
AI DATA SCIENTIST
TRAINING PROGRAMME
Fungal Image Analysis and Classification
Presented by:
Rahul Kumar
M.Sc(BHU)
Made by Rahul

Table of Contents

Introduction

Mucor mycosis infection is a disease caused by fungi. After the second wave of COVID-19, it came to notice. The most of the cases were reported in
India where the infection rate was five times the world. Mucor mycosis is diagnosed
by looking at a tissue sample in the lab. Your doctor may collect a sample of
phlegm or nasal discharge if you have a suspected sinus infection. In the case
of a skin infection, your doctor may also clean the wounded a
question.

Types of Fungi

Hypha 1 ->
Tortuous septate hyaline hyphae

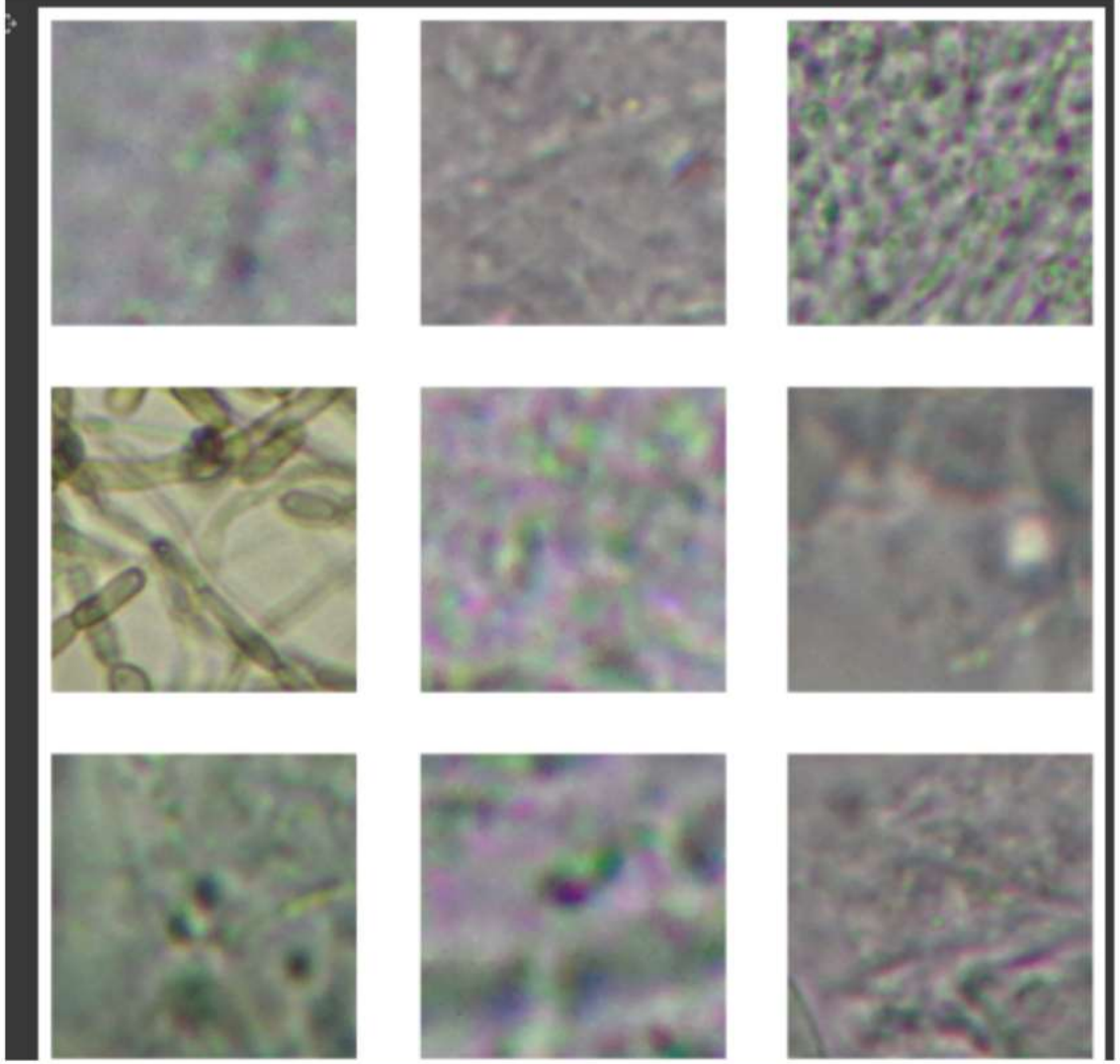
Hypha 2 ->
Beaded arthroconidial septate hyaline hyphae

