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S.NO	TITLE	YEAR	ABSTRACT
1.	A Hierarchical Approach for Rain or Snow Removing in A Single Color Image	2017	In this paper, we propose an efficient algorithm to remove rain or snow from a single color image. Our algorithm takes advantage of two popular techniques employed in image processing, namely, image decomposition and dictionary learning. At first, a combination of rain/snow detection and a guided filter is used to decompose the input image into a complementary pair: (1) the low-frequency part that is free of rain or snow almost completely and (2) the high-frequency part that contains not only the rain/snow component but also some or even many details of the image. Then, we focus on the extraction of image's details from the high-frequency part. To this end, we design a 3-layer hierarchical scheme. In the first layer, an over-complete dictionary is trained and three classifications are carried out to classify the high-frequency part into rain/snow and no rain/ snow components in which some common characteristics of rain/snow have been utilized. In the second layer, another combination of rain/snow detection and guided filtering is performed on the rain/snow component obtained in the first layer. In the third layer, the sensitivity of variance across color channels (SVCC) is computed to enhance the visual quality of rain/snow-removed image. The effectiveness of our algorithm is verified through both subjective (the visual quality) and objective (through rendering rain/snow on some ground-truth images) approaches, which shows a superiority over several state-of-the-art works.

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2.	A Region-Wised Medium Transmission Based Image Dehazing Method	2017	Image dehazing is a technique to enhance the Images acquired in poor weather conditions, such as fog, haze, etc. Existing image dehazing methods are mainly based on dark channel prior. Since the dark channel is not reasonable for sky regions, sky segmentation and region wised medium transmission based image dehazing method is proposed in this paper. Firstly, sky regions are segmented by quad-tree splitting based feature pixels detection. Then, a medium transmission estimation method for sky regions is proposed based on color characteristic observation of sky regions. The medium transmission is then filtered by an edge preserving guided filter. Finally, based on the estimated medium transmission, the hazed images are restored. Experimental results demonstrate that the performance of the proposed method is better than that of existing methods. The restored image is more natural, especially in the sky regions.
3.	Accurate Shadow Detection From High-Resolution Satellite Images	2017	High-resolution satellite images contain a huge amount of information. Shadows in such images generate real problems in classifying and extracting the required information. Although signals recorded in shadow area are weak, it is still possible to recover them. Significant work is already done in shadow detection direction but, classifying shadow pixels from vegetation pixels correctly is still an issue as dark vegetation areas are still misclassified as shadow in some cases.

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			In this letter, a new image index is developed for shadow detection employing multiple bands. Shadow pixels are classified from the index histogram by an automatic threshold identification procedure. The whole approach is applied on different study areas and high accuracies are achieved (average of 97%). The linear correlation method is then applied to compensate the classified shadow pixels. Two standard approaches of shadow detection are then applied to the same study areas to validate the proposed approach. The results show that the proposed approach achieves the best results. It also gives robust shadow detection results in classifying shadow from vegetation pixels comparable to the other two considered standard approaches.
4.	Affine Non-local Means Image Denoising	2017	This work presents an extension of the Non-Local Means Denoising method, that effectively exploits the affine invariant self-similarities present in images of real scenes. Our method provides a better image Denoising result by grounding on the fact that in many occasions similar patches exist in the image but have undergone a transformation. The proposal uses an affine invariant patch similarity measure that performs an appropriate patch comparison by automatically and intrinsically adapting the size and shape of the patches. As a result, more similar patches are found and appropriately used. We show that this image Denoising method achieves top-tier performance in terms of PSNR, outperforming consistently the results of the regular Non-Local Means, and that it provides

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			state-of-the-art qualitative results.
5.	An Image-Based Approach to Detection of Fake Coins	2017	We propose a new approach to detect fake coins Using their images in this paper. A coin image is represented in the dissimilarity space, which is a vector space constructed by comparing the image with a set of prototypes. Each dimension Measures the dissimilarity between the image under consideration and a prototype. In order to obtain the dissimilarity between two coin images, the local keypoints on each image are detected and described. Based on the characteristics of the coin, the matched keypoints between the two images can be identified in an ancient manner. A post processing procedure is further proposed to remove mismatched key points. Due to the limited number of fake coins in real life, one-class learning is conducted for fake coin detection, so only genuine coins are needed to train the classifier. Extensive experiments have been carried out to evaluate the proposed approach on different datasets. The impressive results have demonstrated its validity and effectiveness.
6.	Automatic Detection of Red Light Running Using Vehicular Cameras	2017	The red traffic light running is a very common Traffic violation. Nowadays, vehicles running red traffic lights are detected by sensors fixed on the streets. However a very small percentage of all traffic lights are equipped with such sensors. For This reason, this work proposes a red light runner detection to be performed by a system that consists of a camera and a

