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Image Annotation Using Multi-Label Learning

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Abstract: ***Recently Ayurveda science is gaining more importance and popularity across the globe because of its amazing therapeutic values. In olden days man lived very close to nature and whenever he got indisposed he cured himself by the resources and materials provided by nature, which is nothing but the herbs. Unfortunately, due to lack of scientific validation in various concepts, this precious gift from our ancestors is trailing. Hence, evidence-based research is highly needed for global recognition and acceptance of Ayurveda, which needs further advancements in the research methodology. Image Annotation is the procedure by which computer system automatically assign data about it in the form of keywords to digital image. With the rapid progresses of information technologies, may work have been dedicated to applying the technologies of pattern recognition and image processing to object identification i.e. leaf identification in our project. The proposed system aims to describe, desired leaf identification base on shape. In our project we describe the development of an android application that gives user ability to identify the ayurvedic plant leaf base on photographs of desired leaf. The propose system is based on image annotation, where we shall apply pattern recognition and image processing on ayurvedic plants leaves.***

The proposed system then use to identity plant and shows its medical features by using capture image of plant leaves from android application. The project is useful for researchers who are working in ayurvedic field, farmers and also for community to spread awareness about surrounding ayurvedic plants.

Keywords: Image Annotation, Multi-label Dictionary Learning (MLDL), Hue Saturation Value (HSV), Scale-Invariant Feature Extraction (SIFT)

I. INTRODUCTION

Automatic image annotation is a key step towards based retrieval. The objective of image annotation is to automatically annotate image with appropriate keywords i.e. labels which reflect visual content in the images. The increasing the number of images in social network and on the sharing websites (Facebook, twitter, YouTube etc.). In image annotation task, one image is often has multiple labels owns to its complicate semantics. Many discriminative method have been presented and view image annotation as a Multi-label classification problem. A simple method to address this problem is to discompose it into number of independent binary classification problems.

Recognition of plants has major importance in Ayurveda industry. The naked eye observation of experts was the main approach adopted in practice for detection of plant. There are about million different types of plants available in nature. Naked eyes can't recognize and distinguish between them without proper guidance of experts. Many plants even share very similar characteristics. This system once developed, can help many practitioners of AYUSH and even hobbyists to identify many plants with just a photo of leaf's image. The system even provides other information about that plant including its locations in India, It's medicinal usage etc.

In this project, identification android application that gives users or researcher the capability to identify the plant based on the photographs of plant leaf taken from an android application. The system involve the combination of features derived from shapes, vein, color and texture etc. of the leaf. This approach will be tested on user provided images, that contains various color leaf (foliage plants) and green leaves respectively.



Fig.1 Identification of Plant by its Leaf

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II. LITERATURE REVIEW

In the present image annotation system different methods are used which try to exploit labels correlatively or assumes that labels are not dependent of each other. These methods mainly aims to exploit correlation and focus on how to describe it in better way. Some existing systems either focuses on input feature space or output label space, so learning performances in both the spaces need to be improved.

Following is the description about survey of existing system

R. Datta, D. Joshi and J. Z. Wang have proposed,"Image retrieval: Ideas, influences, and trends of the new age"[1]In the field of image retrieval they have discussed research trends for image retrieval using Google scholar's search tools as well as computed its citation scope. They have considered some important aspects such as interface, visualization scalability for practical purpose.

V. N. Murthy, E. F. Can and R. Manmatha have proposed, "A hybrid model for automatic image annotation"[2]Evaluation of image annotation they have shown that combine hybrid with discriminative and generative model high dimension feature for overcome using LDA model reduction of dimensionality. Their future work investigate about unsupervised feature learning.

L. Wu, R. Jin and A. K. Jain have proposed, "Tag completion for image retrieval"[3]The new algorithm for solving optimization problem studies of extensive empirical shows that algorithm of proposed system is for effective than other state-of-the-art algorithms. Keyword/tag matching use for many image search engine because tag based image retrieval is not as much efficient but also effective. TBIR performance mostly depend on quality of manual tags.

V. Lavrenko, R. Manmatha and J. Jeon have proposed, "A model for learning the semantics of pictures"[4] In the system new statistical generative model for learning of the different images. They have shown model works better than other models of the retrieval and annotation of the different images for the better coverage of evaluation of how algorithm can be extend large datasets.

J. Wu, H. Shen, Y. Li, Z. B. Xiao, M. Y. Lu and C. L.Wang have proposed, "Learning a hybrid similar it measure for image retrieval"[5]In the system they have used to search images by description and content based are used in the procedure of image retrieval process. It improve query value and image relevancy in search process initiated using the user intention image selection process. The system uses the query enhancement process with user intention based response model and retrieval process.

