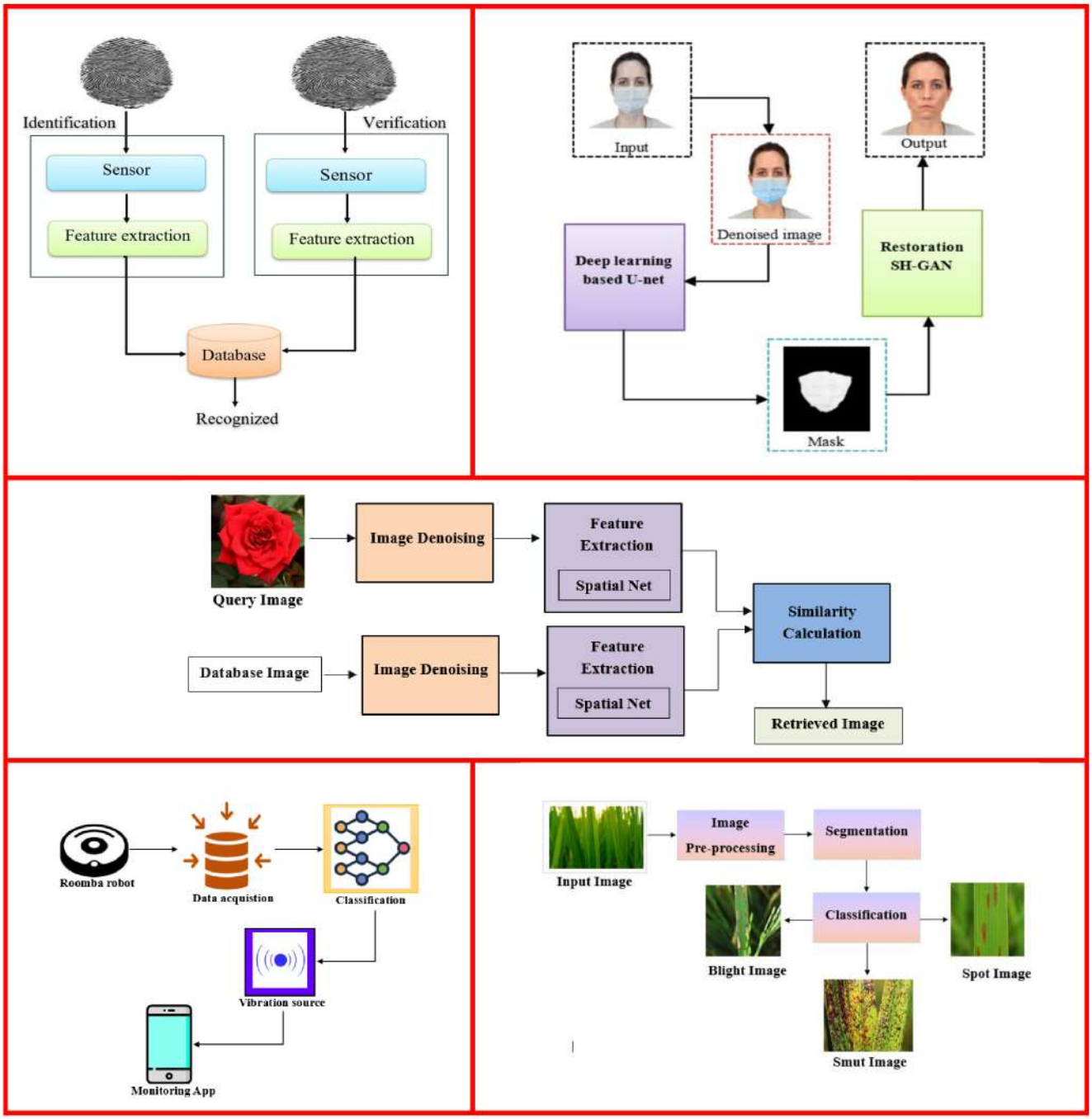
Volume 2, Issue 5, September – October (2024)

