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Automatic Recognition Of Medicinal Plant Using Artificial Intelligence To Serve People

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ABSTRACT :

It has been shown that a fully robotic approach utilizing PC vision and artificial intelligence techniques can identify medicinal plants. In a laboratory setting, the leaves of 25 different species of medicinal plants were gathered and preserved using a cutting-edge cell. Numerous features, such as length, width, border and area, number of vertices, shading, border, and frame territory, have been extracted from every sheet. These features have then been used to elaborate on a few highlights. A CNN classifier that used a 10-times cross-approval technique produced the greatest results. The CNN classifier outperformed all other AI techniques, including neural systems, Naïve Bayes, KNN, and the nearest k-neighbor, with an accuracy of 98.3%. These findings are encouraging, and further research will be prepared to investigate the exposure of deep learning neural systems to identify restoration plants employed in vital medical services using a larger data set and top-tier processing facilities. To the best of our knowledge, this work is the first of its type to produce a distinct picture data collection for medicinal plants that are available on the island of Mauritius. In order to enable taxonomists create recognizable test procedures for more competent species, it is anticipated that an electronic or portable PC framework for the programmed recognition of restoration plants will assist the local populace in expanding their knowledge of medicinal plants.

INTRODUCTION :

Plant ID has a significant job in current logical issues, for example, biodiversity, environment, and pharmacology among others. In Biology, plant distinguishing proof includes breaking down numerous organs, for example, blossoms, seeds, leaves and woody parts. This methodology renders the errand troublesome as blossoms and seeds, which are occasional and subject to the plant's age and condition, are difficult to discover. In exceptional circumstances, for example, discovering fossils or uncommon plants, the material accessible to distinguish a plant is only the leaves. To comprehend these circumstances, a leaf morphological scientific categorization method is proposed, which considers just the leaves to play out the distinguishing proof errands. Right now, are an outcome of soil impact, atmosphere or even condition when the leaf is being shaped.

Plants have been utilized as medicines for thousands of years in different countries and are a source of many potent and powerful drugs worldwide, a total of more than 35,000 plant species are used for medicinal purposes. The value of medicinal plants to human livelihoods is essentially infinite. The World Health Organization estimated that 80% of the population of de-veloping countries relies on traditional medicines, mostly plant drugs, for their primary healthcare needs. Since time immemorial man has used various parts of plants in the treatment and prevention of many ailments. From prehistoric days, plants are used for shelter, food and medicine. The use of plants for medicinal purposes is as old as our civilization. The first known written record of curative plants was of Sumerian herbal of 2200 BC. In the 5th century BC, The Greek doctor Hippocrates list out some 400 herbs in common use (Lakshmi V et al., 2006). Dioscorides, in the 1st century AD, wrote an herbal by using 600 plants which ultimately became the base for many later works. The World Health Organization estimated that 80% of the population of developing countries religon traditional medicines, mostly plant drugs, for their primary health care needs. Time immemorial man has used various parts of plants in the treatment and prevention of many ailmentsNormally customary individuals are doled out with the activity of gathering the plants from the timberlands. Once in a while they couldn't perceive the uncommon and significant plants due to human blunder. These uncommon sorts of plants are critical to spare the life of a patient. Additionally, here and there these individuals could get off base species which might be hurtful plants. In such cases, it is important to utilize the programmed plant acknowledgment framework. This framework helps a conventional people or any layman to perceive the diverse plant species. These sorts of frameworks are likewise extremely accommodating for the trekking individuals if they are intrigued to gather the plant species while trekking the mountains

EXISTING SYSTEM :

This study suggested a novel Android-based mobile application for recognizing digital leaf photos of Indonesian medicinal plants based on their texture and color characteristics. 51 species of Indonesian medicinal plants were employed in the studies, and each species has 48 photos, for a total of 2,448 photos used in this study. In order to identify medicinal plants, this study examines how well the Fuzzy Local Binary Pattern (FLBP) and the Fuzzy Color Histogram (FCH) fuse. The texture of leaf images is extracted using the FLBP approach. The color of the leaf image is extracted using the FCH approach. The Product Decision Rules (PDR) approach is used to fuse FLBP and FCH. This study classified medicinal plant species using a Probabilistic Neural Network (PNN) classifier. According to the experimental findings, the average accuracy of identifying medicinal plants can be raised by combining FLBP and FCH. When FLBP and FCH are fused, the identification accuracy is 74.51%. This software is crucial for assisting users in recognizing and locating information on Indonesian medicinal plants. In the past, plants were the source of all therapeutic remedies, whether they were in the form of simple plant parts or more sophisticated forms like crude extracts, mixes, etc. Many medications that are effective against a variety of illnesses are now made from plants (Fabricant and Farnsworth, 2001). The majority of these entail identifying and modifying the active components present in a certain medicinal plant. Indigenous populations in rural parts of many developing countries are familiar with the usage of medicinal plants, while in developed countries, 25% of pharmaceuticals are derived from plants.