Hypha 3 ->
Groups or mosaics of arthroconidia

Hypha 5 ->
Septate hyaline hyphae with chlamydioconidia

Hypha 6 ->
Broad brown hyphae

```
plt.figure(figsize=(10,10))
for images,labels in X_train_ds.take(1):
  for i in range(9):
    ax=plt.subplot(3,3,i+1)
    plt.imshow(images[i].numpy().astype("uint8"))
    plt.axis("off")
```



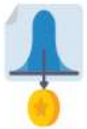
DATA UNDERSTANDING

```
X_train_ds=tf.keras.utils.image_dataset_from_directory(
    data_dir,
    labels='inferred',
    label_mode="int",
    class_names=['.ipynb_checkpoints',"H1","H2","H3","H5","H6"],
    color_mode="rgb",
    batch_size=32,
    image_size=(256, 256),
    shuffle=True,
    seed=123,
    validation_split=0.2,
    interpolation="bilinear",
    follow_links=False,
    crop_to_aspect_ratio=False,
    subset='training'

)
```

```
Found 9114 files belonging to 6 classes.
Using 7292 files for training.
```

This fungi dataset contains 9114 images in different folders named as H1, H2, H3, H5 and H6



TRAINING DATASET

VALIDATION DATASET

input_1 (InputLayer)	[(None, 224, 224, 3)]	0
block1_conv1 (Conv2D)	(None, 224, 224, 64)	1792
block1_conv2 (Conv2D)	(None, 224, 224, 64)	36928
block1_pool (MaxPooling2D)	(None, 112, 112, 64)	0
block2_conv1 (Conv2D)	(None, 112, 112, 128)	73856
block2_conv2 (Conv2D)	(None, 112, 112, 128)	147584
block2_pool (MaxPooling2D)	(None, 56, 56, 128)	0
block3_conv1 (Conv2D)	(None, 56, 56, 256)	295168
block3_conv2 (Conv2D)	(None, 56, 56, 256)	590080
block3_conv3 (Conv2D)	(None, 56, 56, 256)	590080
block3_pool (MaxPooling2D)	(None, 28, 28, 256)	0
block4_conv1 (Conv2D)	(None, 28, 28, 512)	1180160
block4_conv2 (Conv2D)	(None, 28, 28, 512)	2359808
block4_conv3 (Conv2D)	(None, 28, 28, 512)	2359808
block4_pool (MaxPooling2D)	(None, 14, 14, 512)	0
block5_conv1 (Conv2D)	(None, 14, 14, 512)	2359808
block5_conv2 (Conv2D)	(None, 14, 14, 512)	2359808
block5_conv3 (Conv2D)	(None, 14, 14, 512)	2359808
block5_pool (MaxPooling2D)	(None, 7, 7, 512)	0
flatten (Flatten)	(None, 25088)	0
dense (Dense)	(None, 5)	125445

Total params: 14,840,133
Trainable params: 125,445

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 224, 224, 3)]	0
block1_conv1 (Conv2D)	(None, 224, 224, 64)	1792
block1_conv2 (Conv2D)	(None, 224, 224, 64)	36928
block1_pool (MaxPooling2D)	(None, 112, 112, 64)	0
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flatten (Flatten)	(None, 25088)	0
dense (Dense)	(None, 5)	125445

Total params: 14,840,133
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Model Working

According to the set up of the model it works in the following steps:

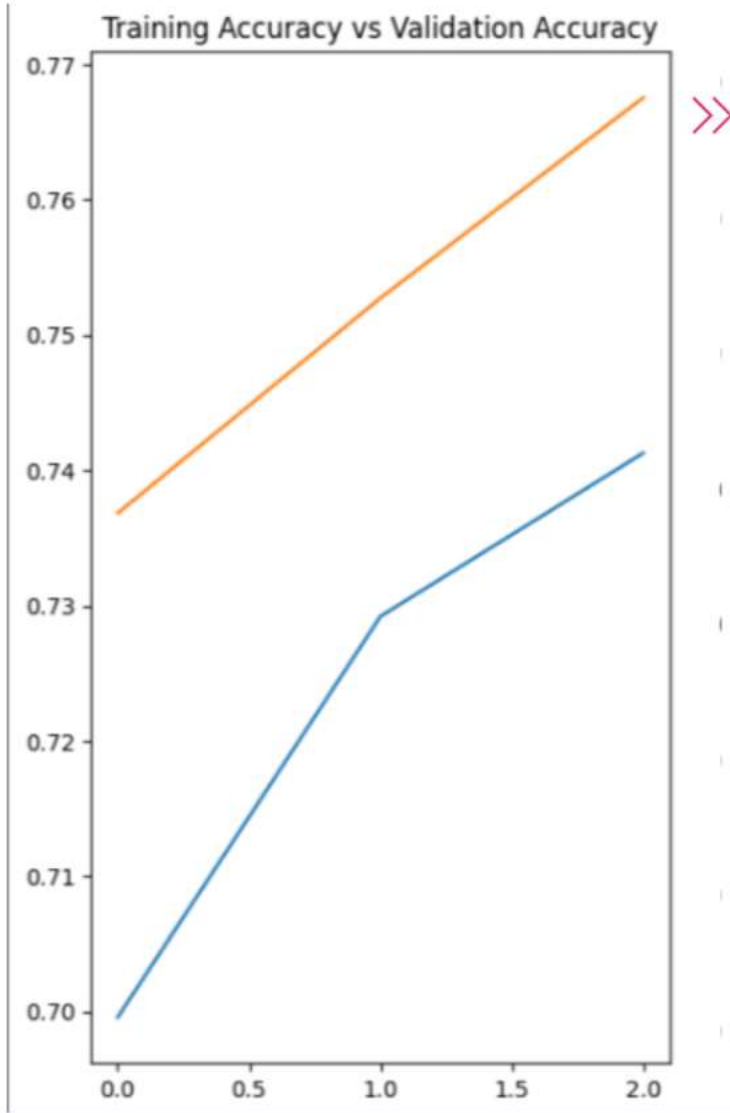
- **Loading Dataset**
- **Resizing and Rescaling**
- **ModelTraining**
- **Model Evaluation**

Model Performance

Model Performance is evaluated at every epoch and every step.

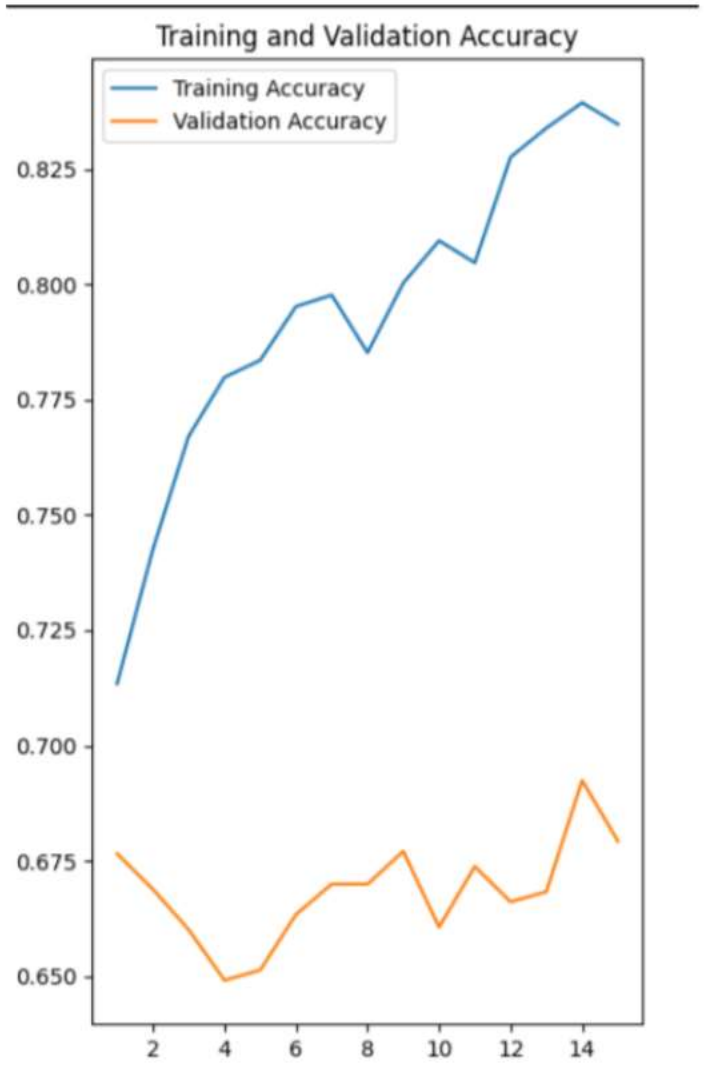
If model accuracy at different segments of the data sets that is at training and validation set is remains almost equal or little bit deviates from itself then model is performing well. The loss must also keep on decreasing at different levels.

