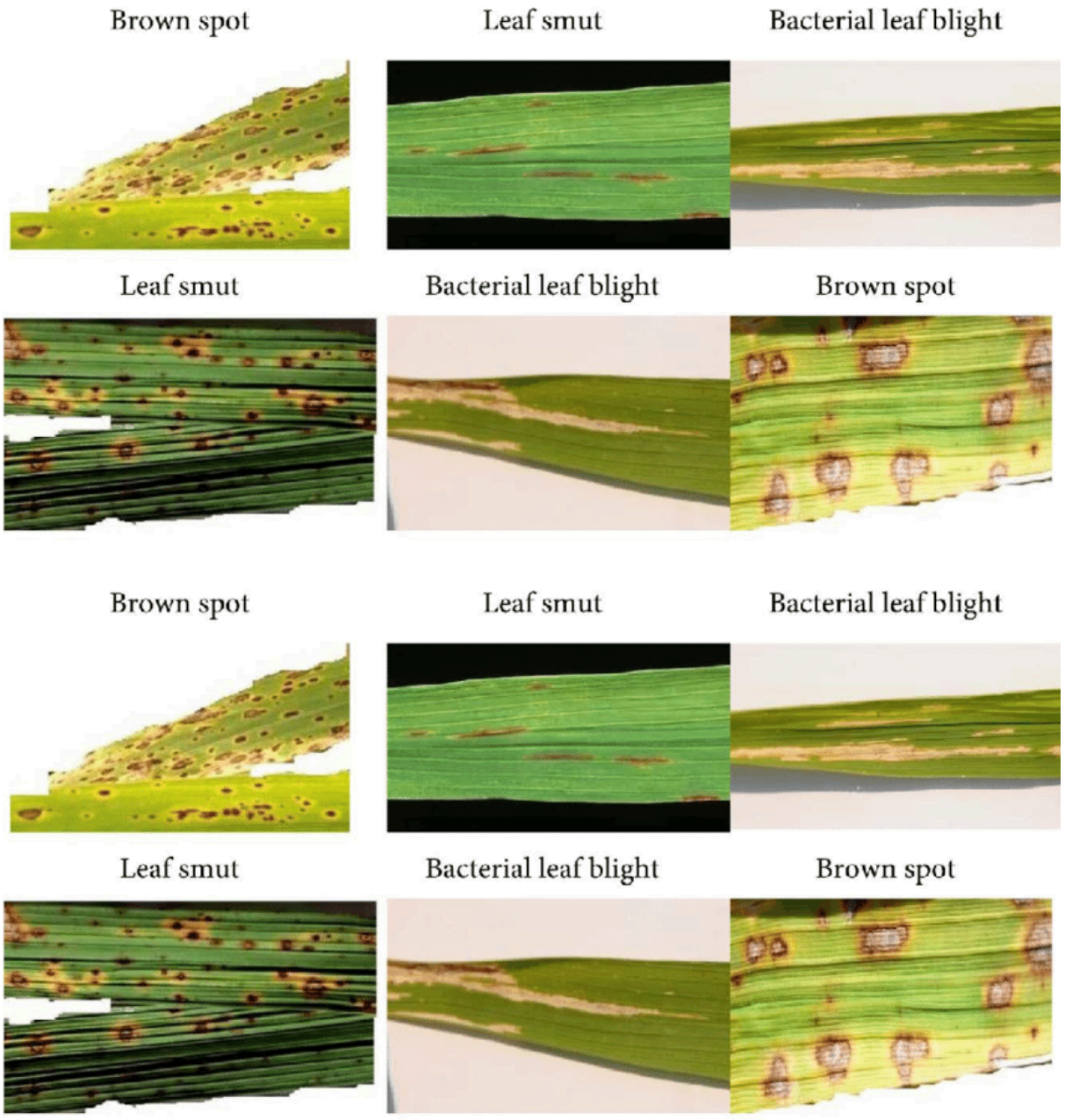
RICE LEAF DISEASE DETECTION

PROJECT-ID = PRCP-1003-Riceleaf

INTRODUCTION

Rice plants are highly vulnerable to a range of bacterial, viral, and fungal diseases, which can drastically reduce rice production. This poses a serious challenge in meeting the global demand for rice, a staple food for a large portion of the population. These diseases not only threaten sustainable rice cultivation but also create hardships for farmers worldwide. Detecting and addressing infections in rice leaves at an early stage is essential to promote the healthy growth of rice plants. Timely intervention plays a critical role in ensuring a steady supply of rice and safeguarding food security for an ever-growing global population.

