MONKEY POX DISEASE DETECTING SYSTEM USING DEEP LEARNING

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Abstract: Due to the recent monkeypox outbreak's quick spread to more than 40 nations outside of Africa, public health is now at risk. It is difficult to diagnose clinically in its early stages since it resembles both chickenpox and measles. Computer-assisted monkey pox lesion detection may be helpful for surveillance and quick identification of suspected cases when confirmatory Polymerase Chain Reaction (PCR) assays are not accessible. Under the condition there are enough training examples available, deep learning techniques have been demonstrated to be useful in the automated detection of skin lesions. Such databases are not currently accessible for the monkeypox condition. The majority of the photographs came from news websites, blogs, and publicly available case reports. A 3-fold cross-validation experiment is set up, and the sample size is increased through data augmentation. The second phase is categorizing diseases like monkeypox using several pre-trained deep-learning models including VGG-16, CNN, and Mobile Net. It is an ensemble of the three models created. An online method for screening for monkeypox is also being developed as a prototype web application. While the early results on this tiny dataset are promising.

***Keywords*:** Monkeypox image dataset, Skin disease classification, Transfer Learning, image processing, CNN, Mobile Net & VGG19.

I. INTRODUCTION

As the world recovers from the COVID-19 epidemic, the recent multi-country outbreak of monkeypox has raised concerns in global communities. The World Health Organization (WHO) declared that the outbreak poses a moderate threat to global public health and has stopped suddenly declaring it a public health emergency. However, healthcare organizations such as World Health Network (WHN) expressed a heightened concern and highlighted the need for immediate and concerted global action against the disease. It nearly resembles chickenpox, measles, and smallpox in clinical features. The minor differences in the skin rash of these conditions and the relativity of monkeypox have made the early opinion of this condition veritably grueling for healthcare professionals. A prototype web- app developed that incorporates the advanced deep literacy models of monkeypox from skin lesions uploaded by druggies is available. Although the case fatality ratio has been reported to be 3–6% for the recent outbreak, early detection of monkeypox, corresponding contact tracing, and isolation are essential to limit the community transmission of the virus. The mechanism of AI- grounded automated computer-backed systems may mainly limit its global spread. In recent times, the multi-faceted operations of deep literacy (DL), particularly the variations of Convolutional Neural Networks (CNNs), have revolutionized different disciplines of medical wisdom due to their superior literacy capability. When trained with large data, these deep networks can reuse images in different layers, automatically rooting salient features and learning to identify the optimal representations for specified tasks. still, the demand for large quantities of data and time-consuming training with devoted computational coffers limits the connection of DL- grounded frameworks. While using accelerators (e.g., GPU, TPU) resolves the time and resource-related issues, the dataset-related enterprises persist due to the difficulty of carrying unprejudiced, homogeneous medical data. Data addition is a well-known system of adding the dataset size by generating fresh samples through slight variations of data. In case of scarcity of data, transfer learning is also a commonly used technique. This method utilizes a CNN model pre-trained on a large dataset (e.g., Image Net) and transfers its knowledge for context-specific learning to a different, comparatively smaller dataset. African regions may introduce a bias in the dataset because of very high inter-class similarity and intraclass variability. This mechanism was introduced by the “Monkeypox Skin Lesion Dataset (MSLD)”, an openly accessible dataset containing web-scrapped images of different body parts (face, neck, hand, arm, and leg) of patients with monkeypox and non-monkeypox (measles, chickenpox) cases to also present a DL-based preliminary feasibility study leveraging transfer learning involving VGG16, CNN, and Mobile Net architectures to explore the eventuality of deep literacy models for the early discovery of the monkeypox disease.

