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Expert Skin Disease Identification System Using Machine Learning

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ABSTRACT

Dermatology disorders are illnesses that are most prevalent worldwide. While it's that, it is extremely hard to diagnose and needs a hugepractical experience. We are offering an approach in this project to identify multiple diseases. The system has a two stage approach that incorporates computer vision and machine learning on clinically validated histopathological attributes to exactly classify the disease. Our project goal is to diagnose skin disease type easily with accuracy and recommend the latest and most global medical suggestions. In the first step, the skin disorder image is subjected to various pre processing techniques and extraction of features (histopathological attribute). The second stage includes the use of Machine Learning algorithms to find disease that are assisted by the histopathological attributes found on skin examination. This paper proposes an illness of the uploaded image by using Image Processing technique assisted by skin identification system. As an input to the prototype, the person can upload an image of the infected skin by capturing using the Smartphone camera. Then the preprocessing technique is applied on the image to identify the disease and the detected disease is displayed on the screen. This system is very much beneficial for the people who are living in rural areas where the access of dermatologists is difficult. We use Pycharm-based python script for the experimental results for this proposed program.

KEYWORDS

Skin Disease Identification, Diagnosis Algorithm, Fungal Infection and Urticaria.

Introduction

Dermatology is one of the most demanded treatments and not able to predict skin disease to treat, owing to trouble. In most of the developed nations, visiting a dermatologist is expensive for an outsize number of individuals. In the developing world, the ever present use of mobile phones opened up a new approachfor cheap disease diagnosis. This system makes use of built in Cameras in every Smartphones and takes advantage of the device's processingcapabilities for diagnosis. This system consists of a two-stage approach to solve the problem. The first stage involves recognitionof the given image and ultimately the second stage includes a Machine Learning solution that is virtually foolproof. The difficulty for medical diagnosis is that within the initial stage a disease that displays the characteristics of 1 disease and within the following stages will have the characteristics of another.

An examination of tissue is usually important for the identification of the nature of illness but many histopathological features are also shared by these diseases. This problem is resolved with the help of Machine Learning Modules on the clinically validated features that are processed by a microscopic examination of the skin examples. Medical students find it hard to validate the identification of the nature of illness because of the subjective aspects of the diagnosis. This method will play a vital learning tool that helps verify their result since they need access to health-related information. By deploying an array of Computer vision and Machine Learning algorithms, we have achieved greater accuracies. Skin disorder is an abnormality to the skin. Skin plays a key function in defending the body against harm causing bacteria. Fungal infections and parasites. Therefore, the true treatment of skin disease is important. Genetics, profession, diet, behaviour, etc.are different elements causingskin disease. They also influenced geographical factors such as season and climate. Overcrowding and poor sanitation in the developed world are responsible for the spread of skin diseases.

Identification of skin disease from dermoscopic pictures is viewed as a question of picture classification. The conventional approach to classification of images requires a robust representation of features that are fed to the training classifier. Inspired by the medical diagnostic technique, the skin lesion is characterized by several color, texture and shape features. However, to affect the dermoscopic images obtained from various acquisition devices and captured under various illumination conditions, it is considerably difficult to establish robust feature representation.

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This builds from the use of deep convolutional neural networks by computer vision researchers.

Related Works

Okubovejo, Damilola A, et al, Automatic Skin Disease Diagnosis Using Image Classification, 2013

This paper deals with a similar concept. Within this paper, a study was built into a model system that uses medical imaging to minimize strong medical expertdependencies for the diagnosis procedure of Pigmented Skin Lesion within patients. The approach of this work is predicted on soft science design to recognize a conceptual device defined by a skin picture for the diagnosis of skin disease. The aim of this paper is make use of function based on texture analysis and identify the lesion using techniques such as thresholding and neural network to build and construct a new skin disease diagnosis algorithm.

Ajith, Archana, et al, Dermatological Disease Detection Using Image Processing and Artificial Neural Network, 2015

A system was proposed in the paper to process and segment an inge obtained from the consumer to construct a model which can predict the disease for a new image of a skin disease. Extraction of features on each image is completed to remove features that will not be used to establish a model classification. Ultimately with this classification model, the system can predict the disease for a replacement image of a skin disease that can be obtained by the user through an Android app. And based on this predicted disease, the system will ask the user's question and the system will decide the type of disease based on the answer. Finally, the program recommends medical care or guidance depending on the result of expected skin disease. Considered the diseases are eczema, fungal infection and urticaria.

