ABSTRACT

In the areas of medicine and diagnostic imaging, artificial intelligence and machine learning have sped up the rate of evolution to an incredible speed. Recent years have seen a rise in the use of deep learning algorithms in the development of image-based clinical decision support systems. Overall, melanoma is the sixth most prevalent cancer in women and the fifth most common cancer in males. White people have a 20-fold higher risk of developing melanoma than black people have. In this innovative study, a convolutional neural network is used to distinguish melanoma pictures from baseline images. Images are gathered from a number of internet data sources, including Human Against Machine (HAM), Ph2 dataset, mednet, dermis, and dermnet dataset. Through the process of transfer learning, we investigated many pre-trained models, including Alexnet, VGG16, and VGG19 from the Visual Geometry Group. Models that have already been trained on melanoma images are employed for their binary categorization. Additional deep convolutional neural network architecture is developed for the sole purpose of input picture binary categorization.

The hyper parameters like learning rate, activation function, and batch normalization of the network are adjusted to improve the performance. The performance is analyzed in terms of sensitivity, specificity, accuracy, precision, recall, and F-score. Further, it is observed that the built architecture outperforms the pre-trained model. Melanoma is one of the perilous forms of skin cancer affecting the people word wide. The image-based analysis helps for the early diagnosis of skin cancer, leads to treatment at an early stage, which reduces the mortality rate. Images were collected from the ph2 dataset and also from human against machine dataset. Pre-processing of the image is done with the help of a weighted median filter, and segmentation is examined with different techniques, and the best result is obtained in the combination of watershed transform and maximal similarity region merging. Further, a novel approach based on the wavelet transform followed by the application of local

ternary pattern analysis is used for feature extraction. Histogram intersection, Bhattacharya distance, Chi-square distance and pearson correlation coefficients are calculated. In the present work, only Histogram intersection and Chi-square distance features are used. Further classification based on various machine learning techniques is explored, namely k- nearest neighbour classifier, Bayesian classifier, decision tree, and support vector machine. The highest classification accuracy is achieved in the case of a Support vector machine classifier with radial basis function as the kernel. Binary classification is alone explored in this paper. The obtained results outperform the various states of art techniques existing in the literature. A classification accuracy rate of 98.6% is achieved, and obtained sensitivity result is 98.8%, obtained specificity result is 98.7% respectively.