II. LITERATURE SURVEY

Image data collection and implementation of the deep learning-based model in detecting monkey pox disease using modified VGG19 Md Manjurul Khondhaker Al Momin, Ahmed Nazmus Sakib Shahana Akter Luna et. al,2022:While the world is still trying to recover from the damage caused by the broad spread of COVID-19, the Monkeypox contagion poses new trouble getting a global pandemic Although the Monkeypox virus itself is not deadly and contagious as COVID-19, still every day, the new patient case has been reported from many nations. Therefore, it will be no surprise if the world ever faces another global pandemic due to the lack of proper precautions steps. Lately, Machine literacy (ML) has demonstrated huge eventuality in an image- grounded judgments similar to cancer discovery, excrescence cell identification, and COVID-19 case discovery. thus, an analogous operation can be espoused to diagnose the Monkeypox-related complaint as it infected the mortal skin, which image can be acquired and further used in diagnosing the complaint. Considering this occasion, the work is to introduce a recently developed" Monkeypox2022" dataset that's intimately available to use and can be attained from the participated GitHub repository. The dataset is created by collecting images from multiple open-source and online doors that don't put any restrictions on use, indeed for marketable purposes, hence giving a safer path to use and circulate similar data when constructing and planting any type of ML model. Further, to propose and estimate a modified VGG16 model, which includes two distinct studies Study One and Two. The output of the exploratory computational results indicates that the suggested model can identify Monkeypox cases for Studies One and Two, independently. Additionally, to use Local Interpretable Model-Agnostic Explanations (LIME) and further understanding of the distinctive traits that mark the onset of the monkeypox virus and explain the model's prediction and feature extraction.

Mobile Nets Effective Convolutional Neural Networks for Mobile Vision Applications Andrew G. Howard, Meng long Zhu, Bo Chen, Dmitry Kalenichenko, 2017: This mechanism presents a class of efficient models called Mobile Nets for mobile and embedded vision applications. Mobile Nets are grounded on a streamlined armature that uses depth-wise divisible complications to make lightweight deep neural networks. to introduce two simple global hyperactive- parameters that efficiently trade- between latency and accuracy. These hyperactive- parameters allow the model builder to choose the right-sized model for their operation grounded on the constraints of the problem. To present extensive experiments on resource and accuracy trade-offs and show strong performance compared to other popular models on Image Net classification and then to demonstrate the effectiveness of Mobile Nets across a wide range of applications and use cases including object detection, fine grain classification, face attributes, and large, scale geo-localization

Monkeypox Skin Lesion Discovery Using Deep Literacy Models A Feasibility Study Shams Nafisa Ali, Md. Tazuddin Ahmed, 2022: The recent monkeypox outbreak has become a public health concern due to its rapid-fire spread in more than 40 countries outside Africa. Clinical opinion of monkeypox in an early stage is challenging due to its similarity with chickenpox and measles. In cases where the confirmational Polymerase Chain response (PCR) tests aren't readily available, the computer-supported discovery of monkeypox lesions could be salutary for surveillance and rapid-fire identification of suspected cases. Deep literacy styles have been set up effectively in the automated discovery of skin lesions, handed sufficient training exemplifications are available. still, as of now, similar datasets aren't available for the monkeypox complaint. The current article was first developed about the Monkeypox Skin Lesion Dataset (MSLD)" conforming skin lesion images of monkeypox, chickenpox, and measles. The images are mainly collected from websites, news portals, and publicly accessible case reports. Data augmentation is used to increase the sample size, and a 3-fold cross-validation experiment is set up. In the next step, several pre-trained deep knowledge models, VGG- 16, ResNet50, and InceptionV3 are employed to classify monkeypox and other conditions. A group of the three models is also developed A prototype web- operation is also developed as an online monkeypox netting tool. While the original results on this limited dataset are promising, a larger demographically different dataset is needed to further enhance the generalizability of these models.

III. PROPOSED METHODOLOGY

A. EXISTING SYSTEM

In the existing method, there is transfer learning involving Resnet50, VGG16, InceptionV3, and Dense net methods implemented architecture to explore/check or detect the potential of deep learning models for the early detection of the monkeypox disease. The conventional way is to do the process manually and it consumes a lot of time and more human effort sometimes experts are available and time constraints and the existing system contains the following disadvantages: Time-consuming, more human effort, more complicated, Low accuracy, Less Performance.

B. MOTIVATION AND PROBLEM STATEMENT

Here, the model can be considered useful since it helps us reduce the existing system's limitations. By providing support through classification analysis of monkey pox disease by using CNN, VGG19, and Mobile-Net of deep learning algorithms. Hence, the proper classification is important for the proper treatment to recognize the disease so it can able to generate the best results and treat them effectively.