DISADVANTAGES OF EXISTING SYSTEM

- The most of existing methods has ignored the poor quality images like images with noise or poor brightness
- Less Acuracy rate

PROPOSED SYSTEM :

Using a CNN classifier, the suggested method achieved a very high accuracy of 98% when evaluated on a dataset of 55 Vietnamese medicinal herbs. Each image has a 256 by 256 pixel size. suggested a method for identifying and classifying plant leaves that is based on fractal dimension features based on vein patterns and leaf shape. creating a texture signature for a leaf using the GLCM (Gray level co occurance matrix) technique and a volumetric fractal dimension approach.

ADVANTAGES OF PROPOSED SYSTEM

- High accuracy is obtained and time consumption for detecting the shape.
- More datasets are included.

MODULE DESCRIPTION :

Preprocessing

One crucial phase in the data mining process is data pre-processing. The adage "garbage in, garbage out" is especially relevant to initiatives involving data mining and machine learning. Lack of control over data collection techniques frequently leads to out-of-range values (e.g., Income: -100), impossible data combinations, missing values, etc. Results from data analysis that has not been thoroughly checked for these issues may be deceptive. Therefore, before doing an analysis, the quality and representation of the data should come first. Particularly in computational biology, data pre-processing is frequently the most crucial stage of a machine learning project. The final training set is the result of preparing the data.

Feature Extraction

Reducing the amount of resources needed to describe a big collection of data is the goal of feature extraction. One of the main issues in analyzing complex data is the sheer volume of variables involved. In addition to requiring a significant amount of memory and processing capacity, analysis with many variables might lead to a classification algorithm that overfits training samples and performs badly when applied to fresh samples. Techniques for creating variable combinations to circumvent these issues while still accurately describing the data are collectively referred to as feature extraction. Effective model building, according to many machine learning practitioners, depends on appropriately optimized feature extraction.

Feature Selection

The process of choosing a subset of pertinent features (variables, predictors) to be used in model creation is called feature selection, sometimes referred to as variable selection, attribute selection, or variable subset selection.

Prediction

Predictive analytics is driven by predictive modelling. It's more of an approach than a process. Predictive analytics and machine learning go hand-in-hand, as predictive models typically include a machine learning algorithm. These models can be trained over time to respond to new data or values, delivering the results the business needs. Predictive modelling largely overlaps with the field of machine learning.

USES OF MEDICINAL PLANTS

India is a veritable emporium of medicinal plants, because of varied physiography, soil and climatic conditions. The number of medicinal plants in India, both indigenous and exotic, has been variously put at between 3, 000 to 3,500 species. Sixteen medicinal plants of exotic origin, introduced in India years back, are now considered as a part of India‟s medicinal plants resources. Notable among these are, Senna, Psyllium, Belladonna, Cinchona, Eucalyptus, Ipecac, Digitalis and Mexican Dioscorea. The number of plants having confirmed therapeutic properties or yielding a useful chemical compound thus lays around 700 species. Out of these the plants providing largely or regularly used raw materials by Indian Drug and Pharmaceutical Industry are about 335, including those whose materials are imported from other countries. Some of which are liquorice, henbane, cassia bark, galangal, ephedra, long pepper and star anise are used in large quantities. India ranks foremost after South Korea in the supply of medicinal plants to the industrialized countries of the west, where demand for natural drug has been on the increase in recent years. Nearly three fourth of the drugs mentioned in the various pharmacopoeia are found in their natural state in India, since the climate and geographical conditions are congenial for commercial growing of indigenous and exotic medicinal plants. Globally, about 85 percent of the traditional medicines used in primary healthcare are derived from plants. In today‟s scenario there is lot of increasing pressure in health Estelar 65 care costs. Government is encouraging the use of indigenous system of traditional medicine rather than expensive synthetic drugs. It is reported that around 80% of the world‟s population have still trust on traditional system of medicine. Herbal medicines include herbs, herbal preparations and finished herbal products that contain active principles of plant parts, or other plant materials, or combinations. Traditional use of herbal medicines has a long historical use of these medicines. Their use is well established and widely acknowledged to be safe and effective and is globally accepted. The chemical composition present in them is a part of the physiological function of living flora and hence they are believed to have better compatibility with the human body. The herbal health care have therefore, been derived from rich traditions or ancient civilizations and scientific heritage which came to the present generations through primarily oral traditions. Medicinal plant parts should be authentic and free from pesticides, heavy materials, microbial or radioactive contamination, etc



APPLICATIONS OF CNN

Image recognition

CNNs are often used in image recognition systems. In 2012 an error rate of 0.23 percent on the MNIST database was reported. Another paper on using CNN for image classification reported that the learning process was "surprisingly fast"; in the same paper, the best published results as of 2011 were achieved in the MNIST database and the NORB database. Subsequently, a similar CNN called AlexNet[74] won the ImageNet Large Scale Visual Recognition Challenge 2012.

