Fruit Recognition System using DRLBP & DRLTP Feature Extraction Based on Neural Network

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Abstract— Image processing technique is growing step by step in all fields and including the agriculture to classify fruits. Generally fruit recognition techniques which combine different analysis method like color -based, shape-based, size-based and texture-based. This paper presents the strong item recognition the usage of fruit and texture characteristic extraction. The Discriminative Robust Local binary pattern (DRLBP) and Discriminative Robust local ternary Pattern (DRLTP) has been used to recognize the fruits using it feature extraction technique. Probabilistic neural network (PNN) classifies the fruits by comparing shape, color, fruits name, and texture feature afford at the time of training. The evaluation is to execute and to identify the two database namely real time database and fake plastic fruit database.

Key words: Discriminative Robust Local binary pattern (DRLBP), Discriminative Robust Local ternary Pattern (DRLTP), Probabilistic neural network (PNN)

I. INTRODUCTION

Digital image processing has a wide scope of applications such as remote sensing, image and data storage for transmission in business applications, medical imaging, recognition field. Recognition system is an essential field of computer science concerned with recognizing pattern, particularly visual and sound patterns. It is central to optical character recognition, voice recognition and handwriting recognition. It uses methods from statistics, machine learning and other areas. In earlier years, a few kinds of image analysis technique are utilize to analyze the agricultural images such as fruits and vegitables, for recognition and classification purposes. Fruits are real wellspring of vitality, vitamins, fiber plant chemicals and supplements. So filling up on these fruit can help in weight reduction or wellbeing administration. On the off chance that we put a original fruit or plastic fruit before person then he/she unfit to anticipate the correct or close about original image by simply seeing at it or notwithstanding investigating it by hand. So to overcome this problem this paper proposes new technique in extension with neighbourhood binary sample and ternary sample referred to as Discriminative Robust Local binary pattern (DRLBP) and Discriminative Local Ternary Pattern (DRLTP). The discriminative robust nearby binary sample (DRLBP) is used for specific object texture and facet contour function extraction system. It is robust to illumination and evaluation variations because it most effective considers the signs of the pixel differences. The proposed capabilities preserve the contrast statistics of picture patterns. They contain both facet and texture facts which is suited for fruit recognition. The DRLBP discriminates an item like the fruit surface texture and the fruit shape shaped by means of its boundary. These features are useful to differentiate the most wide variety of samples correctly and it is matched with already stored photo samples for comparable category type. Neural network is classifer that classifies the output based on the input data provided in it at the time training. Probabilistic neural network (PNN) will classify and identify the type of fruit. This will allow the system to extract the features in an exclusive approach that will give the ability to identify the original/fake fruit.

A. Related Work:

The k-nearest neighbor algorithm is the methodology that has been used to develop the fruit recognition system. KNN Algorithm perform fruit classification by using the distance between the feature value of unknown fruit with the feature value of stored fruit examples after that algorithm will find out the nearest examples to unknown fruit.[1] An effective segmentation technique may greatly decrease computational complexity for the later stages of the pipeline, since it reduces the input data to only the significant regions that should be processed.[2] The edge features refers to the process of identifying and locating sharp discontinuities in the image. The discontinuities are abrupt changes in pixel intensity which characterize boundaries of the fruits in a scene. The gradient points in the direction of most rapid increase in intensity. The gradient magnitude is used as a measure of edge features.[3] Gabor filter extracts the local image features efficiently. On basis of these features binary face template is produced. The main advantage of using LBP is it is less sensitive to illumination variation, scaling and rotation. The LBP operator is generalized by allowing larger neighborhood radii r and different number of sampling points.[4] The fruit images are converted to HSV color space and the Statistical features such as Mean, Standard Deviation, Skewness and Kurtosis are derived from *H* and *S* components. Hence there will be 8 color statistical features for an image. The *V* component is subjected to one level decomposition using Discrete Wavelet Transform and the co-occurrence features such as contrast, energy, local homogeneity, cluster shade and cluster prominence are derived from the Co-occurrence matrix constructed from the approximation sub-band.[5]:

B. Motivation & Justification:

The digital image processing is getting increasingly significance now a days. The part of segmentation is pivotal in many undertakings requiring image analysis. Feature extraction can be therefore utilized as a contribution to various example pattern recognition and classification techniques, which will then arrange or perceive the semantic substance of the image or its objects. It can be executed in any application and with no issue because of its robustness, low complications and it hold differentiate data. Neural network enable solutions to be found to problems where

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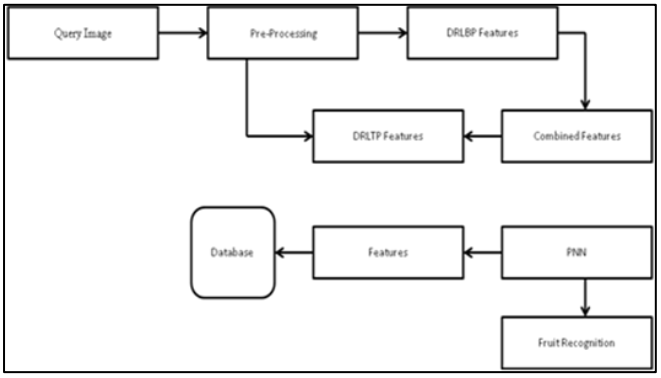
algorithmic methods are too computationally intensive to solve. The problem of feature extraction and classification seems to be a suitable application for neural nets. It offer significant speed advantages over conventional techniques. This inspire to work in neural network so, the work is to legitimize the fake fruits or an original fruits.

