Skin Disease Classification

A Synopsis Submitted
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in
Data Science

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Synopsis

1. Introduction

Deep learning has become an extremely popular method in recent years, and can be a powerful tool in complex, prior-knowledge-required areas, especially in the field of biomedicine, which is now facing the problem of inadequate medical resources. The application of deep learning in disease diagnosis has become a new research topic in dermatology. The current trend of research on Deep Learning along with Image Classification using Convolutional Neural Network (CNN). Several variants of these algorithms have been developed. The current research is to study and develop algorithm that helps to classify skin diseases by using data from clinical images.

2. Objective

Skin diseases are the fourth most common cause of human illness which results in enormous non-fatal burden in daily life activities. Visual assessment in combination with clinical information is the common diagnostic procedure for diseases. However, these procedures are manual, time-consuming, and require experience and excellent visual perception. In this study, an automated system is proposed for the diagnosis of skin diseases by using data from clinical images and patient information using deep learning model.

3. Related work

Several existing approaches are mechanized to recognize and classify skin diseases. Most of the diagnosing methods rely on imaging technology, and the epidermal recognition of such skin diseases does not need radiological imaging technologies. They can recognize the condition based on the standard images through image processing techniques, including image transformation, equalization, enhancement, edge detection, and segmentation. The skin images that are captured for disease identification and classification are processed and fed as input for the advanced artificial intelligence approaches like Machine Learning, Deep Learning, Artificial Neural Network, Convolutional Neural Network, Back Propagation Neural Network, and classifiers such as Support Vector Machines, Bayesian classifier for the prediction of the type of skin disease.

4. Proposed Method

This project includes development of a mobile application where we can classify the skin disease on basis of the image that is clicked through the camera. It uses concepts of Deep Learning, Image Classification, Convolutional Neural Network and ML Ops.

5. Methodology

- This machine learning project starts with data collection. Data which we can use as a training dataset. In our case, we need to collect images of different skin diseases.
- For Data cleaning and pre-processing, we will be using tf data set and data augmentation. Data Augmentation is required as we might not have enough diverse set of images, so we rotate, flip, and adjust contrast to create more training samples.
- Once we have that, we will use model building using convolutional neural network, since it is a standard way of image classification. We'll export the trained model onto our disk.
- We will further cover ML Ops concept using TF serving where a tf server will run on top of the exported model, this tf serving will be called from fast API.

- We will build a website in React JS which will be calling the fast API server. On this website, we can drag and drop the image and it will tell us the disease.
- The next phase would be mobile app development. We will convert the exported float model into TF lite model using quantization. Quantization is a way to reduce the size of the model, so that the model is occupying less memory and to increase inference speed. We will deploy the TF Lite model to Google Cloud and we will write Google Cloud Functions which will be serving the mobile application. This application will be written in React Native (hybrid mobile app development framework).

Model Building	TensorFlow, Convolutional Neural Network, Data Augmentation, TF dataset
Backend Server	TF serving, Fast API
Model Optimization	Quantization, TensorFlow Lite
Frontend and Deployment	React JS, React Native, Deployment TO GCP

6. Plan of work

Phase I

- Data Collection and pre-processing.
- Model Building (using CNN for image classification).
- Fast API / TF serving Backend.
- Website Development (in React JS).

Phase II

- Image Data Generator API.
- Model Deployment to Google Cloud Platform (GCP).
- Mobile App Development (in React Native).

References

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