Local Phase Quantization and SIFT ”		“ Local Phase Quantization and SIFT ”	In this paper, author purposed a LPQ with SIFT. Purposed method shows higher accuracy than the SIFT.	Blurring, white Gaussian noise
2015	Reza Moradi Rad and KokSheik Wong	“Digital Image Forgery Detection by Edge Analysis”	2015 International Conference on Consumer Electronics-Taiwan (ICCE-TW)	“ Edge Analysis ”	In this paper, author purposed an edge analysis method. The purposed method analyses object’s outline to see whether there are too sharp, too smooth or too natural. This method is not limited to double compression and it gives better result against splicing.	Boundary resolution, splicing
2015	Varsha Karbhari Sanap, Vanita Manikrao Mane	“Region Duplication Forgery Detection in Digital Images Using 2D-DWT and SVD ”	2015 IEEE	“ 2D-DWT and SVD ”	In this paper, author purposed a 2D- DWT method which is compared with existing methods i.e. SIFT, DCT etc. and hence the accuracy of 2D-DWT is better than Existing methods.	Hit Rate, Miss rate
2015	Meenal Shandilya, Ruchira Naskar	“Detection of Geometric Transformations in CopyMove Forgery of Digital Images ”		“ Scale Invariant Feature Transform (SIFT) ”	In this paper, author presented a SIFT method which is capable to detect the geometric transformation. In future this methods is used to other geometric transformation i.e. reflection etc.	Rotation , Rescaling
2015	Surbhi Sharma, Umesh	“A rotationally	2015 IEEE International Conference	“ rotationally invariant ”	In this paper, author presented a RITD. A purposed method is	blurring

	Ghanekar	invariant texture descriptor to detect copy move forgery in medical images”	on Computational Intelligence & Communication Technology	texture descriptor”	compared with DCT+SVD and FAST and the efficiency of Purposed method better.	
2015	Neetu Singh, Neetu Singh	“Analysis of Benford’s Law in Digital Image Forensics”	2015, IEEE	“Benford’s Law”	In this paper, author presented a law which is applied on JPEG and JPEG2000. In this purposed work author analyses JPEG 2000 with DCT and DWT independently and then use both to analyses JPEG 2000. DWT gives better result means high mean deviation is obtained from DWT.	compression
2015	Ms.S.T Suryakanthi Sornalatha, Ms.S.Devi Mahalakshmi, Ms. Dr.K.Vijayalakshmi	“Detecting Contrast Enhancement based Image forgeries by Parallel Approach”	IEEE Sponsored 2 nd International Conference on Electronics and Communication Systems (ICECS ‘2015)	“Parallel Approach”	In this paper, two contrast enhancements based algorithms have been proposed. These algorithms based on histogram bins and peaks analysis. Parallel approach used to increases the performance of the system. Image enhancement techniques are applied after the Jpeg compression strategy. Prior works for composition detection fails to identify which type of manipulation was enforced.	splicing
2015	Songpon Teerakano k, Uehara Tetsutaro	“Enhancement of Image Tampering Detection using JPEG’s Quantization and Re-Interpolation Processes”	2015 IEEE 39th Annual International Computers, Software & Applications Conference	“JPEG’s Quantization and Re-Interpolation Processes”	In this paper, author developed mechanism compared with two existing techniques: using interpolation and JPEG’s quantization noise techniques. Using of JPEG’s quantization noise as a image forgery, the output shows the better re the use of re-interpolation process. The result noisy and contain some errors, to overcome this problem authors present a new technique with 2-D product. Future work, they also plan to extend our proposed method to 3-dimensional domain, i.e. 3-dimensional	Compression, accuracy

					cross-product which we believe it will result in much higher accuracy in detecting of the tampered images.	
2015	Nirupama Tiwari, Deepika Dubey, Anshi Goyal	“Reducing Forged Features Using Tampered and Inconsistent Image Detection Techniques In Digital Image Processing”	2015 Fifth International Conference on Communication Systems and Network Technologies	2-D DWT etc	Many techniques, some of which were introduced in this paper, have been proposed for detection but the majority of them could not prove itself as a perfect technique as they have limitations of their own	Compression, rotation
2015	Diaa M. Uliyan, Hamid A. Jalab, Ainuddin W. Abdul Wahab	“Copy Move Image Forgery Detection Using Hessian and Center Symmetric Local Binary Pattern”	2015 IEEE Conference on Open Systems (ICOS), August 24-26, 2015, Melaka, Malaysia	“ Hessian and Center Symmetric Local Binary Pattern ”	In this paper, author presented The combined Hessian points and CSLBP make the features invariant to translation, scale, and illumination. The best TPR and FPR are observed in proposed method at 92% and 8% respectively. Future work will use blur-invariant features to improve the efficient detection of region duplications under blur degradations.	Scaling, translation
2015	Huayong. Ge, Shujuan. Fang	“Detecting Image Forgery Using Linear Constraints Based on Shading and Shadows”	2015 International Conference on Informative and Cybernetic for Computational Social System	“ Lambert illumination mode ”	They combine the brightness of reflect light on the objects in image to optimization their algorithm in the future research work.	accuracy
2015	Abhishek Kashyap, B. Suresh, Megha Agrawal, Hariom Gupta, Shiv Dutt Joshi	“Detection of Splicing Forgery Using Wavelet Decomposition”	International Conference on Computing, Communication and Automation (ICCCA2015)	“ Wavelet Decomposition ”	Comparison of proposed method with existing methods I.e ng, Zhang Zhen for analyzing accuracy. They can improve the detection accuracy by decreasing block size and increase number of computations, if we require quicker results. In future this work can be extended to propose a new method which can detect	Splicing