C. Outline of the Proposed Work



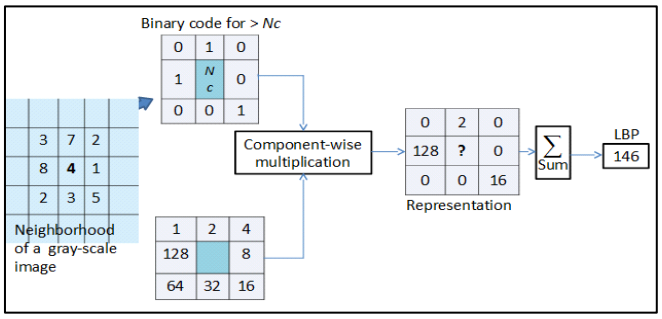
D. Organization of the Paper:

The paper is planned as follows, Methodology which includes Discriminative Robust Local binary pattern (DRLBP) and Discriminative Robust local ternary Pattern (DRLTP) is presented in section II, Experimental results are shown in section III,Conclusion is presented in section IV.

II. METHODOLOGY

A. Discriminative Robust Local binary pattern (LBP):

Local Binary Pattern (LBP) is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, LBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the LBP operator in real-world applications is its robustness to monotonic gray-scale changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyze images in challenging real-time settings. The basic idea for developing the LBP operator was that two-dimensional surface textures can be described by two complementary measures: local spatial patterns and gray scale contrast. The original LBP operator forms labels for the image pixels by thresholding the 3 x 3 neighborhood of each pixel with the center value and considering the result as a binary number. The histogram of these $2^8 = 256$ different labels can then be used as a texture descriptor. This operator used jointly with a simple local contrast measure provided very good performance in unsupervised texture segmentation. After this, many related approaches have been developed for texture and color texture segmentation.The LBP operator was extended to use neighborhoods of different sizes (Ojala et al. 2002). Using a circular neighborhood and bilinearly interpolating values at non-integer pixel coordinates allow any radius and number of pixels in the neighborhood. The gray scale variance of the local neighborhood can be used as the complementary contrast measure.



B. Discriminative Robust local ternary Pattern (DRLTP)

Local ternary patterns (LTP) are an extension of Local binary patterns (LBP). Unlike LBP, it does not threshold the pixels into 0 and 1, rather it uses a threshold constant to threshold pixels into three values. A novel edge-texture feature for recognition that provides discrimination which is Discriminative Robust Local Ternary Pattern which helps in discrimination of the local structures that Robust Local Ternary Pattern seems to misrepresent. Also, the proposed features tend to retain the contrast information of the image patterns. They comprises of both edge and texture information which seem desirable for object recognition. An object has two distinct states for differentiation from other objects - the object surface texture and the object shape formed by its boundary. The boundary often shows much higher contrast between the object and the background than the surface texture. Differentiating the boundary from the surface texture brings additional discriminatory information because the boundary contains the shape information. Local Ternary Pattern does not provide differentiation between a weak contrast local pattern and a strong contrast pattern.

C. Probabilistic Neural Network(PNN):

A probabilistic neural network (PNN) is predominantly a classifier. Map any input pattern to a number of classifications. It Can be forced into a more general function approximator. A PNN is an implementation of a statistical algorithm called kernel discriminant analysis in which the operations are organized into a multilayered feed forward network with four layers: input layer, Pattern layer, Summation layer, Output layer. Neural networks are a computational approach which is based on a large collection of neural units loosely modeling the way a biological brain solves problems with large clusters of biological neurons connected by axons. An artificial neuron network (ANN) is a computational model based on the structure and functions of biological neural networks. Information that flows through the network affects the structure of the ANN because a neural network changes - or learns, in a sense - based on that input and output. Neural networks typically consist of multiple layers or a cube design, and the signal path traverses from front to back. Back propagation is where the forward stimulation is used to reset weights on the "front" neural units and this is sometimes done in combination with training where the correct result is known. PNNs are much faster than multilayer perceptron networks. It can be more accurate than multilayer perceptron networks. Training samples can be added or removed without extensive retraining.

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D. Experimental Results

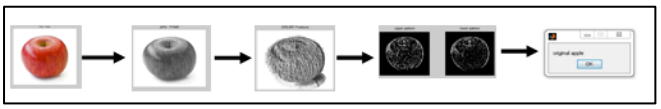

Fig. 1: Result of an Apple fruit

Fig. 2: Result of a plastic Mango fruit

III. CONCLUSION

The DRLBP and DRLTP feature extraction techniques and PNN classifier technique have been undertaken to recognized the fruits which is original and which in the fake fruit.

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