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			computer embedded in the vehicle. An algorithm is also proposed to process the recorded videos and a prototype was implemented. The prototype's goal is to monitor work vehicles without any intervention in driving, acting only in as an educational tool. Tests are performed with video recorded in the streets of Belo Horizonte during the day and with a benchmark video using the implemented Prototype. The results are compared based on the execution time and accuracy. The video processing took less one tenth of the video duration and the accuracy was about 95.8%.
7.	Change Detection Based on Gabor Wavelet Features for Very High Resolution Remote Sensing Images	2017	In this letter, we propose a change detection method based on Gabor wavelet features for very high resolution (VHR) remote sensing images. First, Gabor wavelet features are extracted from two temporal VHR images to obtain spatial and contextual information. Then, the Gabor-wavelet based difference measure (GWDM) is designed to generate the difference image. In GWDM, a new local similarity measure is defined, in which the Markov random field neighborhood system is incorporated to obtain a local relationship, and the coefficient of variation method is applied to discriminate contributions from different features. Finally, the fuzzy c-means cluster algorithm is employed to obtain the final change map. Experiments employing Quick Bird and SPOT5 images demonstrate the effectiveness of the proposed approach.

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8.	Con-Text: Text Detection for Fine-grained Object Classification	2017	This work focuses on fine-grained object classification using recognized scene text in natural images. While the state-of-the-art relies on visual cues only, this paper is the first work which proposes to combine textual and visual cues. Another novelty is the textual cue extraction. Unlike the state-of-the art text detection methods, we focus more on the background instead of text regions. Once text regions are detected, they are further processed by two methods to perform text recognition i.e. ABBYY commercial OCR engine and a state-of-the-art character recognition algorithm. Then, to perform textual cue encoding, biand trigrams are formed between the recognized characters by considering the proposed spatial pairwise constraints. Finally, extracted visual and textual cues are combined for fine-grained classification. The proposed method is validated on four publicly available datasets: ICDAR03, ICDAR13, *Con-Text* and *Flickr-logo*. We improve the state-of-the-art end-to-end character recognition by a large margin of 15% on ICDAR03. We show that textual cues are useful in addition to visual cues for fine-grained classification. We show that textual cues are also useful for logo retrieval. Adding textual cues outperforms visual- and textual-only in fine-grained classification (70.7% to 60.3%) and logo retrieval (57.4% to 54.8%).
9.	Dual Deep Network for Visual Tracking	2017	Visual tracking addresses the problem of identifying and localizing an unknown target in a video given the target specified by a bounding box in the first frame. In this paper, we propose a

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			dual network to better utilize features among layers for visual tracking. It is observed that features in higher layers encode semantic context while its counterparts in lower layers are sensitive to discriminative appearance. Thus we exploit the hierarchical features in different layers of a deep model and design a dual structure to obtain better feature representation From various streams, which is rarely investigated in previous work? To highlight geometric contours of the target, we integrate the hierarchical feature maps with an edge detector as the coarse prior maps to further embed local details around the target. To leverage the robustness of our dual network, we train it with random patches measuring the similarities between the network activation and target appearance, which serves as a regularization to enforce the dual network to focus on target object. The proposed dual network is updated online in a unique manner based on the observation that the target being tracked in consecutive frames should share more similar feature representations than those in the surrounding background. It is also found that for a target object, the prior maps can help further enhance performance by passing message into the output maps of the dual network. Therefore, an independent component analysis with reference algorithm (ICA-R) is employed to extract target context using prior maps as guidance. Online tracking is conducted by maximizing the posterior estimate on the final maps with stochastic and periodic update.

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			Quantitative and qualitative evaluations on two large-scale benchmark data sets show that the proposed algorithm performs favourably against the state of- the-arts.
10.	Fast unsupervised Bayesian image segmentation with adaptive spatial regularization	2017	This paper presents a new Bayesian estimation technique for hidden Potts-Markov random fields with unknown regularization parameters, with application to fast unsupervised K-class image segmentation. The technique is derived by first removing the regularisation parameter from the Bayesian model by marginalisation, followed by a small-variance-asymptotic (SVA) analysis in which the spatial regularisation and the integer-constrained terms of the Potts model are decoupled. The evaluation of this SVA Bayesian estimator is then relaxed into a problem that can be computed efficiently by iteratively solving a convex total-variation Denoising problem and a least-squares clustering (K-means) problem, both of which can be solved straightforwardly, even in high-dimensions, and with parallel computing techniques. This leads to a fast fully unsupervised Bayesian image segmentation methodology in which the strength of the spatial regularisation is adapted automatically to the observed image during the inference procedure, and that can be easily applied in large 2D and 3D scenarios or in applications requiring low computing times. Experimental results on synthetic and real images, as well as extensive comparisons with state-of the- art algorithms, confirm that the proposed methodology offer extremely fast convergence and produces accurate segmentation results, with the important

