Performance Analysis of Deep Learning Techniques Detecting Black Fungus

Mallikarjuna Rao Gundavarapu, Bhargavi Lella, Shriya Manda, Lakshmi Prasanna Nekkanti, Prerana Panchareddy

Abstract: *Mucormycosis, which is also commonly known as "Black Fungus", is a deadly fungal infection that is caused by a group of molds called "mucormycetes". Black Fungus attacks when one gets in contact with fungus spores in the environment, especially when a person is having any kind of skin trauma like a cut, scrape, burn, etc. They noted that this infection affects a person who is having other health issues like diabetes, cancer, organ transplants, or who is using other drugs which compromise the immune system. The spread of coronavirus has hiked the cases of Black Fungus as coronavirus leaves its patient's immune systems in a weakened state, making them more susceptible to Mucormycosis. The symptoms of black fungus when the body gets attacked vary depending on where it is growing in your body, some of the recognized symptoms include fever, cough, chest pain, headache, swelling and redness of eyes, discoloration over the eyes, nose, and sides of one's face, blurred vision and in severe cases loss of vision, blood vomits, shortness of breath. It enters the body via the nose, mouth, or eyes and can affect the brain and other organs if not treated on time. The primary aim of this project is to detect black fungus using Deep Neural Networks based on the iris dataset. We have experimented with various deep learning techniques for detecting black fungus from eye image datasets, such as VGG16, ResNet-50, InceptionV3, and AlexNet.*

Keywords: *Mucormycosis, Discoloration, Redness, Swelling, Coronavirus, Vision.*

I. INTRODUCTION

Fungus is harmful to human health, it may cause various life-threatening diseases. There are millions of different fungal species present in the environment of which few cause fungal infections which are extremely hazardous to human health.

One such deadly fungal infection is "mucormycosis" which is commonly referred to as black fungus, it is a very rare but fatal disease caused by a group of molds called "mucormycetes", which is ubiquitously present in the environment, especially in soil, air, plants, manure, dead and decaying organic matter and also have traces in the nose and mucus of healthy humans. Although the root causes of a person being infected with black fungus are still uncertain, in most cases, people get infected when they get in contact with the fungal spores present in the environment, especially when a person is having any kind of skin trauma like a cut, scrape, burn, etc. They also noted that this infection affects people who have other health issues like diabetes, cancer, organ transplants, or who are using other drugs which may compromise their immune system. It is a very rare fungal infection, but, in recent times, there has been a tremendous increase in the cases of black fungus compared to the last few years or decades. The doctors and medical experts suggest that this may be because of the spread of COVID-19. The primary reason for this is the use of various steroids and drugs which are used in the treatment of COVID-19, which helps reduce the inflammation in the lungs while the body's immune system is going into overdrive to combat coronavirus. However, then it lessens inside the affected person's immunity stage and additionally shoots up blood sugar levels in both diabetics and non-diabetic Covid-19 sufferers. It's the concept that this drop in immunity triggers and puts the patients at extra risk for mucormycosis. The mortality rate has also increased significantly because of this. Some of the recognized symptoms of black fungus include fever, cough, chest pain, headache, swelling and redness of eyes discoloration over the eyes, nose, and sides of one's face, blurred vision, and in severe cases loss of vision, blood vomits, and shortness of breath. It shows the severe impact on the brain and other internal organs if not detected and treated on time. The primary aim of this project is to analyze and predict the probability of a person being infected with mucormycosis based on the black fungus symptoms with help of a black fungus disease detection model using deep neural networks.

We have used four different models to train and compare the results. The models used are Inception v3, VGG16, ResNet50, and AlexNet.

A. Inception V3

The Inception v3 model is a popular image recognition model. On the ImageNet dataset, they have proved it to achieve higher than 78.1 percent accuracy. The model has 48 layers.