RICE LEAF DISEASE:



DATA SUMMARY

This dataset includes 120 JPG images of rice leaves affected by various diseases. The images are divided into three categories, each representing a specific type of disease, with 40 images in each category.

CLASSES

- Leaf smut
- Brown spot
- Bacterial leaf blight

WE HAVE BROKEN DOWN THE PROJECT INTO SEVERAL STEPS:

- Importing library
- Loading data
- Preparing data
- Data Processing
- Model building
- Training
- Evaluation
- Testing

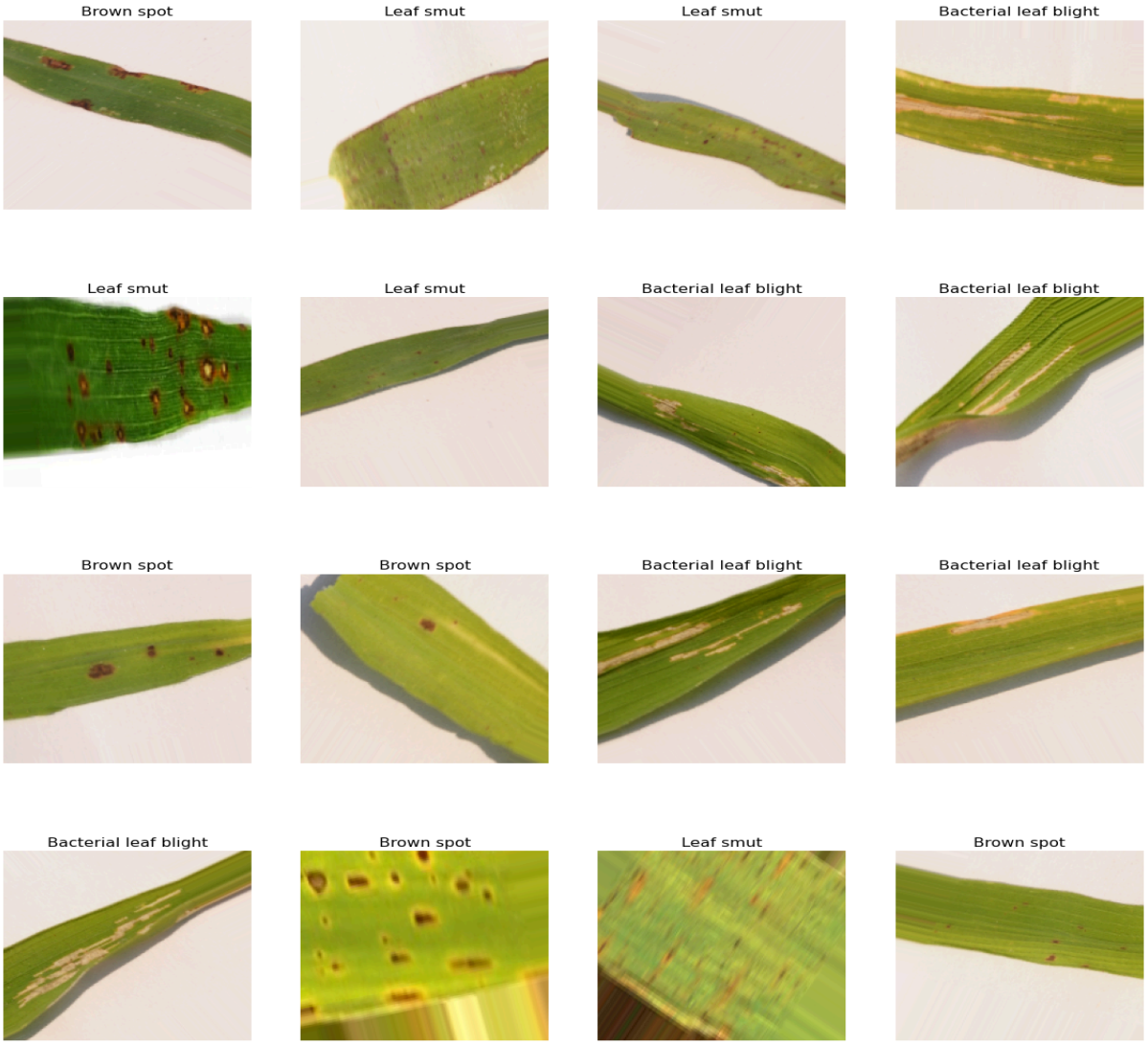
LOADING AND PREPARING THE DATA

- Divide the dataset into three subsets: train, test, and validation, using the split-folders library.