Ambad, Pravin S., and A. S. Shirat, An Image Analysis System to Detect Skin Diseases, 2016

This paper introduces the image recognition method for detecting various skin diseases, where users can take photographs of different moles or skin patches and the method will analyze and process the image and identify the image into a range of skin diseases. The program analyzes and analyses the image and classifies the image to the image features based on normal, melanoma, psoriasis or dermo case extraction. A notice will be given to the consumer to look for medical aid if the mole belongs to the group of atypical or melanoma. Even this approach suffers from the segmentation problems.

Existing System

The current program often relies as a helping hand of doctors to investigate the patient’s condition with Skin Disorder. Derma disorder that appears like a simple impetuous but may have symptoms of serious principle condition which can also prove fatal if not properly treated. Though skin disease is normal, early detection is very difficult. Most people wait for the affected region's natural recovery which leads to worse circumstances. Often, the parents neglect children with other skin disorders. Unfortunately causes loss of confidence, Mentally ill and even causes health issues. Expensive Care Cost is another explanation of why people think about before they visit a doctor. Furthermore, the amount of precision in exiting the device is rather less than due to manual inspection.

Proposed System

This program serves as an interactive learning method that helps to validate the results by using Clinical data. Using the Machine Learning and Computer Vision Algorithms, greater accuracies were achieved. The system is capable of detecting different forms of Skin Disease out of it most common diseases are - Psoriasis, Lichen, Planus, Pityriasis Rosea, etc. We use Pycharm-based python script for the experimental results for this proposed program.

Software Requirements

Operating System:		Windows
Coding Language:		Python
Tool	:	Pycharm

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Frontend : HTML

1) Proposed Methodology

The Computer Vision Phase

The Computer Vision Phase - Image Processing Mechanism which involves extracting functions from the given images by using OpenCV Python Module. There are various kinds of tasks involved to gradually change the given input images to the optimum image, with the necessary feature. Second, the given input is transformed as luminance into a grayscale image which is the necessary component representing all the functions present in the given input. Since the Skin Color of the Contaminated Area will be the same for almost all the Skin Disorder that has been investigated, the chrominance of the picture should not be taken into consideration. Then we add a Sharpening Filter function to the given input to improve the contrast of the image's edge mask. We also add certain filtering functions such as median and smooth filter for noise reduction (unwanted input data). Sobeloperator is used for image's edge Detection.

The Machine Learning Phase

The training set is fed with feature-rich images during the machine learning process. For the purpose of implementation, we used the Keras library in python to run the machine learning algorithm. Machine learning is an inspired imitation of brain functions. The whole model consists of layers in the brain, including neurons. Keeping in mind past results, this model learns. Firstly, using Keras the sequential model is developed. Initial layers with a corrector feature are applied. The next step is the addition of a nxn matrix pooling layer. The combined images are then flattened, which is a vector that is continuous. The secret layer is the layer containing all the receptors, which are called artificial neurons. Those layers mimic the human brain by learning from each layer. Once each layer is added, the model is compiled and saved as a h5 file that can be loaded onto another computer as well as the front end so that we don't need to train the model at any time.

The User Interface

The user interface web app is rendered in this project. The web app consists of a button for selecting the image which will open the file explorer. The image will appear on the web app screen after selection to indicate if the right image has been selected. There is another button to show the result which will evaluate the image once pressed and display the results in the web app screen.

2) Module Description

Image Acquisition

Photos may be acquired through a camera or stored locally. Photos can be collected from polls and blogs, as well. Filtering is a non-linear process applied on given input for pre-processing of input which is used to improve the image processing technique and also recommendation of models because of this property. Coevolutionary neural networks have reliable results in semance filtering and identification of paraphrases. For this purpose, CNN is used for the identification of skin disease. CNN classifier is used to train and check photos of the skin disease. CNN means Convolution Neural Network which is a classifier consisting of layered architecture in which multiple layers perform specific train and test operations on input image data.

3) Software Environment

PyCharm is a Python IDE developed by JetBrains for professional developers. It provides developers with all the tools they need to increase their coding efficiency, as well as smart code support.