IJDSAI

ISSN: 2584-1041

International Journal of Data Science and Artificial Intelligence



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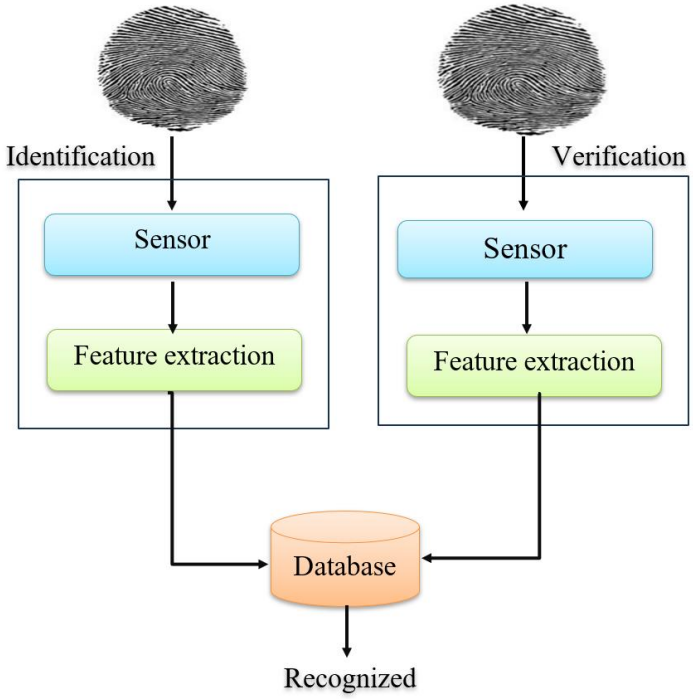
1. FINGERPRINT RECOGNITION AND AUTHENTICATION VIA ATROUS SPATIAL PYRAMID POOLING INFUSED MODULAR NEURAL NETWORK

Y. Sayed Abdhahir and C. Senthil Singh

Abstract – Fingerprint recognition is a vital biometric technology employed in various security systems due to its high reliability and uniqueness. This paper presents a novel FINGPRA-NET for fingerprint recognition system based on deep learning. The proposed fingerprint recognition algorithms that incorporate feature extraction, pattern matching, and deep learning techniques to enhance recognition accuracy and computational efficacy. Initially, the gathered images are denoised using Laplacian filter to highlight regions of fast intensity variation in an image, which is useful for detecting the edges. The atrous spatial pyramid pooling (ASSP) layer is integrated in deep learning based modular neural network to enhance the performance and generalization capabilities of the model. This combination leverages the strengths of both ASPP (for capturing context at multiple scales) and MNN (for specialized detection tasks), resulting in improving the accuracy in fingerprint recognition. Coyote Optimization Algorithm (COA) is used to find the best correspondences between minutiae points in different fingerprint images. The experimental fallouts prove that the proposed FINGPRA-NET method achieves an overall accuracy of 98.92% outperforming traditional methods. The high accuracy and low error



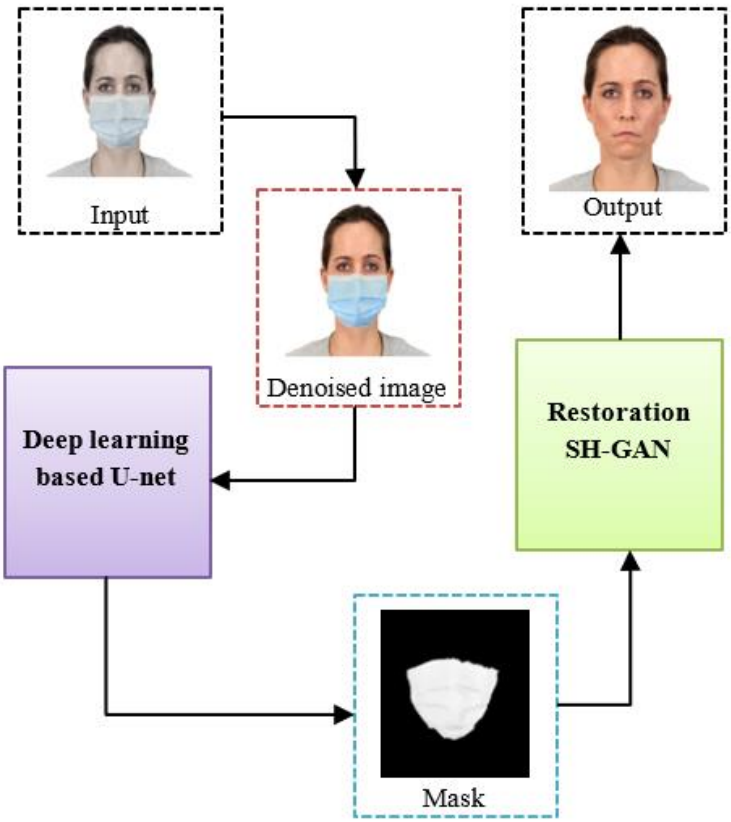
rates signify the model's effectiveness in distinguishing between authentic and non-authentic fingerprints.