III.SYSTEM DIAGRAM

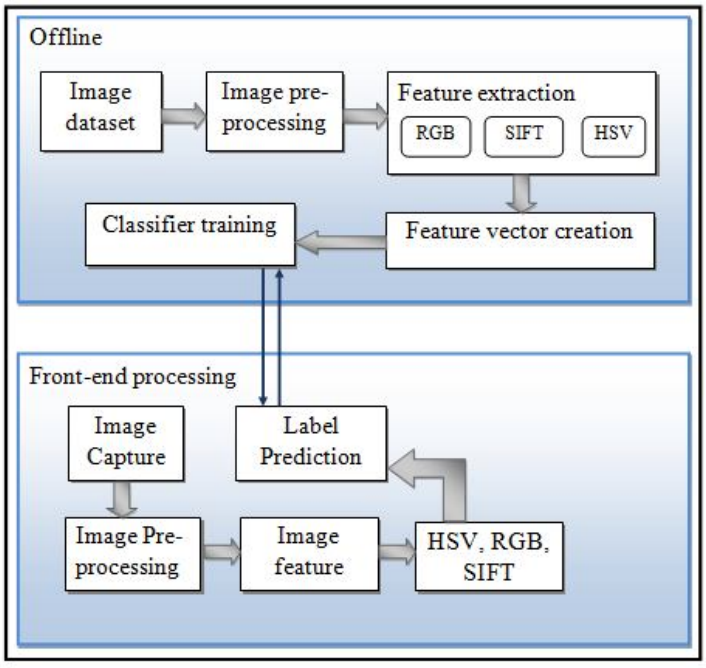


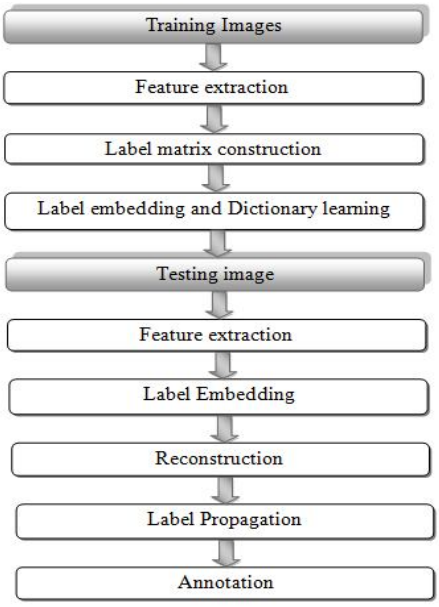
Fig.1 System Diagram

In the working of system first we have to collect sample for experiment. So we will make one dataset which will contain metadata, features etc. Then we will proceed for image processing. On the basis of pixel image will be preprocess then in the feature extraction three main things will include that means RGB, HSV,SIFT after the extracted feature creation of feature vector will be done. Final step will be label prediction which utilize the relationship between label and visual features of plant leaf images.

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IV. WORKFLOW OF THE SYSTEM



V. MATHEMATICAL MODEL

Mathematical model is used for describe the system using mathematical concepts and language. It also used to measure how system implemented mathematically.

Let S is system for implementation.

Where,

S = (I,P,O)

I is set of images

Input = $\{I_1,I_2,I_{3...}I_n\}$

Process = $\{P_1,P_2,P_3,P_4,P_5,P_6,P_7,P_8\}$

P_1 = Read image files

P_2 = Pre-process image files

P_3 = Image feature extraction

P_4 = Feature vector creation

P_5 = Classifier training naive bays

P_6 = Read input image

P_7 = Create feature vector of input image

P_8 = image label prediction

Output = $\{O_1\}$

O_1 = Output label of given image

Venn Diagram

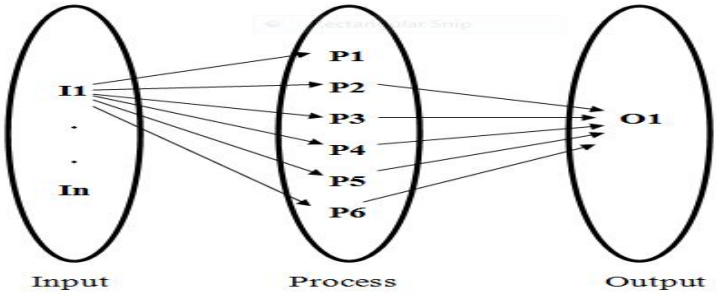


Fig.2 Venn Diagram

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VI. CONCLUSION

In this project, a new approach of using deep learning method was explored in order to automatically classify and detect plant from leaf images. The developed model was able to detect leaf presence and distinguish between healthy leaves, which can be visually diagnosed. The complete procedure was described, respectively, from collecting the images used for training and validation to image preprocessing and augmentation and finally the procedure of training the deep CNN and fine-tuning. Different tests were performed in order to check the performance of newly created model. An extension of this study will be on gathering images for enriching the database and improving accuracy of the model using different techniques of fine-tuning and augmentation.The system detect Ayurvedic plant from the leaf image capture by android application and also shows its medicinal value and location of plant. The system is very useful for researchers, farmers and common people to spread awareness about Ayurvedic plants.