					image forgery in which copy create forgery region is scaled or rotated.	
2015	Hongli Han ,Yezhou Li ,Shaozhan g Niu,Zhenz hen Gong	“Tamper Detection Based on the Consistency of Quantization Error Caused by Multiple JPEG Compression ”	Proceedings of ICCT2015	“ DCT ”	In this paper, authors proposed the tamper detection method based on the consistency of quantization error to solve the situation that tampered image was compressed with quality factors ranging from low to high and obtain a good result. By having a better combining with the data approximate recovery method. It is not appropriate when block is too small.	Compression
2015	Beste Ustubioglu , Vasif Nabiyev, Guzin Ulutas, and Mustafa Ulutas	“Image Forgery Detection Using Colour Moments”		“ DCT and SIFT ”	The method has higher accuracy ratios and the method also achieves to decrease the dimension of feature vector.	Compression
2015	Neetu Yadav, Rupal Kapdi	“Copy Move Forgery Detection using SIFT and GMM”	2015 5th Nirma University International Conference on Engineering (NUiCONE)	“ SIFT and GMM ”	The presented technique can show effectiveness with respect to combined RST modifications to detect copy-move forged region in the image. The cluster formation phase has been extended by using image segmentation method. SIFT based image forgery detection techniques can further be extended to include the detection of other image forgery apart from copy-move. Limitation is improper detection.	transformation
2015	Fuxing Zhao, Rong Zhang, Haolong Guo, Yanhua Zhang	“Effective Digital Image Copy-Move Location Algorithm Robust to Geometric Transformations ”	ICSPCC2015 IEEE	“ SIFT and ZNCC coefficient s ”	The proposed method combines the key point-based method with the block-based method. For a tampered image, the presented algorithm. It also improves the efficiency of the algorithm and makes the algorithm more robust.	Rotation , scaling , multiple copy
2016	Xiuli Bi, Chi-Man Pun, Xiao-Chen Yuan	“Adaptive Polar based Filtering	IEEE TrustCom BigDataSE- ISPA	“ Adaptive Polar based Filtering ”	The proposed method put efforts on the last step in the common three-step pipeline of CMFD methods to	geometric distortion

		Method for Image Copy-Move Forgery Detection ”		Method”	improve the accuracy of the detection results. In the proposed adaptive polar based filtering method, the polar distribution of the matched pixel pairs are calculated, and the filtering threshold is determined adaptively by analyzing the polar distribution. In addition, the performance of the proposed method is compared with the existing state-of-the-art CMFD methods. The comparison results show the superiority of the proposed method even when under various challenge conditions.	
2016	Atefeh Shahroudn ejad,Mohammad Rahmati	“Copy-Move Forgery Detection in Digital Images Using Affine-SIFT ”	ICSPIS 2016, 14-15 Dec. 2016, Amirkabir University of Technology, Tehran, Iran.	“Affine-SIFT”	Method is robust to some post-processing operations such as blurring and Gaussian noise addition. Experimental results show that the proposed method detects a large number of matched keypoints in duplicated regions and finally, estimates the regions correctly.	Rotati on, scalin g transf ormati on
2016	Anselmo Ferreira, Siovani C. Felipussi, Carlos Alfaro, Pablo Fonseca, John E. Vargas-Munoz, Jefersson A. dos Santos, and Anderson Rocha	“Behavior Knowledge Based Fusion for Copy-Move Forgery Detection ”		“SIFT and SURF”	They explored approaches to combine methods that take the best of two worlds in the copymove detection problem: block-based and points of interest detection methods. We proposed three extensions for Behavior Knowledge Space representation fusion: the multi-scale BKS representations, generative models to complete missing information in the BKS representation and multi-directional neighborhood analysis to integrate the neighborhood behavior into the decision-making process of a given pixel. However, the method has two main drawbacks: the first one happens when there is no complementarity of the underlying methods to be combined. As future work, one promising investigation	Accur acy

					would be improving the detection methods to also consider possible counter-forensic techniques. In an adversarial attack scenario, it is possible that simple methods and also basic fusion approaches will easily break down.	
2016	Hajar Moradi-Gharghani and Mehdi Nasri	“A New Block-based Copy-Move Forgery Detection Method in Digital Images ”	International Conference on Communication and Signal Processing,	“ DCT transform and lexicographically sorted ”	The main novelty of this paper is considering a dispersion threshold to find the exact forgery cases, and eliminate regions with similar patterns. The method can effectively find regular, irregular and multiple forged sections. As future works, another feature extraction algorithm such as Zernike moments can be used, and the threshold parameters will be calculated in an adaptive manner.	FPR and DAR
2016	Rahul Dixit , Ruchira Naskar , Swati Mishra	“Blur-invariant copy-move forgery detection technique with improved detection accuracy utilising SWT-SVD ”	IET Image Processing	“ Blur-invariant and SWT-SVD ”	The proposed method is evaluated for two types of forgeries: copy-move forgery (i) without blurring, (ii) with blurring. Future research in this direction would include investigation of other forms of image region transformations, such as rotation, rescale and reflection, in copy-move forgery.	Blurring
2016	Ye Zhu1, Ramanathan Subramanian, Tian-Tsong Ng, Stefan Winkler, Rama Ratnam	“COMPARISON OF HUMAN AND MACHINE PERFORMANCE FOR COPY-MOVE IMAGE FORGERY DETECTION INVOLVING SIMILAR	IEEE	“ LBP, DCT and SVD ”	machines achieve comparable or better CMFD accuracies for scale, rotation and naive CMF-based tampering in both serial and parallel presentation formats. The need to account for SGOs in CMFD is demonstrated by the fact that R-CMFD, which specifically extracts textural descriptors to this end, performs as well/outperforms SIFT-based detection for the above factors.	Rotation, scaling, blurring