C. PROPOSED SYSTEM

The proposed methodology for performing the classification of either the image is lung or liver Disease identification using Convolution Neural Network CNN, Mobile Net, VGG19, of deep learning along with the deep learning methods. As image analysis-based approaches for monkeypox skin Disease detection. Hence, proper classification is important for the monkeypox skin disease which will be possible by using the proposed method. The proposed consists of the following advantages: Accurate classification, ess complexity, Easily identifies the images, High performance, Time minimizing.

D. MODULES

i) System

Create Dataset

The dataset containing images of Monkeypox images with other diseases or not i.e., normal skin to be classified and is split into training and testing datasets with a test size of 30-20%.

Pre-processing

The data collected are converted into a common format of images of the same size and dimensions. Resizing and reshaping the images into an applicable format to train the model. NumPy is used to represent each pixel of the image of the same size and dimensions. Last, the labeled data out of which 80% will be used to train the model and 20% is used to test the model.

Training

The pre-processed training dataset trains the model using VGG19 Deep learning and CNN and Mobile net and transfers learning methods.

ii) User

Login/Registration

The user can register and log in with the credentials to the system. The System allows registered users to get in, and SQL is used to store and maintain the data of the registrations.

Upload Image

Here, the user can only upload the image that she/he needs to be predicted only if the user has logged into the System. If not, a pop-up will be shown on the screen saying that the user must log in first into the system to upload an image.

Classifier Module

The Classifier module classifies the uploaded image with pre-trained parameters learned for transfer learning using VGG19 and Mobile-Net. It helps in predicting the results of the model and displays monkey pox images or either with different labels.

E. PROPOSED ARCHITECTURE

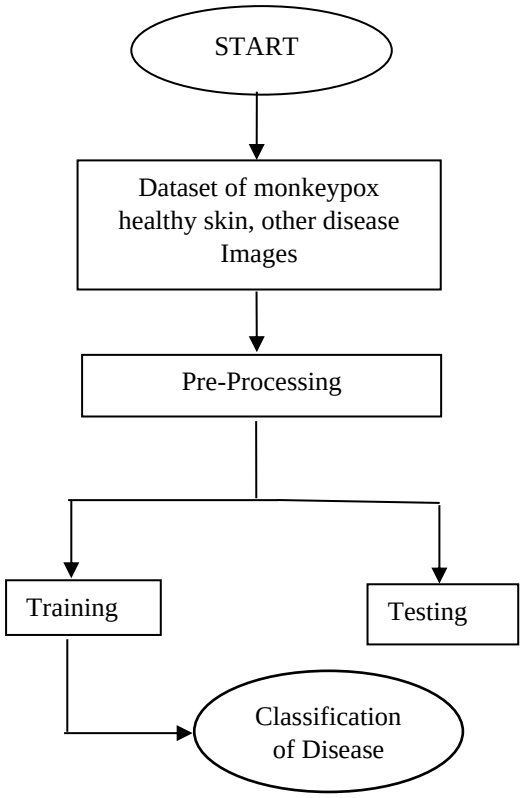


Figure 1: Proposed Architecture

F. ALGORITHMS USED

Three deep-learning algorithms are used for the prediction of the system they are:

MOBILE NET

The Mobile Net model is designed to be used in mobile applications, and it is Tensor Flow's first mobile computer vision model. Mobile Net uses depth-wise separable convolutions. It significantly reduces the number of parameters when compared to the network with regular complications with the same depth in the nets. It results in lightweight deep neural networks. A depth-wise separable convolution is made from two operations they are Depth-wise-convolution and Point-wise-convolution. Mobile-Net is a class of CNN that was open-sourced by Google, and thus, it gives us an excellent starting point for training the classifiers that are insanely small and insanely fast.

VGG19

VGG19 is a variant of the VGG model which in short consists of 19 layers (16 complication layers, 3 Completely connected layers, 5 Max-Pool layers, and 1 SoftMax layer). There are numerous variants of VGG like VGG11, VGG16 and others VGG19 has 19.6 billion FLOPs. Hence the name VGG, It carries and uses some ideas from its forerunners and improves on them, and uses deep Convolutional neural layers to ameliorate accuracy.

