CODE	TITLE	APPLICATION / DESCRIPTION
VTIMP01	3D-FLARE: A Touchless Full-3D Fingerprint Recognition System Based on Laser Sensing	<b>Application:</b> Digital Security System <b>Description:</b> We explore and evaluate the feasibility to move from current technology operating on 2D images of elastically deformed impressions of the ridge pattern, to a new generation of systems based on full-3D models of the natural non-deformed ridge pattern itself.
VTIMP02	SecureFace: Face Template Protection	<b>Application:</b> Digital Security System, Neural Networks <b>Description:</b> We propose a randomized CNN to generate protected face biometric templates given the input face image and a user-specific key. The use of user-specific keys introduces randomness to the secure template and hence strengthens the template security.
VTIMP03	Soft Semantic Representation for Cross-Domain Face Recognition	<b>Application:</b> Image Recognition, Neural Networks <b>Description:</b> We propose an effective algorithm for cross-domain face recognition by exploiting semantic information integrated with deep Convolutional Neural Networks (CNN). We first introduce a soft face parsing algorithm where the boundaries of facial components are measured as probabilistic values.
VTIMP04	A State-of-the-Art Survey on Deep Learning Methods for Detection of Architectural Distortion from Digital Mammography	<b>Application:</b> Medical Image Processing, Neural Networks <b>Description:</b> Convolutional neural network, CNN, breast cancer, deep learning, Gabor filters, mammography.
VTIMP05	An Efficient Bar/QR Code Recognition System for Consumer Service Applications	<b>Application:</b> Consumer Application, Product Identification <b>Description:</b> This paper presents a new method for Bar code and QR code recognition. The method involves the graying operation on images acquired, filtering, binarization, data recognition and decoding of the code.
VTIMP06	Band Reducing Based SVM Classification Method in Hyperspectral Image Processing	<b>Application:</b> Image Enhancement <b>Description:</b> In the proposed method, first the Hyperspectral Dataset is normalized and pixel values are adjusted between 0 and 255. A 3x3 Median filter and 5x5 Mean filter are applied. Features are extracted by taking the average of 5, 25 and 125 consecutive bands on the Hyperspectral bands. The final feature matric is obtained by combining the features obtained
VTIMP07	Detecting Keratoconus from Corneal Imaging Data using Machine Learning	<b>Application:</b> Medical Image Processing <b>Description:</b> The aim of this study is to develop and test a machine learning algorithm that can detect keratoconus at early stages. We applied several machine learning algorithms to detect keratoconus and then tested the algorithms using real world medical data, including corneal topography, elevation, and pachymetry parameters collected from OCT-based topography instruments from several corneal clinics
VTIMP08	On the Security of Reversible Data Hiding in Encrypted Images by MSB Prediction	<b>Application:</b> Data Security, Image Stegnography <b>Description:</b> The reversible data hiding in encrypted images by MSB prediction not only provides high embedding bit-rates, but also entails a very low mathematical complexity. This correspondence investigates its security and shows flaws in embedding imperceptibility, unauthorized detection/removal of embedded data and unauthorized access to image content.
VTIMP09	Collaborative Filtering of Correlated Noise: Exact Transform-Domain Variance for Improved Shrinkage and Patch Matching	<b>Application:</b> Image Enhancement <b>Description:</b> We discuss the adoption of the exact noise power spectrum within shrinkage, in similarity testing (patch matching), and in aggregation. We also introduce effective approximations of the spectrum for faster computation



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CODE	TITLE	APPLICATION / DESCRIPTION
VTIMP10	Fingerprint Spoof Detector Generalization	<b>Application:</b> Digital Security System <b>Description:</b> We present a style-transfer based wrapper, called Universal Material Generator (UMG), to improve the generalization performance of any fingerprint spoof (presentation attack) detector against spoofs made from materials not seen during training.
VTIMP11	Image Restoration via Simultaneous Nonlocal Self-Similarity Priors	<b>Application:</b> Image Restoration <b>Description:</b> We propose a novel approach for image restoration by simultaneously considering internal and external non-local self-similarity (SNSS) priors that offer mutually complementary information. Specifically, we first group nonlocal similar patches from images of a training corpus. Then a group based Gaussian mixture model (GMM) learning algorithm is applied to learn an external NSS prior.