		BUT GENUINE OBJECTS ”				
2016	Bihan Wen, Ye Zhu3,, Ramanathan Subramanian, Tiansong Ng, Xuanjing Shen, Stefan Winkler	“COVER AGE – A NOVEL DATABA SE FOR COPY- MOVE FORGER Y DETECTI ON”	ICIP-IEEE	“ Coverage – A Novel Database and novel sparsity-based metric ”	This paper presents COVERAGE, a novel CMFD database with annotations where the challenge is to distinguish the forged region from SGOs. Several metrics are proposed to estimate forgery quality, as well as CV and VP-based CMFD performance. Obtained results reveal that (i) the FEA metric correlates well with human performance, and (ii) automated CMFD methods perform poorly on COVERAGE.	Scal ing , rotatio n, illumi natio n
2016	Yuan Rao, Jiangqun Ni	“A Deep Learning Approach to Detection of Splicing and Copy-Move Forgeries in Images”	IEEE International Workshop on Information Forensics and Security (WIFS)	“ Convolutional neural network (CNN) ”	Extensive experiments on several public datasets have been carried out, which demonstrates the superior performance of the proposed CNN based scheme over other state-of-the-art image forgery detection methods.	Robus tness
2016	Rahul Dixit and Ruchira Naskar	“DyWT based Copy-Move Forgery Detection with Improved Detection Accuracy ”	2016 3rd International Conference on Signal Processing and Integrated Networks (SPIN)	“ DyWT ”	They have proposed a technique of region-duplication identification in digital images. The performance of the proposed technique has been optimized in terms of detection accuracy and false positive rate. The shift-invariant properties of DyWT used in the proposed method would be exploited to achieve detection of geometrically transformed image regions.	Accur acy, False positiv e rate
2016	Musaed Alhussein	“Image Tampering Detection Based on Local Texture Descriptor and	2016 UKSim-AMSS 18th International Conference on Computer Modelling and Simulation	“ Local Texture Descriptor and Extreme Learning Machine ”	The proposed method was evaluated on CASIA databases, and compared to two other related methods. The proposed method achieved 95.67% accuracy in CASIA v1.0 database, and 97.3% in CASIA v2.0 database. These accuracies	Accur acy

		Extreme Learning Machine ”			are on the high end of the reported results on these two databases. In a future work, we will apply some feature selection algorithms to reduce the number of features. Also, we will investigate the effect of other types of color components such as luminance and Chroma, or hue and saturation, in image forgery detection.	
2016	Raichel Philip Yohannan, Manju Manuel	“Detection of copy-move forgery based on Gabor filter ”	2nd IEEE International Conference on Engineering and Technology (ICETECH), 17th& 18th March 2016, Coimbatore, TN, India.	“ Gabor filter ”	An efficient method is proposed for copy-move forgery detection. The characteristics of Gabor filters were exploited in order to look for forgery clues. The proposed method is evaluated on a number of original and forged images.	Gaussian blur, rotation
2016	Fei Zhao, Wenchang Shi, Bo Qin, Bin Liang	“A Copy-Move Forgery Detection Scheme with Improved Clone Region Estimation ”	2016 Third International Conference on Trustworthy Systems and Their Applications	“ SIFT, SURF, Harris AFFINE ”	This paper has the following two contributions: • The true matched keypoints to narrow the scope of the detected regions are searched by PSO, which obviously reduces the false positive rate. • The customized thresholds calculated by mean value method for each image can reduce the false negative rate as far as possible. This method reduce the FNR rate and give efficient result.	FNR
2016	Mohsen Zandi, Ahmad Mahmoudi -Aznaveh, and Alireza Talebpour	“Iterative Copy-Move Forgery Detection Based on a New Interest Point Detector”		“ Iterative Method ”	In this paper , authors present a new filtering algorithm is also utilized which separates the correct matches even in presence of high falsely matched pairs. In other words, the suspicious regions can be investigated more precisely by selecting more keypoints. In future work, they plan to improve the proposed interest point detector by means of scale-space techniques in order to deal with the resizing attack more effectively.	Blurring, rotation, compression

2016	Elif Baykal, Beste Ustubioglu, Guzin Ulutas	“Image Forgery Detection based on SIFT and k-means++”	IEEE TSP	“SIFT and k-means++”	In this paper, author purposed a sift and K-mean ++ method to decrease time complexity.	Rotation
2016	Nithiya. R, Veluchamy.S	“KEY POINT DESCRIPTION BASED COPY AND MOVE IMAGE FORGERY DETECTION SYSTEM”	2016 Second International Conference on Science Technology Engineering And Management (ICONSTEM)	“adaptive over segmentation and key point matching algorithm”	In this paper author shows that image forger region are accurately detected and computational complexity are decremented dramatically and recall rate of the proposed system is increases up to 97.22%.	Rotation, scaling, blurring
2016	Sawinder Singh Mangat, Harpreet Kaur	“Improved Copy-move Forgery Detection in Image by Feature Extraction with KPCA and Adaptive Method”	2016 2nd International Conference on Next Generation Computing Technologies (NGCT-2016)	“hybrid method with KPCA and Adaptive Method”	In this paper, author compare two method I.e SVM and neural network and they prove that SVM is more efficient than neural network.	Accuracy
2016	Choudhary Shyam Prakash, Sushila Maheshkar	“Copy-Move Forgery Detection using Lexicographical sort”	International Conference On Parallel, Distributed and Grid Computing (PDGC)	“DCT”	This method is quicker than other method due to dimension reduction. The detection ability is maintained and false matching ratio is reduced. This method is also tested on image which is post processed by different operations and the matching ratio is satisfactory which shows the robustness of our method.	Blur image
2016	Saurabh Agarwal, Satish Chand	“Image Forgery Detection Using Markov Features in Undecima	IEEE	“Undecimated Wavelet Transform”	In this paper, author have utilized Undecimated Wavelet Transform to highlight important details and extract features using Markov process. The UWT provides the output of same nature irrespective of the	Accuracy