CONVOLUTIONAL NEURAL NETWORK

Convolutional Neural Networks (CNN, or ConvNet) is a type of multi-layer neural network that's meant to discern visual patterns from pixel images. In CNN, 'complication' is appertained to as the fine function. It's a type of direct operation in which you can multiply two functions to produce a third function that expresses how one function's shape can be changed by the other. In simple terms, two images that are represented in the form of two matrices, are multiplied to give an affair that's used to prize information from the image. CNN is analogous to other neural networks, but because they use a sequence of convolutional layers, they add a

subcaste of complexity to the equation. CNN cannot serve without convolutional layers. Artificial neural networks known as CNN have excelled in several computer vision applications. It has chosen people's interests in a wide range of categories. A convolutional neural network is made up of multitudinous layers, similar to complication layers, pooling layers, and completely connected layers, and it uses a backpropagation algorithm to learn spatial scales of data automatically and adaptively.

G. IMPLEMENTATION PROCESS

Firstly, collected the Monkeypox and other skin Diseases images. Load the dataset into and Pre-processing**.** Here split the data into train data and test data. After splitting apply the Mobile Net and VGG19 algorithms respectively and fit the train data and test data. The proposed methodology got the best accuracy score for Mobile Net. Later, the entire work is done with the Django framework**.** Users can view the home, about, upload page, and Results.

IV. EXPERIMENTAL ANALYSIS

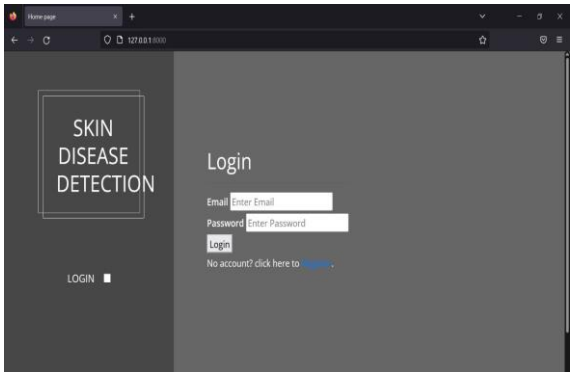


Figure 5: Login Page

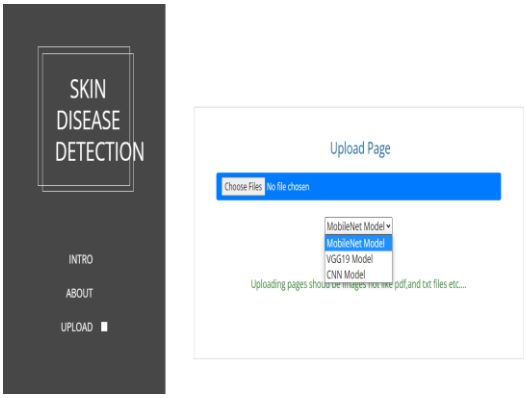
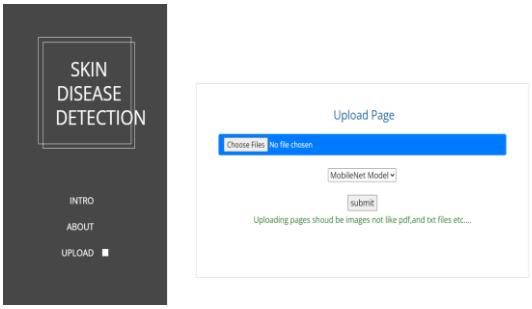


Figure 7: Model Selection image



Upload image

Figure 6:

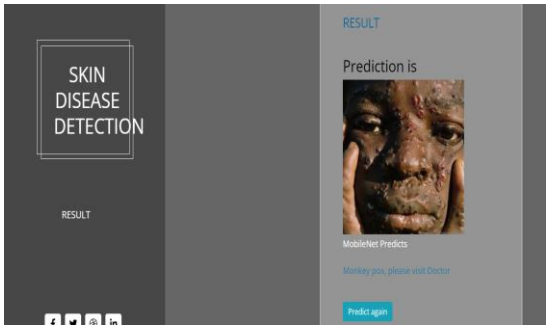


Figure 8: Output image

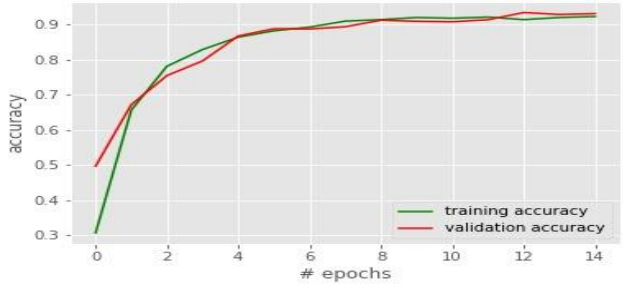


Figure 9: CNN accuracy

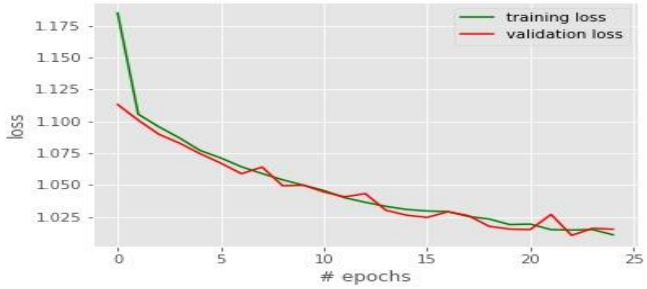


Figure 12: Mobile net Loss

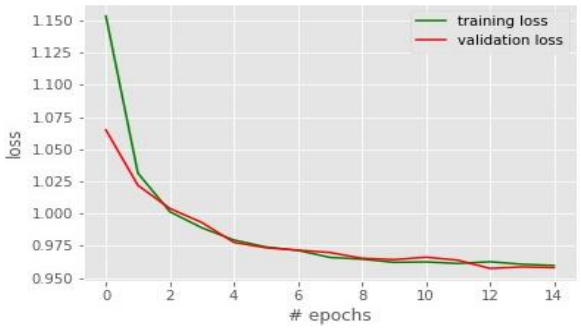


Figure 10: CNN Loss

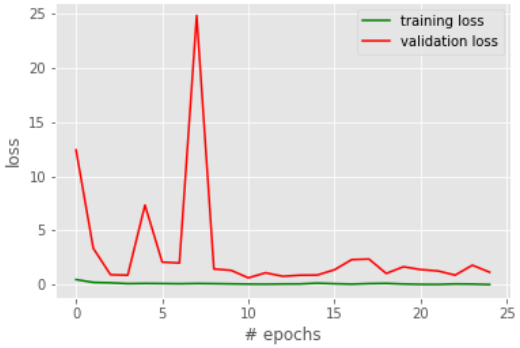


Figure 13: VGG19 accuracy

Figure 11: Mobile net accuracy

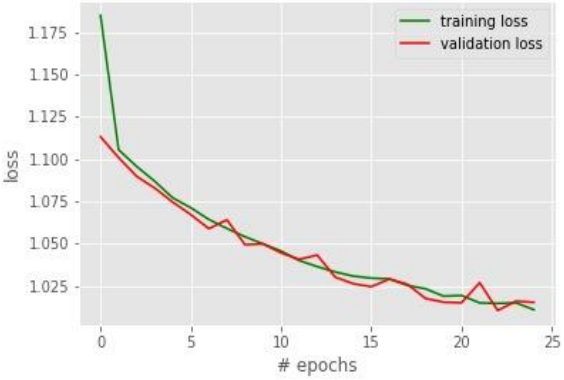


Figure 14: VGG19 loss

V. CONCLUSION

In detecting monkeypox disease, this system has successfully classified the images of Monkeypox and other skin diseases image classification, which are either diseased with monkeypox or other disease items names using deep learning and transfer learning. Here, this system results in considering the dataset of Monkeypox diseases which will be of different types trained using Mobile-Net and CNN and VGG19 transfer learning method. After the training, testing by uploading the image and classifying it.

Monkeypox disease detecting system can be utilized in the future to classify the types of different Skin diseases easily that which can tend to easy Prediction of diseases in early stages and can take the initial medications, precautions, and take measures.

VI. REFERENCES

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