SUMMARY PAPER 3

Analysis of Artificial Intelligence based Image Classification Techniques

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INTRODUCTION

Artificial intelligences are given to a machine to work on its task independently without need of any manual guidance. All the necessary guidance and directions to be given to the machine or system are programmed once at the time of installation. Most of the existing automations requires a human guidance at regular interval to make up the operations. The artificial intelligence based systems are generally a one time programing automation system added with human intelligence to take decisions in critical circumstances. The proposed artificial intelligence based visual system makes an independent billing process for fruits by classifying it through a camera and an algorithm. The computer vision intelligence is enforced to a system by fixing a camera to produce a visual image which can be readable by an algorithm programmed in the system. The input scene can be any kind of image, which can be taken directly with a camera or scanner.The computer vision based diagnosing systems performs very fast and accurate. The diagnosis reports are helpful for surgical arrangement and post-surgical health estimation. An image classification technique for automobile air-conditioning leakage detection was proposed to identify the faulty portion in the circuit with the help of mean weight least square SVM algorithm. Labeling of images is an expensive work in the process of image classification. Labeling consumes more time and energy, but it is necessary to label the images for training process in classification techniques. A deep learning method was performed to classify the type of vehicles to be a part in intelligent traffic system. A traffic sign sensing technique was structured based on computer vision technique to develop a smart transport system. The technique is helpful in path pre-planning and safe driving of a vehicle when it is manual or autonomous. A combination of image processing and computer vision technique was implemented to predict the growth of a fruit in farming field. The growth stages are identified by changes in color of the fruit, and the changes are verified by analyzing the RGBD of an image.

Proposed Method

The proposed artificial intelligence based image classification technique performance is analyzed with several image classifiers for its better outcome. The proposed method classifies the fruit by detecting its color, shape and size. Figure 4 specifies an overview of the proposed classification system. Before carrying the images for classification, the proposed system improvise the visual rating of the images by preprocessing it. The image preprocessing of the proposed system consists of image resizing, gray scale conversion and edge detection for extracting its features in an efficient manner.

Results and Discussion

The classifiers performance are analyzed with the kaggle fruit image detection dataset in MATLAB platform with i7 processor of 8GB RAM. Table 1 specifies the confusion matrix for the SVM classifier. The performance of the classifiers are analyzed with 58 test images in combination of 18 apples, 17 bananas and 18 oranges along with that 5 numbers of mixed fruit images are given to the classifiers for detecting its specificity and negative predictive value. Table 2, 3 and 4 indicates the confusion matrix of KNN, RF and DA classifiers respectively. Table 5 point outs the performance metric analysis of the classifiers in terms of accuracy, sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV). The performance of specificity and NPV can be improved when the mixed category images are trained with the classifiers but at the same time the performance of KNN may also get increase among all the another classifiers.

Conclusion

The proposed artificial intelligence based image classification system suggests a preprocessing method with KNN classifier can classify the fruit images effectively than the other classifiers with accuracy of 93.103%. The proposed methodology can be merged with a weighing machine for faster billing process. The proposed algorithm has to be improved in specificity and NPV to meet the real time challenges and the mixed fruit evaluation has to be improved for real time performance evaluation. This can be achieved by training the network model with more number of mixed fruit images.