		ted Wavelet Transform ”			location of the signal whereas the DWT doesn't. Due to the shift-invariant property of UWT, the features extracted in this domain provide better results.	
2016	Rafsanjany Kushol, Md Sirajus Salekin†, Md. Hasanul Kabir and Ashraful Alam Khan	“Copy- Move Forgery Detection Using Color Space and Moment Invariants -Based Features”	IEEE	“ Color Space and Moment Invariants -Based Features”	In this paper, authors depict a new feature based copy move forgery detection approach where both human vision related information and object information are used to generate the feature vector. The proposed method is robust against different types of post processing methods like JPEG compression, blurring.	Bright ness, color chang e
2016	Haoqing Luan and N.F. Law	“A Novel Dual- Threshold SIFT- based Copy- Move Forgery Detection ”		“ SIFT”	SIFT based method is not reliable to handle more than three images then authors presented a novel method which overcome the problem of Sift method and it is more accurate than SIFT method.	Scalin g and Rotati on
2016	Shiv Prasad, B. Ramkumar	“Passive Copy- Move Forgery Detection using SIFT, HOG and SURF Features ”	IEEE International Conference On Recent Trends In Electronics Information Communicat ion Technology, May 20-21, 2016, India	“ SIFT, HOG and SURF”	In this paper, author purposed a hybrid method which is more accurate than single technique I.e SIFT, SURF etc. Drawback of this technique is that it is very slow.	FPR and Accur acy
2016	Gamal Fahmy, Rolf Wurtz	“PHASE BASED FORGER Y DETECTI ON OF JPEG ANTI FORENSI CS”	2016 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT)	“ PHASE BASED”	In this paper, the proposed approach relied on detecting spatial frequency phase data and is primarily based on the assumption that injected dithered noise is typically out of phase in its embedded region, hence any noise dithering can be detected especially in homogenous regions where any phase discrepancy is easily recognizable.	JPEG Comp ressio n
2016	Yuanman Li and	“Image Copy-		“ Hierarchi	A novel iterative homography estimation	Comp ressio

	Jiantao Zhou	Move Forgery Detection Using Hierarchical Feature Point Matching ”		cal Feature Point Matching ”	technique is finally proposed by exploiting the dominant orientation information. In this method experimental results demonstrate the superior performance of the proposed scheme.	n, TRP, FPR
2016	Sudhakar. K, Sandeep V M, Subhash Kulkarni	“Redundant Sift Features Via Level Sets For Fast Copy Move Forgery Detection ”		“SIFT features and Chan-Vese’s approach”	The proposed method is robust, simple, efficient and cost effective. The major advantage is reduction of number of key-points as compared to traditional approach.	Rotation
2016	Xufeng Lin and Chang-Tsun Li	“Refining PRNU-Based Detection of Image Forgeries ”	DMIAF	“PRNU”	In this paper, authors Despite some possible false positives introduced the overall better performance has been verified in the task of detecting three different kinds of realistic image forgeries. We believe that this work will facilitate forensic investigators to get a more accurate and informative detection result.	Scaling, cut paste
2016	Vanita Agarwal and Vanita Mane	“Reflective SIFT for Improving the Detection of CopyMove Image Forgery”	ICRCICN	“MIFT and SIFT”	In this paper, author presented a MIFT with SIFT method which is applicable for every type of transformation. Computational time is also less.	Image Splicing, Retouching
2016	Toqeer Mahmood , Tabassam Nawaz, Zahid Mehmood , Zakir Khan , Mohsin Shah , Rehan Ashraf	“Forensic Analysis of Copy-Move Forgery in Digital Images Using the Stationary Wavelets ”	Sixth International Conference on Innovative Computing Technology	“SWT”	In this paper author presented a SWT method which is applied when information is not embedded. It is also robust to post processing operations.	Blurring , Noise , Rotation
2016	Mejren Mohammad Al-Hammadi and Sabu	“Improving SURF Based Copy-Move Forgery	IEEE International Symposium on Multimedia	“SISR algorithm and SURF approach”	In this paper author purposed a Super-SURF method which uses the power of super resolution algorithm to resolve more details in small size forgeries	Translation, rotation, scaling,

	Emmanuel	Detection Using Super Resolution”			as a pre- processing step, which helps in detecting small size forgeries. Purposed method is compared with SURF and shows best result than SURF.	distortion
2016	Saurabh Agarwal and Satish Chand	“Texture Operator based Image Splicing Detection Hybrid Technique ”	Second International Conference on Computational Intelligence & Communication Technology	“ rotation invariant co-occurrence among adjacent local binary pattern ”	In this paper , author propose Super-SURF, which uses the power of super resolution algorithms to resolve more details in small size forgeries as a preprocessing step, which helps in detecting small size forgeries. This classifier is time and space efficient in comparison to other binary classifiers like SVM and shows that it have better performance than other methods.	Compression
2016	Ram Kumar Karsh , Anurag Das , G. Lavanya Swetha, Abhishek Medhi, Rabu Hussain Laskar	“Copy-Move Forgery Detection Using ASIFT”	IEEE	“ ASIFT ”	In this paper, author use a ASIFT method and compare with SIFT method and shows ASIFT is more reliable.	Transformation
2016	Ashwini V. Malviya and Siddharth A. Ladhake	“Region duplication detection using color histogram and moments in digital image”		“ HSV and COLOR moment ”	In this paper, authors purposed color histogram and moments, color moment is used because it is more robust to rotated image and HSV is used for feature extraction. This method is more reliable to affine transformation.	Rotation
2016	Meera Mary Isaac and Dr. M. Wilscy	“A Key point based Copy-Move Forgery Detection using HOG features ”	International Conference on Circuit, Power and Computing Technologies [ICCPCT]	“ HOG ”	In this paper, authors presented a blind copy move forgery detection algorithm, which robustly detect copy move regions.	Translation, rotation and scaling
2016	Prajwal Pralhad	“Copy-Move	Fourth International	“ SIFT ”	In this paper, author purposed SIFT with HSV	Blurring,