VTIMP12	Learning Salient Segments for Speech Emotion Recognition using Attentive Temporal Pooling	<b>Application:</b> Speech Emotion Recognition, Neural Network <b>Description:</b> By introducing an attentive temporal pooling module into the deep neural network (DNN) architecture, we present a simple but effective speech emotion recognition (SER) framework, which is able to automatically highlight the emotionally salient segments while suppressing the influence of less relevant ones.
VTIMP13	Multiscale Cloud Detection in Remote Sensing Images Using a Dual Convolutional Neural Network	<b>Application:</b> Image Remote Sensing, Neural Network, Machine Learning <b>Description:</b> We propose an architecture of two cascaded CNN model components successively processing under sampled and full-resolution images. The first component distinguishes between patches in the inner cloud area from patches at the cloud's boundary region. For the cloud-ambiguous edge patches requiring further segmentation, the framework then delegates computation to a fine-grained model component.
VTIMP14	Multi-Scale Deep Representation Aggregation for Vein Recognition	<b>Application:</b> Medical Image Processing, Neural Network <b>Description:</b> We propose a novel Multi-Scale Deep Representation Aggregation model based on a pre-trained DCNN for hand-dorsa vein recognition. The proposed method effectively enhances the robustness and feasibility of identity identification systems based on vein information
VTIMP15	Natural Steganography in JPEG Domain with a Linear Development Pipeline	Application: Digital Image Stegnography Description: This paper proposes an embedding mechanism to perform NS in the JPEG domain after linear developments by explicitly computing the correlations between DCT coefficients before quantization.
VTIMP16	Unsupervised Adversarial Domain Adaptation for Cross-domain Face Presentation Attack Detection	<b>Application:</b> Image Enhancement, Digital Image Security <b>Description:</b> We propose an unsupervised domain adaptation with disentangled representation (DR-UDA) approach to improve the generalization capability of PAD into new scenarios. DR-UDA consists of three modules, i.e., ML-Net, UDA-Net and DR-Net.
VTIMP17	A Siamese CNN for Image Steganalysis	<b>Application:</b> Image Stegnography, Neural Networks <b>Description:</b> We address this issue by exploring the possibility of exploiting a network for steganalyzing images of varying sizes without retraining its parameters.
VTIMP18	Spatial Domain Steganography Techniques and Neural Network based Steganalysis with Differential Storage	<b>Application:</b> Image Stegnography, Neural Networks <b>Description:</b> An algorithm is proposed which focuses on steganalysis of images classifying them as stego or cover using neural network. It compares the performance of neural network based on the different inputs to the neural network



CODE	TITLE	APPLICATION / DESCRIPTION
VTIMP19	Automated Detection and Classification of Oral Lesions Using Deep Learning for Early Detection of Oral Cancer	<b>Application:</b> Medical Image Processing, Neural Networks <b>Description:</b> In this paper computer vision based approaches were assessed for the automated detection of oral lesions for the early detection of oral cancer, these were image classification with Convolutional Neural Network is processed.
VTIMP20	Data Augmentation for Improving Proliferative Diabetic Retinopathy Detection in Eye Fundus Images	<b>Application:</b> Medical Image Processing, Neural Networks <b>Description:</b> In our proposed deep learning model is implemented to detect the different eye diseases like macular edema normal, glaucoma and healthy. The Convolutional Neural Networks (CNN) is one of the most famous deep learning algorithms and the most commonly used in image classification applications. The CNN algorithm receives an input image that passes through the layers to identify features and recognize the image, and then it produces the classification result.
VTIMP21	A Novel Deep Learning Pipeline for Retinal Vessel Detection in Fluorescein Angiography	<b>Application:</b> Medical Image Processing, Neural Networks <b>Description:</b> We propose a novel pipeline that enables accurate vessel detection in FA images using DNN's by significantly reducing manual annotation effort.
VTIMP22	Alzheimer's Diseases Detection by Using Deep Learning Algorithms: A Mini-Review	<b>Application:</b> Medical Image Processing, Neural Networks <b>Description:</b> In this paper we propose a new segmentation method which is used region masking for selecting the useful properties of affected parts in the human brain for improving the accuracy of diagnosis for AD. In the proposed method, the accuracy of classification can be improved by deep learning Network classifier, are selected by using region masking. Furthermore, the Convolutional Neural Network classifier is used for the diagnosis of AD.