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			additional advantage of self-adjusting regularisation parameters..
11.	Image Forgery Localization via Integrating Tampering Possibility Maps	2017	Over the past decade, many efforts have been made in passive image forensics. Although it is able to detect tampered images at high accuracies based on some carefully designed mechanisms, localization of the tampered regions in a fake image still presents many challenges, especially when the type of tampering operation is unknown. Some researchers have realized that it is necessary to integrate different forensic approaches in order to obtain better localization performance. However, several important issues have not been comprehensively studied, for example, how to select and improve/readjust proper forensic approaches, and how to fuse the detection results of different forensic approaches to obtain good localization results. In this paper, we propose a framework to improve the performance of forgery localization via integrating tampering possibility maps. In the proposed framework, we first select and improve two existing forensic approaches, i.e., statistical feature based detector And copy-move forgery detector, and then adjust their results to obtain tampering possibility maps. After investigating the properties of possibility maps and comparing various fusion Schemes, we finally propose a simple yet very effective strategy to integrate the tampering possibility maps to obtain the final localization results. The extensive experiments show that the Two improved approaches used in our framework significantly outperform the state-of-

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			the-art techniques, and the proposed fusion results achieve the best **F1**-score in the IEEE IFS-TC Image Forensics Challenge.
12.	Inshore Ship Detection in Remote Sensing Images via Weighted Pose Voting	2017	Inshore ship detection from high-resolution satellite images is a useful yet challenging task in remote surveillance and military reconnaissance. It is difficult to detect the inshore ships with high precision because various interferences are present in the harbor scene. An inshore ship detection method based on the weighted voting and rotation–scale-invariant pose is proposed to improve the detection performance. The proposed method defines the rotation angle pose and the scaling factor of the detected ship to detect the ship with different directions and different sizes. For each pixel on the ship template, the possible poses of a detection window are estimated according to all possible pose-related pixels. To improve robustness to the shape-similar distractor and various interferences, the score of the detection window is obtained by designing a pose weighted voting method. Moreover, the values of some parameters such as similarity threshold and the weight of "V" are investigated. The experimental results on actual satellite images demonstrate that the proposed method is invariant to rotation and scale and robust in the inshore ship detection. In addition, better detection performance is observed in comparison with the existing inshore ship detection algorithms in terms of precision rate and recall rate. The target pose of the detected ship can also be obtained as a byproduct of the ship detection.

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13.	Integrated Localization and Recognition for Inshore Ships in Large Scene Remote Sensing Images	2017	Automatic inshore ship recognition, which includes target localization and type recognition, is an important and challenging task. However, existing ship recognition methods mainly focus on the classification of ship samples or clips. These methods rely deeply on the detection algorithm to complete localization and recognition in large scene images. In this letter, we present an integrated framework to automatically locate and recognize inshore ships in large scene satellite images. Different from traditional object recognition methods using two steps of detection–classification, the proposed framework could locate inshore ships and identify types without the detection step. Considering ship size is a useful feature, a novel multimodel method is proposed to utilize this feature. And an Euclidean distance- based fusion strategy is used to combine candidates given by models. This fusion strategy could effectively separate side-by-side ships. To handle large scene images efficiently, scale invariant feature transform registration is also integrated into the Framework to utilize geographic information. All of these make the framework an end-to-end fashion which could automatically recognize inshore ships in large scene satellite images. Experiments on Quick bird images show that this framework could achieve the actual applied requirements.
14.	Leave-one-out Kernel Optimization for	2017	The objective of this work is to detect shadows in images. We pose this as the problem of labeling image regions, where each region corresponds to a group of super pixels. To

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	Shadow Detection and Removal		predict the label of each region, we train a kernel Least-Squares Support Vector Machine(LSSVM) for separating shadow and non-shadow regions. The parameters of the kernel and the classifier are jointly learned to minimize the leave-one-out cross validation error. Optimizing the leave-one-out cross validation error is typically difficult, but it can be done efficiently in our framework. Experiments on two challenging shadow datasets, UCF and UIUC, show that our region classifier outperforms more complex methods. We further enhance the performance of the region classifier by embedding it in a Markov Random Field(MRF) framework and adding pairwise contextual cues. This leads to a method that outperforms the state-of-the-art for shadow detection. In addition we propose a new method for shadow removal based on region relighting. For each shadow region we use a trained classifier to identify a neighboring lit region of the same material. Given a pair of lit-shadow regions we perform a region relighting transformation based on histogram matching of luminance values between the shadow region and the lit region. Once a shadow is detected, we demonstrate that our shadow removal approach produces results that outperform the state of the art by evaluating our method using a publicly available benchmark dataset
15.	Riesz Fractional Based Model for Enhancing License	2017	One of the major causes of poor results in License plate recognition is low quality of images affected by multiple factors, such as severe illumination condition, complex

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	Plate Detection and Recognition		background, different weather conditions, night light, and perspective distortions. In this paper, we propose a new mathematical model based on Riesz fractional operator for enhancing details of edge information in License plate images to improve the performances of text detection and recognition methods. The proposed model performs convolution operation of Riesz fractional derivative over each input image by enhancing the edge strength in it. To test the performance of the proposed model, we conduct experiments on benchmark license plate image databases, namely, UCSD and ICDAR 2015-SR competition text image databases. Experimental results on enhancement show that the proposed model outperforms the existing baseline enhancement techniques in terms of quality measures. Further, experimental results on text detection and recognition show that text detection and recognition rates are improved significantly after enhancement compared to before enhancement.