Both Model Accuracy Plots



ResNet Plot

VGG16 Plot



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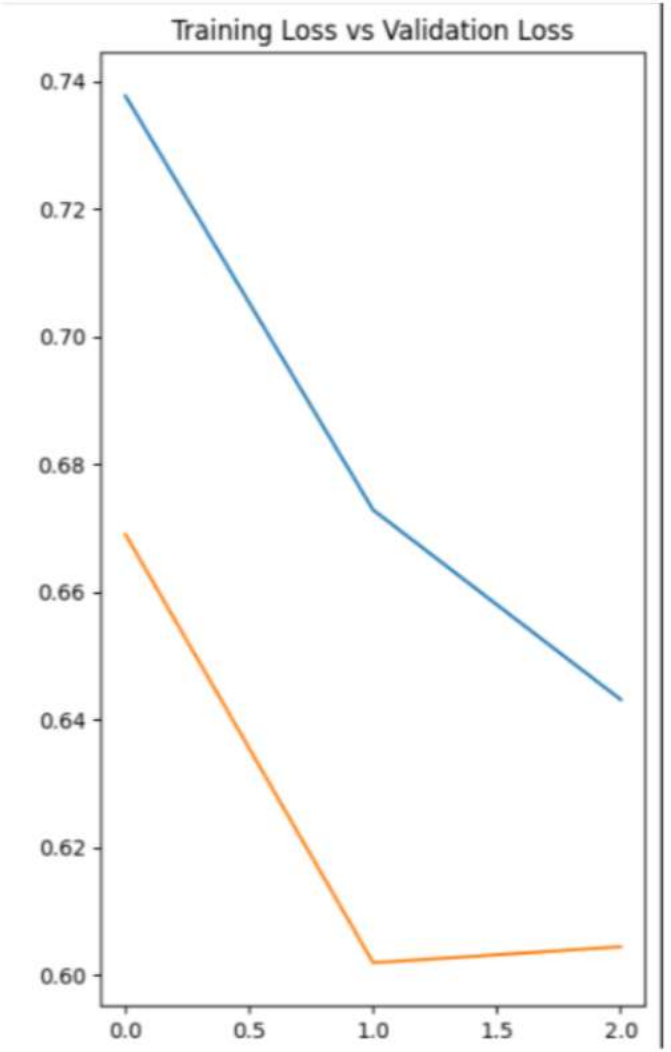
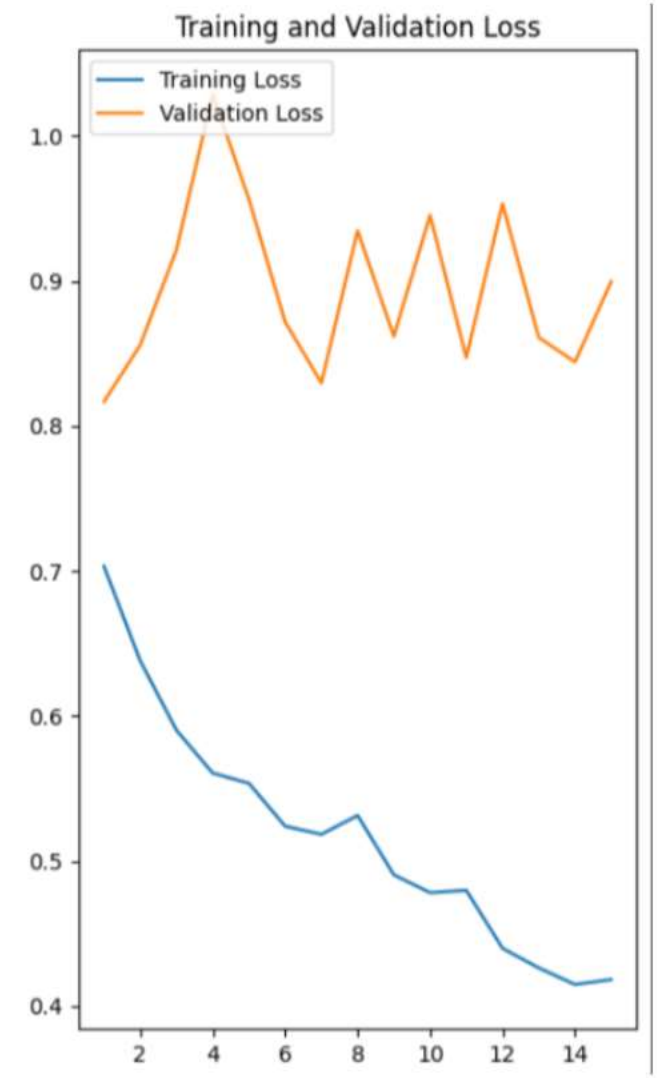
Both Model Loss Plots



ResNet Plot

VGG16 Plot




Thank You