VTIMP23	Convective Clouds Extraction from Himawari–8 Satellite Images Based on Double-Stream Fully Convolutional Networks	<b>Application:</b> Image Enhancement, CNN <b>Description:</b> We proposed a discriminative transfer learning framework for general image restoration. By combining advanced proximal optimization algorithms and discriminative learning techniques, a single training process leads to a transferable model useful for a variety of image restoration tasks and problem conditions.
VTIMP24	A Fast Single-Image Dehazing Algorithm Based on Dark Channel Prior and Rayleigh Scattering	<b>Application:</b> Image Enhancement, CNN <b>Description:</b> We propose a deep CNN model that embodies regional detection on single hazy image. In this structure, haze-relevant feature maps are learned by a stack of convolutional layers, on top of which we append a regression model to predict the medium transmission for each local representation associated with a certain region on the original hazy image.
VTIMP25	Fast Single Image Defogging with Robust Sky Detection	<b>Application:</b> Image Enhancement <b>Description:</b> This paper presents a DCP based image defogging method with improved transmission map to avoid blocking artifacts. The transmission maps are computed for RGB color spaces. After that the haze removed image is divided into three transmission maps called R, G, and B channels are separated utilized to compute an enhancement process. After the separation to computes the enhancement process for these three-color maps separately. Finally combine all these three enhanced color maps and computes the final enhancement.
VTIMP26	A Novel Framework for Classifying Leather Surface Defects Based on a Parameter Optimized Residual Network	<b>Application:</b> Machine Learning <b>Description:</b> We introduce an automated machine-based system which consists of an image grabbing mechanism and an inspection method for detecting and classifying leather fabric into two type's weather it is good or bad. The proposed inspection method treats errors like scratches and pinholes and etc.
VTIMP27	A Face Spoofing Detection Method Based on Domain Adaptation and Lossless Size Adaptation	<b>Application:</b> Machine Learning <b>Description:</b> Here Texture descriptors originally designed for gray-scale images can be applied on colour images by combining the features extracted from different colour channels. Colour texture of the face images is analyzed using three descriptors: Local Binary Patterns (LBP), Co-occurrence of Adjacent Local Binary Patterns (CoALBP), Local Phase Quantization (LPQ) have shown to be effective in gray-scale texture-based face anti-spoofing.

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CODE	TITLE	APPLICATION / DESCRIPTION
VTIMP28	Multiscale and Adversarial Learning- Based Semi-Supervised Semantic Segmentation Approach for Crack Detection in Concrete Structures	<b>Application:</b> Image Segmentation, CNN <b>Description:</b> The proposed a crack detection algorithm using convolutional neural network. The algorithm can extract cracks effectively. Determined crack edges according to the grayscale difference between the crack and background algorithm, we extracted the skeleton line and connected the broken part on an image of an oblique crack.
VTIMP29	Patch-Driven Tongue Image Segmentation Using Sparse Representation	<b>Application:</b> Image Segmentation <b>Description:</b> A patch-driven segmentation method with sparse representation is proposed. Specifically, each patch in the testing image is sparsely represented by patches in the spatially varying dictionary, which is constructed by the local patches of training images. The derived sparse coefficients are then employed to estimate the tongue probability. Finally, the hard segmentation is obtained by applying the maximum a posteriori (MAP) rule on the tongue probability map and further polished with morphological operations.
VTIMP30	Data Augmentation for Improving Proliferative Diabetic Retinopathy Detection in Eye Fundus Images	<b>Application:</b> Image Segmentation, CNN <b>Description:</b> We propose, a new CNN layer creation and training-based method to detect the diseases. The adaptive thresholding algorithm takes original fundus images and their corresponding, manually extracted, region for generation of a supervised training feature vector
VTIMP31	Investigation of dairy cow performance in different udder health groups defined based on a combination of somatic cell count and differential somatic cell count	<b>Application:</b> Image Segmentation <b>Description:</b> In the proposed system first we collect microscopic images of somatic cell images from the laboratory. After that we use some image processing techniques in MATLAB software in order to detect and count the somatic cells present in the microscopic images. For that we are using some image processing algorithms in order to recognize the somatic cells for identifying the milk quality.
VTIMP32	Focus First: Coarse-to-Fine Traffic Sign Detection with Stepwise Learning	Application: Image Segmentation, CNN Description: We proposed the traffic sign detection methods by using deep learning classification-based methods. The CNN (Convolutional Neural Network based TSD (Traffic Sign Detection) methods are reviewed according to their adopted advanced machine learning classification methods.