With PyCharm, developers are able to enhance the quality of their code. The development tool does this by means of quality controls, testing help, intelligent refactoring and system support, among others. With this, code writers may invest more time on additional lines instead of debugging.
In addition, PyCharm has a user-defined interface so that they are free to customize their devices. On top of that,

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there are also more than fifty plugins that developers can use to improve their PyCharm experience.

Pycharm is an Integrated Development Environment used in Computer Programming, especially in the Python Language. It has been developed by the Czech company JetBrains. It offers a different kinds of code overview, can create web pages using HTML, a graphical debugger, an integrated device tester, integration with Version Control System and support web creation with Django.

Pycharm is a Python IDE which includes a complete set of Python development tools. Furthermore, the Pycharm software gives professional Web Development capabilities using flask, streamlit and Django framework. Develop quickly and simpler in a apt and configurable editor with support for develop samples, code downloading, code folding and split window.

Smart Python

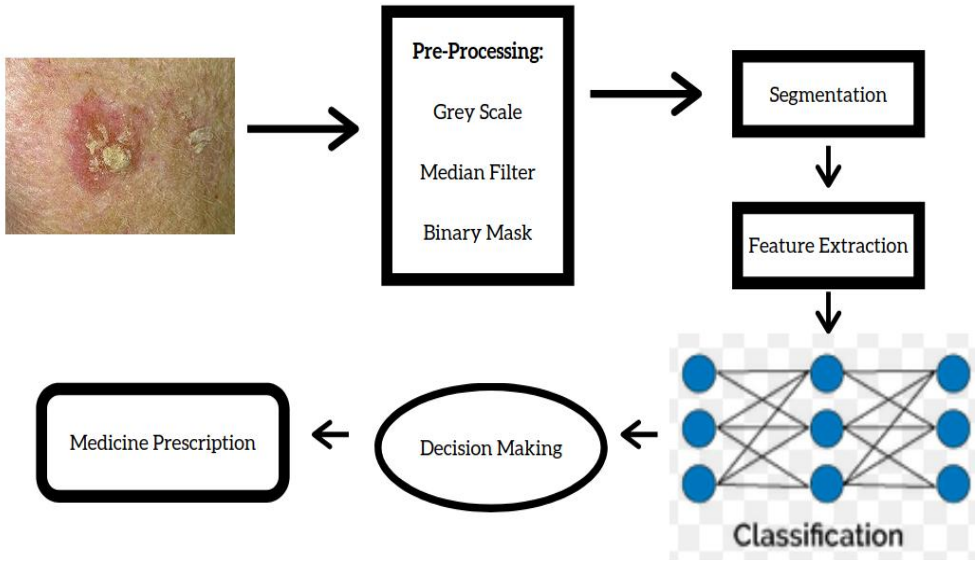
With Pycharm, developers are supported by a smart platform that allows them to complete code, review, find bugs, fast fixes, and more. This helps them to improve their productivity, as their codes can be completed automatically. Plus, they don't have to waste time scouring their codes to rectify errors.

4) Architectural Diagram

Coding subordinate and analysis highlighting code accomplishment, syntax and error, Integration of the linter and quick fixes.

Navigation of software and code: expert views of the software, views of the file structure and fast hop between python usages, files, methods and classes.

Refactoring python: lio rename, extract process, add vector, constant, pull up, msh down and others Web frameworks support: Django, web2py, and Flask Python built-in debugger Integrated unit testing, with coverage of code line by line Integration of version control: Single user interface with change lists and merge for Mercurial, Git, Subversion, Perforce and CVS.



Conclusion

The system proposed is capable of detecting the dermatological disease present in the picture. It can be used to support people from around the world and can be used to do a good job. The devices used are free to use and are accessible to the customer, allowing the device to be implemented at no price. Although the data-set for machine

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learning was small, the program was able to recognize the disease with the least error. The designed framework is lightweight and can be used in low device specification machines. It also features a simple user interface for user convenience. Successfully applied the image recognition and the deep learning algorithms.Future scopes of improvement in present methodologies are:A common model for recognizing all types of skin diseases needs to be adopted.Multilingualism help to make it user-friendly.Introducing IOS support to multi platform functionality.

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