Keywords – Fingerprint recognition, Deep learning, Modular neural networks, Biometrics, Coyote optimization, Security systems

2. FACE REGENERATION AND RECOGNITION USING DEEP LEARNING BASED SIFT-HOG ASSISTED GAN MODEL

C. John Clementsingh and S. Sumathi

Abstract – Face recognition is a vital aspect of computer vision and biometric technology, with applications ranging from security. It is the most critical research direction for identifying criminal activities. The problem of face detection under arbitrary occlusion has become a major concern for social security due to the use of surveillance systems to detect crimes. In complex environments, many researchers use ML-based tec hniques for face recognition, but there has been no satisfactory recognition accuracy for recognizing faces. In this paper, a novel deep learning-based SH-GAN is proposed for efficient regeneration and recognition of human faces. Initially, the masked face images are gathered from publicly available dataset and these images are pre-processed using bilateral filter to remove the noisy artifacts. Then, the noise-free images are fed in the DL-based U-net for segmenting the masked region to create overlaid images. The segmented mask and overlaid image are given as input to the SIFT integrated HOG based GAN for regenerating the facial images based on the ground truth. Additionally, in SH-GAN the regenerated images are identified as authorized and unauthorized (unknown) faces. The experimental results of the proposed model are assessed using specific metrics like accuracy, F1 score, dice index and jaccard index. From this analysis, the proposed SH-GAN attains the overall



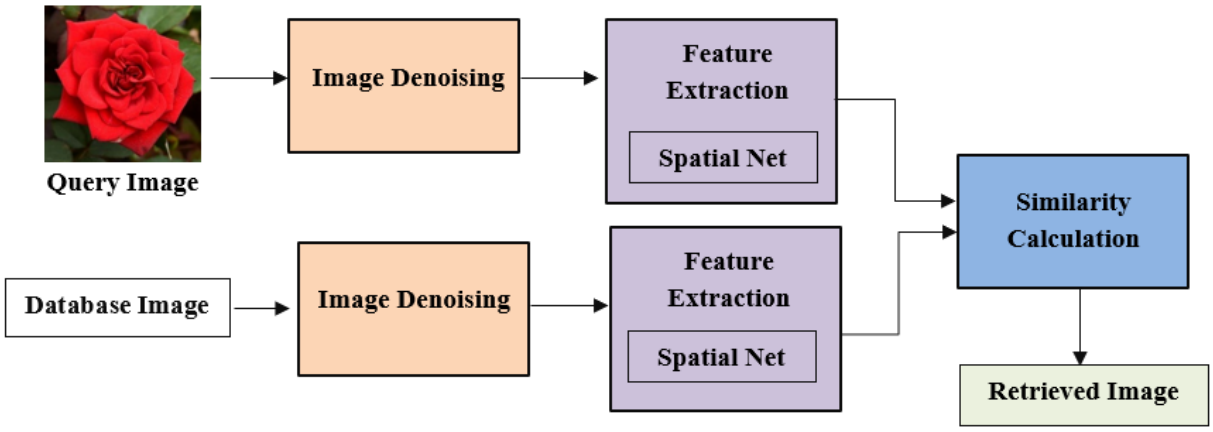
accuracy of 98.14% in the recognition of facial images. The proposed SH-GAN framework increases the overall accuracy of 3.99%, 7.94% and 27.17% for Face mesh model, MFNet and Haar Cascade technique respectively.