	Panzade,C houdhary Shyam Prakash, Sushila Mahesh	Forgery Detection by Using HSV Preproces sing and Keypoint Extraction ”	Conference on Parallel ,Distributed and Grid Computing		and comparing with existing methods. It is also reliable forgery that is caused by multiple cloning of area.	Geom etrical distort ion, noise additi on
2016	Yan Wo , Kemin Yang, Guoqiang Han , Haichao Chen1 , Wenbo Wu	“Copy– move forgery detection based on multiradiu s PCET”	IET Image Processing	“PCET”	The proposed method performs well in computing time based on the multi- thread and GPU acceleration technology, compared with the state-of-the-art methods, it needs more execution time.	Blur, Rotati on, scalin g
2017	Wing Command er Nimit Kaura and Dr Sunita Dhavale	“Analysis of SIFT and SURF features for Copy- Move Image Forgery Detection ”	International Conference on Innovations in information Embedded and Communicat ion Systems (ICIECS)	“SIFT and SURF ”	Future work will be dedicated to investigate those cloned patch images whose key points are not detected by SURF and SIFT algorithm.	Scalin g, Clutte r, Rotati on
2017	Daljeet Kaur Kalsi and Preeti Rai	“A Copy- Move Forgery Detection System Using Approxim ation Image Local Binary Pattern ”	Proceeding International conference on Recent Innovations is Signal Processing and Embedded Systems (RISE - 2017)	“AILBP”	The proposed approach aims to detect the forged region with high accuracy. In future the next step will be the improvement time complexity to detect the forged region	Accur acy
2017	Dhanya R1 , R Kalai Selvi	“A State of the Art Review on Copy Move Forgery Detection Technique s ”	Proceedings of 2017 IEEE International Conference on Circuits and Systems	“Different CMFD Technique s”	In this paper, author presented a review of different techniques.	Retou ching, slicing
2017	Gul Muzaffer and Guzin Ulutas	“A Fast and Effective Digital Image Copy Move Forgery Detection	IEEE TSP	“Binarize d SIFT”	The purposed method is compared with SIFT and SURF and this shows that purposed technique reduce running time, pre-processing and post processing techniques.	Rotati on, Blurri ng, Noise Additi on, JPEG compr

		with Binarized SIFT”				ession
2017	Mohanad Fadhil Jwaid and Prof. Trupti N. Baraskar	“Detection of copy-move image forgery using Local Binary Pattern with Discrete wavelet transform and Principle Component Analysis”	IEEE	“LBP with DWT and PCA”	In this paper, authors presented the methods to detect the forgery by designing a system based on efficient techniques including DWT for compression, and LBP for feature extraction then apply PCA for feature matching and last one is SVM classifier. The result is achieved to 95 %.	Translation, Rotation, Scaling, Distortion
2017	Saleha Safie, Azurah A Samah, Ghazali Sulong, Hairudin Abd Majid, Rafidah Muhammad, Haswadi Hasan	“Block Matching Algorithm for Moving Object Detection in Video Forensic ”	IEEE	“BMA”	The purposed method is robust to compression. For future work, ARPS will be integrated in the video copy-move forgery detection scheme to detect moving object region.	Compression, Video Quality
2017	Badal Soni , Pradip K. Das , Dalton Meitei Thounaojam	“CMFD: a detailed review of block based and key feature based techniques in image copymove forgery detection”	IET Image Processing	“Different techniques of CMFD”	In comparison with the block-based technique, the key point based technique performance is better in computational complexity and robust against various transformations. In key point-based technique features size is relatively large, but the key points extracted from the features vector are normally small in magnitude in comparison with a block of the image. Generally, key point based techniques are unable to detect forgery in highly uniform areas.	Blurring, distortion, scaling, rotation etc.
2017	Junlin Ouyang, Yizhi Liu, Miao Liao	“Copy-Move Forgery Detection Based on Deep	10th International Congress on Image and Signal Processing,	“CNN”	In this paper, authors present a CNN method which shows good performance. At the end authors said that this method is not better because firstly you have to	Copy paste

		Learning ”	BioMedical Engineering and Informatics		apply CNN on CMF image.	
2017	Bambang Harjito, and Heri Prasetyo	“Image Forensics Using EDBTC Feature”	IEEE International Conference on Consumer Electronics - Taiwan (ICCE-TW)	“EDBTC”	In this paper, author purposed a EDBTC which shows best result in compression. And comparison is done with DCT-SVD to show the performance of purposed method.	Compression
2017	Sajjad Dadkhah, Mario Koppen, Somayeh Sadeghi, Kaori Yoshida, H. A. Jalab, Azizah Abdul Manaf	“An Efficient Ward-Based Copy-Move Forgery Detection Method for Digital Image Forensic”	IEEE	“SIFT”	In this paper, author presented an Efficient ward based method. Experiment results shows 97% TRP value with this method. This method is robust against compression.	TPR, FPR, Compression
2017	Rahul Dixit, Ruchira Naskar and Aditi Sahoo	“Copy–Move Forgery Detection Exploiting Statistical Image Features”	IEEE WiSPNET 2017 conference.	“DWT”	Compare the efficiency of the presented method with six different existing copy–move forgery detection techniques, which are based on the following principle operation: PCA, DCT, DWT, DyWT, improved DCT, and DWT with Zenric moment. The performance has been compared in terms of DA and FPR.	Compression
2017	Huynh Kha Tu1., Le Tien Thuong , Ha Viet Uyen Synh , Huynh Thanh Son , Huynh Van Khoa.	“Develop an algorithm for image forensics using feature comparison and sharpness estimation ”	International Conference on Recent Advances in Signal Processing, Telecommunications & Computing (SigTelCom)	“DWT modified Zernike Moments”	The combination of both LL sub-band and HH sub-band improves the exactness of the proposed algorithm and also the novelty of the paper.	Scaling, Duplicate region
2017	Aniket Roy, Akhil Konda, Rajat Subhra Chakraborty	“COPY MOVE FORGERY DETECTION WITH SIMILAR BUT	ICIP	“RLBP and g2NN”	Approach performs best for the COVERAGE dataset and also consistently for other databases for CMFD with respect to the state-of-the-art. The scheme is also robust to post-processing of the forgery.	Illumination change, compression