When applied to facial recognition, CNNs achieved a large decrease in error rate. Another paper reported a 97.6 percent recognition rate on "5,600 still images of more than 10 subjects". CNNs were used to assess video quality in an objective way after manual training; the resulting system had a very low root mean square error.

The ImageNet Large Scale Visual Recognition Challenge is a benchmark in object classification and detection, with millions of images and hundreds of object classes. In the ILSVRC 2014,[76] a large-scale visual recognition challenge, almost every highly ranked team used CNN as their basic framework. The winner GoogLeNet(the foundation of DeepDream) increased the mean average precision of object detection to 0.439329, and reduced classification error to 0.06656, the best result to date. Its network applied more than 30 layers. That performance of convolutional neural networks on the ImageNet tests was close to that of humans. The best algorithms still struggle with objects that are small or thin, such as a small ant on a stem of a flower or a person holding a quill in their hand. They also have trouble with images that have been distorted with filters, an increasingly common phenomenon with modern digital cameras. By contrast, those kinds of images rarely trouble humans. Humans, however, tend to have trouble with other issues. For example, they are not good at classifying objects into fine-grained categories such as the particular breed of dog or species of bird, whereas convolutional neural networks handle this.[citation needed]

Video analysis

Compared to image data domains, there is relatively little work on applying CNNs to video classification. Video is more complex than images since it has another (temporal) dimension. However, some extensions of CNNs into the video domain have been explored. One approach is to treat space and time as equivalent dimensions of the input and perform convolutions in both time andspace.

Drug discovery

CNNs have been used in drug discovery. Predicting the interaction between molecules and biological proteins can identify potential treatments. In 2015, Atomwise introduced AtomNet, the first deep learning neural network for structure-based rational drug design. The system trains directly on 3-

dimensional representations of chemical interactions. Similar to how image recognition networks learn to compose smaller, spatially proximate features into larger, complex structures, AtomNet discovers chemical features, such as aromaticity, sp3 carbons and hydrogen bonding. Subsequently, AtomNet was used to predict novel candidate biomolecules for multiple disease targets, most notably treatments for the Ebola virus and multiple sclerosis.

Human interpretable explanations

End-to-end training and prediction are common practice in computer vision. However, human interpretable explanations are required for critical systems such as a self-driving cars. With recent advances in visual salience, spatial and temporal attention, the most critical spatial regions/temporal instants could be visualized to justify the CNN predictions.

Health risk assessment and biomarkers of aging discovery

CNNs can be naturally tailored to analyze a sufficiently large collection of time series data representing one-week-long human physical activity streams augmented by the rich clinical data (including the death register, as provided by, e.g., the NHANES study). A simple CNN was combined with Cox-Gompertz proportional hazards model and used to produce a proof-of-concept example of digital biomarkers of aging in the form of all-causes-mortality predictor.

CONCLUSION :

In this study, we tackled the challenge of recognizing medicinal plant species through the examination of leaf photos taken in their natural habitat, regardless of lighting conditions. For the image dataset, the fixed zero threshold and vegetative index are successfully evaluated. The outcome demonstrates that the algorithm can segment the leaf region effectively. This technique performed well in reflected images. The color and texture features are used to extract features. Weka is used to classify medicinal plant species, and the accuracy is tested at 98.3%. Regardless of complex backgrounds and different lighting conditions, we intend to design and develop a system in the future that will automatically identify plant species by analyzing photographs of the plant's other components as well as its leaves that were taken in their natural habitat. This outstanding performance shows that computer-aided methods for classifying biological material are viable and may be useful in the fight against "taxonomic crists." The local population will gain more knowledge about medicinal plants, taxonomists will be able to create more effective methods of species identification, and endangered species will be greatly protected with the aid of a web-based or mobile computer system for automatic recognition of medicinal plants. Studying therapeutic plants that are mentioned in folklore is essential. Therefore, research into these plants is necessary to comprehend their chemical and physical characteristics as well as their safety and effectiveness. Numerous companies make use of therapeutic herbs. There has been a rise in the usage of medicinal plants to treat illnesses. It will take longer to determine whether it is medicinal or nonmedicinal. so that we may use this project to develop an application. After that, identifying the therapeutic plants would be simple. It takes less time and is simple to use.

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