VTIMP33	Apple Bruise Grading Using Piecewise Nonlinear Curve Fitting for Hyperspectral Imaging Data	<b>Application:</b> Image Segmentation, CNN <b>Description:</b> A new method is implemented for fruit diseases identification and recognition in hyper spectral images. Three pipeline procedures are followed preprocessing, spot segmentation and classification. In the first step, the fruit disease spots are enhanced by a hybrid method which is the conjunction different preprocessing steps. After that, the lesion spots are segmented by segmentation. The segmented images are optimized and classified by Convolutional Neural Network.
VTIMP34	A New Payload Partition Strategy in Color Image Steganography	<b>Application:</b> Image Stegnography <b>Description:</b> We present a novel and different data embedding techniques made available for hiding the color images without changing the color format from RGB to any other formats. We give the different data in order to hide the input images in the form of watermarking image. After that we use this encrypted image data in the decryption side in order to get the output image.
VTIMP35	Out-of-distribution Detection for Reliable Face Recognition	<b>Application:</b> Image Biometrics, CNN <b>Description:</b> In this project we implemented for face detection and authentication using the Viola-Jones algorithm, creating our own database of faces and recognizing faces utilizing the CNN (Convolutional Neural Network) between the authorized and unauthorized images.
VTIMP36	Machine Learning Driven Approach Towards the Quality Assessment of Fresh Fruits Using Non-invasive Sensing	<b>Application:</b> Image Classification <b>Description:</b> This proposed automated system is designed to overcome the problems of manual techniques. The system consists of several steps like feature extraction, sorting and grading. Features like colour of fruit, shape of fruit and size of fruit are extracted through layers. And finally classified the fruit quality of the images.





IEEE 2020 - DIGITAL IMAGE PROCESSING

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MATLAB	8
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CODE	TITLE	APPLICATION / DESCRIPTION
VTCM01	Novel PAPR Reduction Scheme Based on Continuous Nonlinear Piecewise Companding Transform for OFDM Systems	<b>Application:</b> Power Reduction, OFDM <b>Description:</b> A novel efficient continuous piecewise nonlinear companding scheme is proposed for reducing the peak-to-average power ratio (PAPR) of orthogonal frequency division multiplexing (OFDM) systems.
VTCM02	Distributed Cooperative OFDM-IM System	<b>Application:</b> Orthogonal Frequency-Division Multiplexing (OFDM) <b>Description:</b> This paper considered a multi-relay distributed cooperative system in which not only the source communicates with the destination, but also the relays have communication requests with the destination
VTCM03	Multi-Tap Channel Estimation for Preamble-Based FBMC/OQAM Systems	<b>Application:</b> Quadrature Amplitude Modulation - OFDM <b>Description:</b> The intrinsic imaginary inter-carrier/inter-symbol interference in filter bank Multicarrier with offset quadrature amplitude modulation (FBMC/OQAM) systems makes accurate channel estimation
VTCM04	On the Achievable Max-Min Rates of Cooperative Power-Domain NOMA Systems	<b>Application:</b> NOMA, OFDM <b>Description:</b> The optimization of the achievable max-min rates for full- duplex cooperative NOMA (CNOMA) schemes for the two-user scenario are re-visited and is extended to the three-user scenario where novel expressions for the optimal user cooperation power are derived for both scenarios.
VTCM05	Rate Redundancy and Entropy Allocation for PAS-OFDM based Mobile Fronthaul	<b>Application:</b> Orthogonal Frequency-Division Multiplexing (OFDM) <b>Description:</b> We work with Maxwell-Boltzmann distributions and focus on CCDM algorithm for simplicity. We evaluate the received sensitivity of the entropy allocation in a millimeter-wave radio-over-fiber mobile fronthaul using 64/256QAM OFDM signals and the modified pre-FEC thresholds for conducting a fair comparison.
VTCM06	Sherman-Morrison Formula Aided Adaptive Channel Estimation for Underwater Visible Light Communication with Fractionally- Sampled OFDM	<b>Application:</b> Channel Estimation, Optical OFDM, VLC <b>Description:</b> We investigate the channel estimation (CE) problem in an underwater visible light communication (UVLC) system invoking fractionally-sampled optical orthogonal frequency division multiplexing (FS-OOFDM).