Keywords – Face recognition, Masked occlusion, Deep learning, SIFT, HOG Segmentation.

3. DEEP-FIR: DEEP LEARNING BASED BUTTERFLY OPTIMIZED REGRESSION NETWORK FOR FAST IMAGE RETRIEVAL

S. Caroline and Vemulapalli Sri Lakshmi Harshitha

Abstract – Image retrieval is a fundamental task in computer vision, aims to retrieve relevant images from large-scale databases based on user queries. However, the existing image retrieval systems are their susceptibility to inaccuracies when dealing with semantic gaps among low-level and high-level features leading to mismatches in retrieved results. This work proposes a novel Deep learning (DL) based DEEP-FIR approach to enhance image retrieval efficiency by integrating bio-inspired optimization and deep learning network. Initially, the input query images are pre-processed with weighted median filter to remove the noisy distortions. The proposed



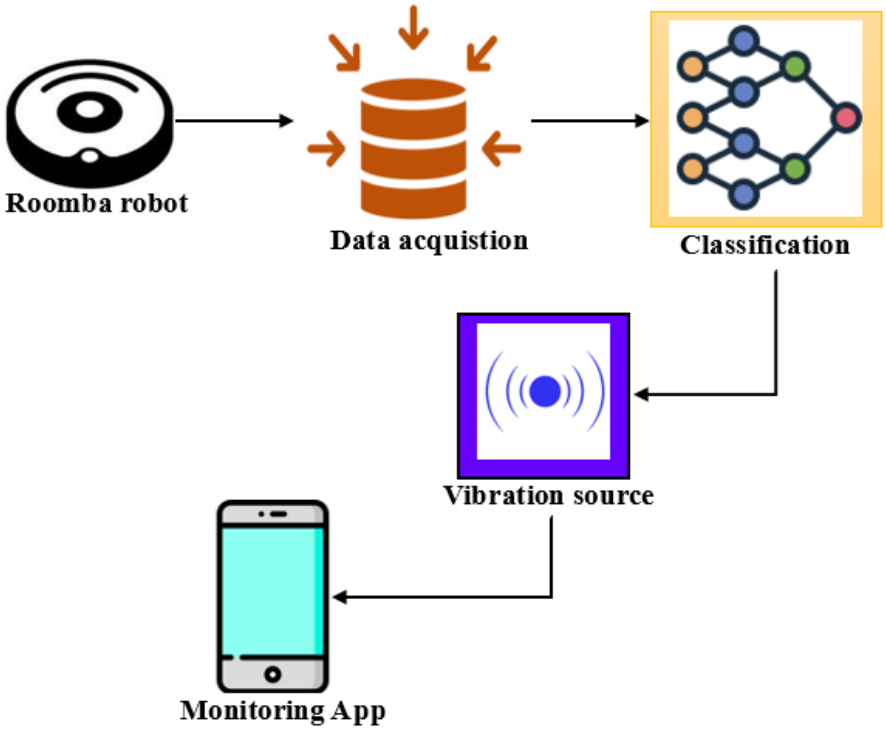
method employs an advanced DL-based Regression network that extracts the low-level features like colour and texture, with high-level semantic features. By fusing extracted features, the retrieval system is the leading to more accurate and discriminative representations of images. Additionally, butterfly mating optimization (BMO) algorithm is utilized for boosting performance by calculating comparison between query and database images to specific retrieval tasks. Experimental results on benchmark datasets establish the efficiency of the proposed DEEP-FIR approach with an overall accuracy of 97.8%. The proposed DEEP-FIR approach increases the overall accuracy of 3.16%, 2.35%, and 4.70% for DL-CNN, Multi-view and CBIR-CNN respectively.