		GENUINE OBJECTS ”				
2017	Ava Pourkashani, Asadollah Shahbahrami, Babak Abad Fomani	“Copy Move Forgery Detection using Histogram Quantization of Cross Power Spectrum ”	International Conference on High Performance Computing & Simulation	“CPS”	Experimental results on some databases show that the performance of the proposed algorithm in terms of detection rate of forged parts and computational time is better than some other algorithms. Purposed technique is compared with many different existing technique i.e SURF, SIFT, SVD& DCT, Zenrik.	Computation time
2017	Mahale Vivek Hilal, Pravin Yannawar, Ashok T. Gaikwad	“Image Inconsistency Detection using Histogram of Orientated Gradient (HOG) ”	IEEE	“HOG”	This paper has two stages the first which is the training stage and the second which is the testing stage, the both stages is similar in process, different in matching stage The results are based on False Accept Rate (FAR) and False Reject Rate (FRR) with help of threshold value. The future of this work may be extending to compare with other techniques which improve the performance.	Retouching, Splicing
2017	Adam Novozamsky and Michal Sorel	“JPEG Compression Model in Copy-move Forgery Detection ”	IEEE	“POCS”	In this paper , authors propose a method to improve reliability of detecting copy-move forgery in JPEG images The proposed approach cannot be directly used with geometrical transforms like scale change or rotation.	Compression
2017	Yuan Wang, Lihua Tian, Chen Li	“LBP-SVD Based Copy Move Forgery Detection Algorithm ”	IEEE International Symposium on Multimedia	“LBP-SVD ”	The method works without any digital watermarks or signature information. Compared with the SVD based methods and LBP-DCT based methods in the literature, the method detects the copied and pasted regions with higher accuracy and has good performance on regular or non-regular copy move forgery operation, also has a good performance on multiple-region copy move forgery as well as the LBP-DCT method and has a higher	Copy paste

					accuracy even if the image has undergone some post processing operations.	
2017	Tarman and Hardeep Saini	“M-SIFT:A Detection Algorithm for Copy Move Image Forgery”	IEEE International Conference on Signal Processing Computing and Control	“ M-SIFT ”	Accuracy of the proposed system is calculated to as 92% which is better than that of existing algorithms. Proposed system can detect forgery if copied part is rotated at 180 degree while existing systems detect upto 40 degree.	Rotation, Resizing, Transformation
2017	Lal Upendra Pratap Singh , Anupam Agrawal	“NO-SHAM: An effective tool based on a novel hybrid approach to detect copy-move forgery in images”	IEEE Uttar Pradesh Section International Conference on Electrical, Computer and Electronics (UPCON) GLA University, Mathura.	“ SLIC and SIFT ”	Purposed software tool show more accuracy irrespective of whether the image is smooth or non-smooth strategy.	Geometric transformation
2017	Resmi M.R. and Vishnukumar S.	“A Novel Segmentation Based Copy-Move Forgery Detection in Digital Images ”	International Conference on Networks & Advances in Computational Technologies (NetACT)	“ Segmentation ”	The proposed method involves a double stage detection mechanism with a view to obtain better detection results.	Rotation
2017	Alaa Hilal, Taghreed Hamzeh, Samer Chantaf	“Copy-Move Forgery Detection using Principal Component Analysis and Discrete Cosine Transform ”	IEEE	“ PCA and DCT ”	The false accept rate has been decreased by the proposed method supporting its suitability for copy-move forgery detection.	Resize , Rotation
2017	Gul MXJDIH U , Guzin UOXWDú , Eyup GHGLNO L	“PSO and SURF based Digital Image Forgery Detection ”	IEEE International Conference on Computer Science and Engineering	“ PSO and SURF ”	The proposed method not only detects duplicated regions but also determines under rotation, scale changes and post processing operations like JPEG compression, blurring, noise adding applied to the forged images.	Gaussian noise, Blurring, Compression etc

2017	Gonapalli Ramu and S.B.G. Thilak Babu	“Image forgery detection for high resolution images using SIFT and RANSAC algorithm ”	International Conference on Communication and Electronics Systems	“ SIFT and RANSAC ”	Purposed technique is compared with existing techniques to show the higher performance rate of purposed method. The further work, we would like to implement the detection process with more recall rates and also with some other tampering techniques like splicing.	Geometric Transformation
2017	Gul MUZAFFER, Eda Sena KARAAGACLI, Guzin ULUTAS	“Recent Keypoint Based Copy Move Forgery Detection Techniques ”	IEEE	“ Different Passive techniques ”	In this paper, authors proposed a different CMFD passive techniques and Computed which method is better. Also described limitations and advantages of different techniques.	Geometric Transformation
2017	Mahmoud Emam, Qi Han, Qiong Li, Hongli Zhang, Mahmoud Emam	“A Robust Detection Algorithm for Image Copy-Move Forgery in Smooth Regions ”	International Conference on Circuits, System and Simulation	“ DoG and MROGH descriptor ”	In this paper, authors propose a key point-based method to detect region duplication forgery based on DoG operator and MROGH descriptor. Compared with state-of-the-art key point-based methods, the experimental results show the robustness of the proposed method against different manipulations such as plain, rotation, scaling and additive noise. In future, they will try to solve this problem by investigating some post processing techniques, to recover some mismatches and hence decrease the number of false negatives.	Rotation, Scaling, Adaptive Noise
2017	Remya Revi K and Dr. M Wilsy	“Scale Invariant Feature Transform based Copy-Move Forgery Detection Techniques on Electronic Images-A Survey”	IEEE International Conference on Power, Control, Signals and Instrumentation Engineering	“ SIFT ”	In this paper, author reviewed a SIFT method. They found out that some techniques are not responsive for geometric transformation such as scaling and rotating. Also it is seen that some methods which give accuracy but have high computational complexity	Rotation, blurring, scaling, additive noise
2017	Bhavya Bhanu M P and Dr.	“Copy-Move Forgery	International Conference on	“ segmentation ”	The proposed method reduces time required for forgery detection. The	Compression