VTCM07	Best Relay Selection Schemes for NOMA Based Cognitive Relay Networks in Underlay Spectrum Sharing	<b>Application:</b> Decode-and-Forward, NOMA <b>Description:</b> This article studies the application of best relay selection (BRS) in downlink scenario of NCRNs in which a base station (BS) being unable to communicate directly with the far user U2 takes assistance from the near user U1 and from the best Decode-and-Forward (DF) relay selected from the potential NCRN operating in underlay environment.
VTCM08	Spectral and Energy Efficiency of Line-of-Sight OAM-MIMO Communication Systems	<b>Application:</b> MIMO, Multi Carrier Modulation <b>Description:</b> We investigate the SE and EE of a misaligned Uniform Concentric Circle Array (UCCA) based Multi-Carrier Multimode OAM and Multiple-Input Multiple-Output (MCMM-OAM-MIMO) system in the line-of sight (LoS) channel, in which two transceiver architectures implemented by radio frequency (RF) analog synthesis and baseband digital synthesis are considered.
VTCM09	A Power Domain Multiplexing Based Co-Carrier Transmission Method in Hybrid Satellite Communication Networks	<b>Application:</b> Hybrid Satellite Networks, Power Domain Multiplexing <b>Description:</b> In this paper, by deeply exploiting such a characteristic, we propose a power domain multiplexing-based co-carrier transmission method in a hybrid satellite network. Superposing a weak signal on a strong one, two signals are enabled to be transmitted on the same carrier with the bandwidth of the strong signal.



**IEEE 2020** - DIGITAL COMMUNICATION SYSTEMS

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MATLAB
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CODE	TITLE	APPLICATION / DESCRIPTION
VTCM10	Adaptive 2x2 MIMO Employed Wavelet-OFDM-Radio Over Fiber Transmission	<b>Application:</b> MIMO, OFDM, Radio Over Fibre <b>Description:</b> This work demonstrates a RF transmission system in S-band employing 2x2 MIMO-OFDM using orthogonal- and biorthogonal- wavelets with diverse phase shift keying modulation (PSK) schemes.
VTCM11	Modified SNR Gap Approximation for Resource Allocation in LDPC- Coded Multicarrier Systems	<b>Application:</b> LDPC codes, Channel Coding, Wireless Networks, OFDM <b>Description:</b> We show that the SNR gap approximation does not accurately model the relation between constellation size and required SNR in low-density parity-check (LDPC) coded multicarrier systems. We solve this problem by using a simple modification of the SNR gap approximation instead, which fully retains the analytical convenience of the former approximation.
VTCM12	The Performance Analysis of Downlink NOMA in LEO Satellite Communication System	Application: LEO Satellite Communication System, NOMA, Description: We investigate the performance analysis of downlink NOMA in dynamic low earth orbit (LEO) satellite communication system with Doppler shift considered. We combine NOMA and orthogonal frequency division multiplexing (OFDM) for better spectral efficiency
VTCM13	Space Division Multiple Access with Distributed User Grouping for Multi- User MIMO-VLC Systems	<b>Application:</b> Distributed user grouping (DUG), MIMO, Space Division Multiple Access (SDMA), Visible Light Communication (VLC) <b>Description:</b> By fully exploiting the spatial distributions of light-emitting diode (LED) transmitters in the ceiling and end users around the receiving plane, we propose a space division multiple access (SDMA) technique for indoor spatial multiplexing-based MIMO-VLC systems.
VTCM14	Preamble-Based MMSE Channel Estimation with Low Pilot Overhead in MIMO-FBMC Systems	<b>Application:</b> FBMC, MIMO, MMSE <b>Description:</b> We propose a novel preamble design with low overhead and present a minimum mean square error (MMSE) algorithm for the channel estimation, which can improve the system performance in harsh environments.
VTCM15	Demonstration of Non-Hermitian Symmetry (NHS) IFFT/FFT Size Efficient OFDM Non-Orthogonal Multiple Access (NOMA) for Visible Light Communication	<ul> <li>Application: Visible Light Communication (VLC), Non-Orthogonal Multiple Access (NOMA)</li> <li>Description: We propose and experimentally demonstrate a non-orthogonal multiple access (NOMA) visible light communication (VLC) system using non-Hermitian symmetry (NHS) inverse-fast-Fourier-transform (IFFT)/FFT size efficient (SE) orthogonal frequency division</li> </ul>