Keywords – Image retrieval, Deep learning, Weighted median filter, Butterfly mating optimization, RegNet.

4. MASS ROBOT: PREDICTIVE MAINTENANCE USING STACKED CNN BI-LSTM FOR CLEANING ROBOTS

M. B. Asha Stebi and A. Ahilan

Abstract – The vibration of mobile cleaning robots can indicate performance degradation or operational safety issues. Therefore, it is crucial to identify the cause of vibrations at an early stage in order to prevent functional loss and hazardous working conditions. To overcome these drawbacks, a novel Maintenance using SCB-LSTM (MASS) Robot system has been proposed for enhanced maintenance planning and real-time fault detection in cleaning robots. Initially, vibration data is collected during the robot's operation. This data is processed through a Stacked Convolutional neural network Bi-directional Long Short-Term Memory (SCB-LSTM) model to identify specific sources of vibration. The information is then sent wirelessly to a remote monitoring application, allowing users to track the robot's condition in real-time and diagnose issues efficiently. The suggested MASS technique has been assessed using a MATLAB simulator. The efficacy of the suggested MASS approach has been evaluated by utilizing parameters such as F1-score, recall, accuracy and precision respectively. The proposed MASS method achieves better accuracy of 79.8%, 85.4%, and 88.1% than GPM [20], DBF [23], and KPM [25] methods.

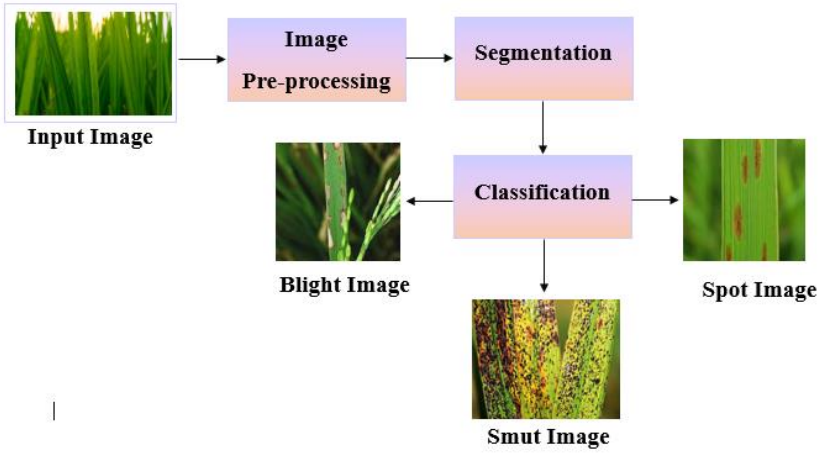


Keywords – Predictive maintenance, Real-time fault detection, Stacked CNN Bi-LSTM, remote monitoring.

5. SEGMENTATION AND CLASSIFICATION OF PADDY LEAF DISEASE VIA DEEP LEARNING NETWORKS

Santhiya Govindapillai and Radhakrishnan Ayyapazham

Abstract – Detection of paddy leaf disease is crucial for the agriculture industry since rice provides sustenance for over 50% of the global populace. In this paper, a novel YOLO-DBN framework has been proposed to identify the leaf diseases like blight, smut and spot in paddy crops. The paddy leaf images are pre-processed using CLAHE (Contrast Limited Adaptive Histogram Equalization) to increase the quality of the images. The pre-processed images are fed as input to YOLO Network to conduct instant segmentation of paddy leaves. The segmented images are fed as input to Deep Belief Network to classify the paddy leaves into blight, smut and spot diseases. The proposed YOLO-DBN achieves a high accuracy range of 97.68%, 96.71% and 98.76% for detecting Blight, smut and spot respectively. The proposed approach and the conventional deep learning techniques like DNN and Alex net. A clustering algorithm is utilized to segment the backdrop, normal section, and sick region. The proposed YOLO-DBN model improves the overall accuracy of 7.51%,1.18%, and 0.38 % better than CNN, DNN, Alex net respectively.



Keywords – Plant disease, segmentation, YOLO Network, Deep learning, Deep Belief Network.