	Arun Kumar MN	Detection Using Segmentation ”	Intelligent Systems and Control (ISCO)		method also reduces false positive rate.	
2017	Ranveer Singh and Ravi Prakash Chaturvedi	“SWT-SIFT based copy-move forgery detection of digital images ”		“ SWT With SIFT ”	This method 128 elements due to which comparatively makes it slower is based on SWT-SIFT and analysis of SIFT, SWT-SIFT, and SURF algorithm including its comparison is done. Since with this approach we can detect large number of key points this makes the matching by SWT-SIFT more accurate.	Scaling, Rotation, Compression
2017	Haodong Li, Student Member, IEEE, Weiqi Luo, Senior Member, IEEE, Xiaoqing Qiu, and Jiwu Huang.	“Image Forgery Localization via Integrating Tampering Possibility Maps ”	IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY	“ Statistical feature, Copy Move Forgery Detection ”	They employed and improved two forensic approaches in the proposed framework, i.e., statistical feature and copy-move based approaches, to deal with the commonly used tampering operations in practice. The performance of the employed approaches has been significantly improved by carefully selecting features, designing the training samples, and adjusting the algorithms and parameters. In order to design a new fusion strategy to integrate the tampering possibility maps, we have analyzed the distributions of values in tampering possibility maps for pristine and fake pixels, and worked out an effective decision curve.	Distortion
2018	Badal Soni, Debalina Biswas.	“Image Forensic using Block-based Copy-move Forgery Detection ”	International Conference on Signal Processing and Integrated Networks (SPIN)	“ SIFT , SURF , Harris Detector ”	In this paper, authors analyze many different techniques of block based according to their performance. They analyze that block based technique are only robust against geometric transformation.	Rotation and scaling
2018	Neema Antony and Binet Rose Devassy	“IMPLEMENTATION OF IMAGE/VIDEO COPY-MOVE	International Conference on Trends in Electronics and Informatics	“ brute-force matching ”	In this paper, author compares DWT, SIFT with purposed technique. As a future study, this proposed method can be applied to other types of forgery such as image/video	Computational time

		FORGERY DETECTION USING BRUTE-FORCE MATCHING			splicing, image/video enhancement.	
2018	Omar Ismae Al-Sanjary, Ahmed Abdullah , Hawar Bahzad Ahmad , Musab A. M Ali , M. N. Mohammed, Muhammad Irsyad Abdullah, Zurida Binti Ishak	“Deleting Object in Video Copy-Move Forgery Detection Based on Optical Flow Concept”	IEEE Conference on Systems, Process and Control	“Optical flow”	The suggested technique not only detects copied areas however also to get the optimal threshold values, the identification of the association among the minimum motion in each S2F frame and the clone object motion fake is essential. Investigational results established that the suggested method could even identify replicated areas, the discovery accuracy is independent to any threshold rate to expedite block corresponding stage.	Accuracy
2018	Mohammad Manzurul Islam1, Gour Karmakar1 , Joarder Kamruzzaman1, Manzur Murshed1, Gayan Kahandawal and Nahida Parvin	“Detecting Splicing and Copy-Move Attacks in Color Images”	IEEE	“DCT and LBP”	In this paper, author used combination of DCT, LBP and SVM to improve the performance of technique. The detection results show that the proposed method is superior to the existing methods across different well known publicly available benchmark datasets for image forgery detection.	Splicing
2018	Khushkaran kaur	"Efficient and Fast Copy Move Image Forgery Detection Technique "	International Conference on Intelligent Computing and Control Systems	“KPCA”	If the image block size is increase then the accuracy of image is decrease but in KPCA the accuracy is not change. Computation time will be tackle in future.	Computation time , accuracy
2018	Theja J Jayan and Sajith Sethu P	“Estimation Of Spliced Images In Photograp	International Conference on Trends in Electronics and	“Naïve Bayes classifier”	In this technique First, it detects all the faces present in the image by using Viola Jones algorithm. Then it is transformed to different	Splicing

		hs ”	Informatics		color spaces. Next illuminant map is obtained for different color spaces. Gray world estimation algorithm is used to obtain illuminant map. From the illuminant map we extract texture, color feature and also some of the image quality measures such as mean square error (MSE), peak signal to noise ratio (PSNR), signal to noise ratio (SNR), maximum difference (MD) and average difference (AD). Finally the Naive Bayes classifier is used to identify whether the image is real or fake	
2018	BEIJING CHEN, MING YU , QINGTAN G SU , HIUK JAE SHIMI , AND YUN-QING SHI	“Fractional Quaternion Zernike Moments for Robust Color Image Copy-Move Forgery Detection ”	IEEE	“fractional Zernike moments (FrZMs) and PatchMatch algorithm ”	The proposed FrQZMs-based algorithm is superior to some existing algorithms in o. The main reasons are as follows: (a) the FrQZMs feature considers color information and is also based on quaternions; (b) the FrQZMs feature considers both magnitude and phase information; (c) the improved PatchMatch algorithm is used to match the extracted FrQZMs feature.	Compression , rotation, scaling
2018	H M Shahriar Parvez,Hamid A. Jalab,Ala'a R. Al-Shamasneh ,Somayeh Sadeghi,Di aa M. Uliyan	“Copy-move Image Forgery Detection Based on Gabor Descriptors and K-Means Clustering ”	International Conference on Smart Computing and Electronic Enterprise.	“Gabor Descriptors and K-Means Clustering ”	Comparison of purposed with segmentation, surf and sift method to analyse the TPR and FPR. It is to believe that this proposed novel method would be beneficial to some extent in various areas of forensic science.	Compression, scaling, rotation
2018	Songpon TEERAK ANOK and Tetsutaro UEHARA	“Copy-move Forgery Detection using GLCM-based Rotation-invariant Feature: A Preliminar	IEEE International Conference on Computer Software & Applications	“GLCM-based Rotation-invariant Feature and SVM”	In this paper, author purposed GLCM method with SURF. In purposed method there is some threshold value which still need further analysis to improve accuracy for this purpose SVM is used.	Brightness, rotation invariants