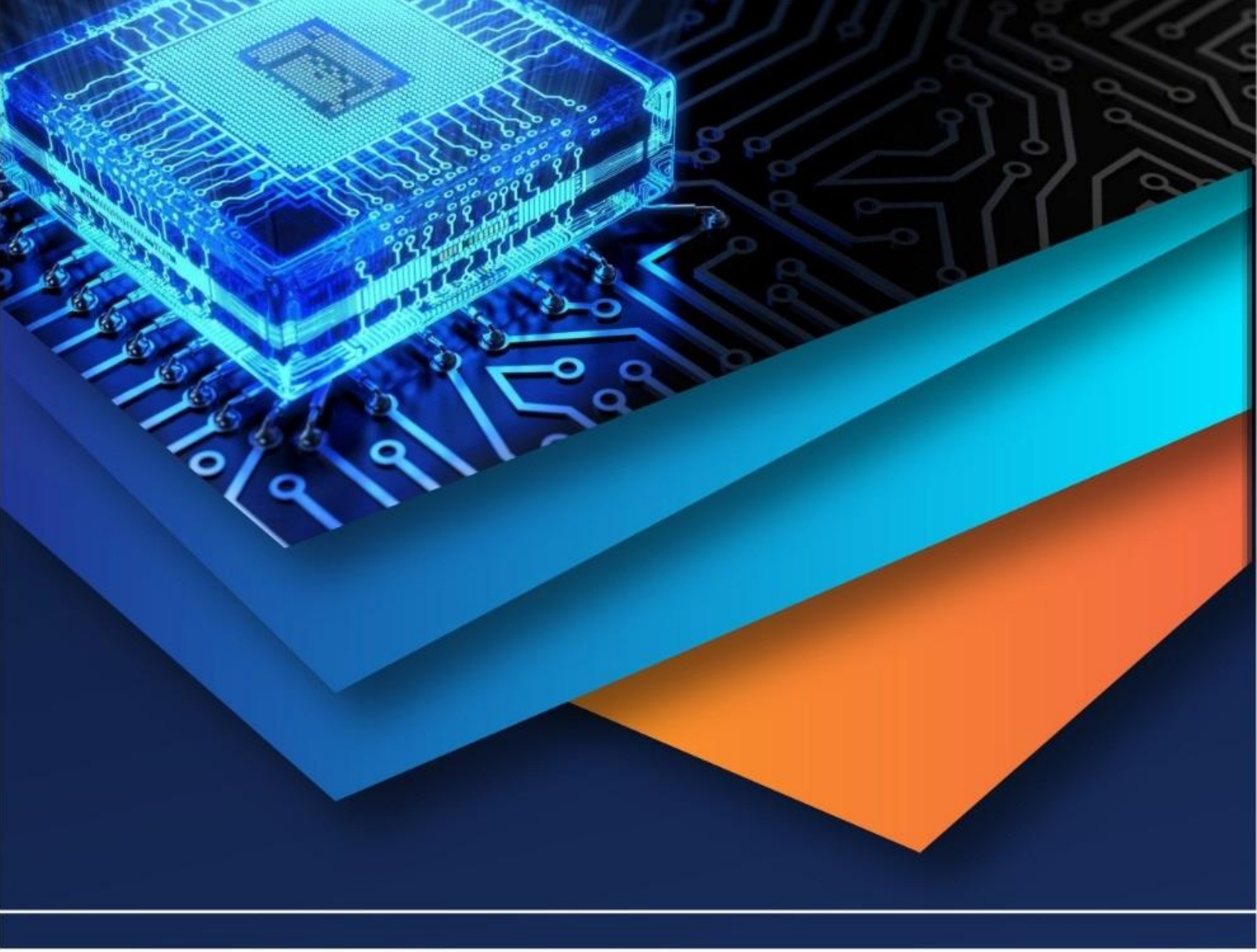
VII. FUTURE WORK

The main goal for the future work will be developing a complete system consisting of server side components containing a trained model and an application for smart mobile devices with features such as displaying recognized fruits, vegetables, and other plants, based on leaf images captured by the mobile phone camera. This application will serve as an aid to farmers, enabling fast and efficient recognition of plant diseases and facilitating the decision-making process when it comes to the use of chemical pesticides. Furthermore, future work will involve spreading the usage of the model by training it for plant disease recognition on wider land areas, combining aerial photos of orchards and vineyards captured by drones and convolution neural networks for object detection. By extending this research, the authors hope to achieve a valuable impact on sustainable development, affecting crop quality for future generations and also we will be use automatic multi-label dictionary.

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