		y Research”				
2018	Yuanman Li and Jiantao Zhou	“Fast and Effective Image Copy-Move Forgery Detection via Hierarchical Feature Point Matching”	IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY	“SIFT with COLOR information”	In this paper, author fully exploiting the robustness properties of the SIFT algorithm (including the dominant orientation and the scale information) and the color information of each key point, proposed technique achieves very high detection accuracy	Resizing
2018	Umair A. Khan , Mumtaz A. Kaloi , Zuhaib A. Shaikh , Adnan A. Arain	“A Hybrid Technique for Copy-Move Image Forgery Detection”	International Conference on Computer and Communication Systems	“SIFT, SURF, MSER, MinEigen, FAST and Harris”	In this paper, author use combination of existing algorithm SURF, SIFT, MSER, Harris, FAST and MinEigen. Proposed technique is further able to detect multiple instances of copy-move forgeries in a given image. In future, their aim to extend the scope of our proposed technique to detect other types of image forgeries such as splicing and geometry-based forgeries.	Accuracy, computational time
2018	Yong Yew Yeap, U. U. Sheikh, Ab Al-Hadi Ab Rahman	“Image Forensic for Digital Image Copy Move Forgery Detection”	IEEE International Colloquium on Signal Processing & its Applications (CSPA 2018)	“Oriented FAST and rotated BRIEF and 2NN”		
2018	Badal Soni, Pradip K. Das and Dalton Meitei Thounaojam	“Improved Block-based Technique using SURF and FAST Keypoints Matching for Copy-Move Attack Detection”	International Conference on Signal Processing and Integrated Networks (SPIN)	“SURF , FAST, SURF and 2NN”	In this paper, authors have proposed an improved block based copy-move attack detection technique using SURF and FAST features matching. The formation of the large block is contributes to the increase of the true positive rate of the proposed technique. The purposed technique is compared with SIFT to show the accuracy and performance is better than existing methods.	Rotation , scaling
2018	Nisha Fule and Vanita Mane	“Improved Matching Technique	International conference on Electronics,	“SIFT”	In this paper, author made comparison between purposed method with existing methods(DWT,	accuracy

		in Digital Image Region Duplication”	Communication and Aerospace Technology		DCT, PCA).And the performance of match rate and miss match rate is slightly efficient than existing methods.	
2018	Badal Soni , PradipK. Das , Dalton Meitei Thounaojam	“Keypoints based enhanced multiple copymove forgeries detection system using density-based spatial clustering of application with noise clustering algorithm”	IET Image Processing	“SIFT and 2NN”	It is clear that the proposed system is able to detect accurately multiple forgeries present in images with very few false points’ detection. In addition to that, the performance comparison of the proposed method with the eight existing methods shows that this proposed method outperformed the existing methods. It is also observed that very few papers have used soft computing techniques in CMFD. The decision-making phase is generally based on determining the values of decision parameters by experience or a result of experiments on a number of forged images.	Scaling , rotation
2018	Yue Wu, Wael Abd-Almageed, and Prem Natarajan	“Image Copy-Move Forgery Detection via an End-to-End Deep Neural Network”	IEEE Winter Conference on Applications of Computer Vision	“Deep Neural Network”	Compared to classic approaches composed of multiple stages with parameter tuning and training, this new approach is fully trainable. Due to this nature, all modules are optimized jointly for the forgery mask reconstruction loss. They also showed that this model can be trained with purely synthesized training data, while achieving much better performance than the classic methods. Drawbacks of the proposed DNN method 1) tends to predict “blob”-like regions; 2) makes mistakes in pure texture images; 3) sometimes erroneously predicts the genuine but visually similar regions as forged regions.	Accuracy
2018	Dr.T.Sridevi and , B.Ramya Krishna	“A Novel Approach for Detection of Copy-Move	International Conference on Inventive Communication and Computation	“SWT and SVD”	In this paper authors develop a forensic technique for blur invariant select-shift replica detection. An Electric point fixing is used to reduce the physical effect. SWT and	Blurring

		Forgery Detection using Transform Domain ”	al Technologies		SVD techniques are used which are robust in finding out the accuracy with 8-connected neighborhood checker.	
2018	Luca D’Amiano, Davide Cozzolino, Giovanni Poggi, and Luisa Verdoliva	“A PatchMatch-based Dense-field Algorithm for Video Copy-Move Detection and Localization”		“PatchMatch-based Dense-field Algorithm ”	In this paper, author made comparison purposed technique with existing technique (HoG) for showing which have better result against forgery. The proposed method cannot be used for real-time analysis or mass screening of video repositories. Therefore, there is much room for future research on tools that solve these problems, even at the price of reduced reliability	Performance, time
2018	Tianyang Du, Lihua Tian, Chen Li	“Image Copy-Move Forgery Detection based on SIFT-BRISK”	International Conference On Control Automation & Information Sciences (ICCAIS 2018)	“SIFT-BRISK”	Comparison of purposed method with existing methods (DCT, SIFT, SURF). proposed method performs a particularly higher robustness than the method in and Due to that we use the binary descriptor BRISK in our method, its low dimension and fast matching speed not only reduce the space complexity but also largely shorten the detection time for copy-move forgery.	Rotation, brightness, scaling
2019	Gul Muzaffer and Guzin Ulutas	“A new deep learning-based method to detection of copy-move forgery in digital images”	IEEE	“A new deep learning-based and AlexNet feature extractor”	Comparison of deep learning method with DCT and SIFT and the f -pixel value is greater than existing methods of purposed method.	Robust and performance
2019	G.Nirmala and K.K.Thyagarajan	“A Modern Approach for Image Forgery Detection using BRICH Clustering based on Normalised Mean	International Conference on Communication and Signal Processing	“BRICH Clustering based on Normalised Mean and Standard Deviation ”	The proposed method appears to provide the good performance which aids for clustering a group as forged based on adjustments made from the original one can be detected. This technique is also can used in computer vision and videos.	Scaling and rotation

		and Standard Deviation ”				
2019	SONGPO N TEERAK ANOK and , TETSUTA RO UEHARA	“Copy-move Forgery Detection: a State-of-the-Art Technical Review and Analysis”	IEEE	“DWT, SIFT,PCA , DoG, LoG, DCT, SWT etc.”	To the best of our knowledge, some stages in the proposed pipeline may currently have only a few associated techniques. However, plan to update and perform more surveys regarding this in the near future.	--

IV. CONCLUSION

- Copy move forgery type is most common forgery type used
- Key point forgery detection techniques are better than block based forgery detection techniques
- Non-blind algorithms give more accuracy as compared to blind image forgery detection algorithms
- Use of effective clustering may lead to improved image forgery detection
- It is clearly obvious that SIFT is significant because of its desired properties, which are Invariant to scale change, rotation change, illumination change. And they are robust to addition of noise, substantial range of affine transformation.

Kavita Rathi "Literature review of Image forgery detection techniques from 2015 to 2019" *International Journal of Engineering Research and Applications (IJERA)*, vol.10(01), 2020, pp 24-55.