DATA PREPARATION

In this step, we will generate batches for both the training and validation datasets while ensuring the images are properly pre-processed. This involves preparing the data in a way that makes it suitable for feeding into the model. By batching the data, we can efficiently manage memory usage and optimize the training process. Additionally, the images will undergo pre-processing steps such as resizing, normalization, and augmentation to enhance the model's ability to learn and generalize effectively.

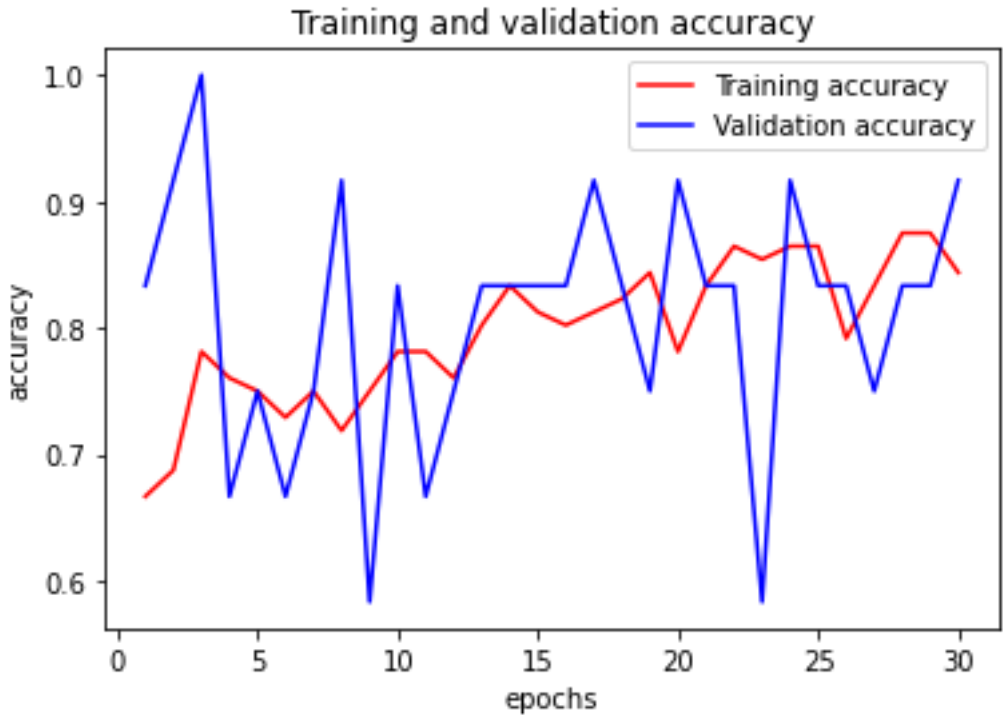
PLOTTING TRAINING IMAGES ALONG WITH THEIR CORRESPONDING LABELS.



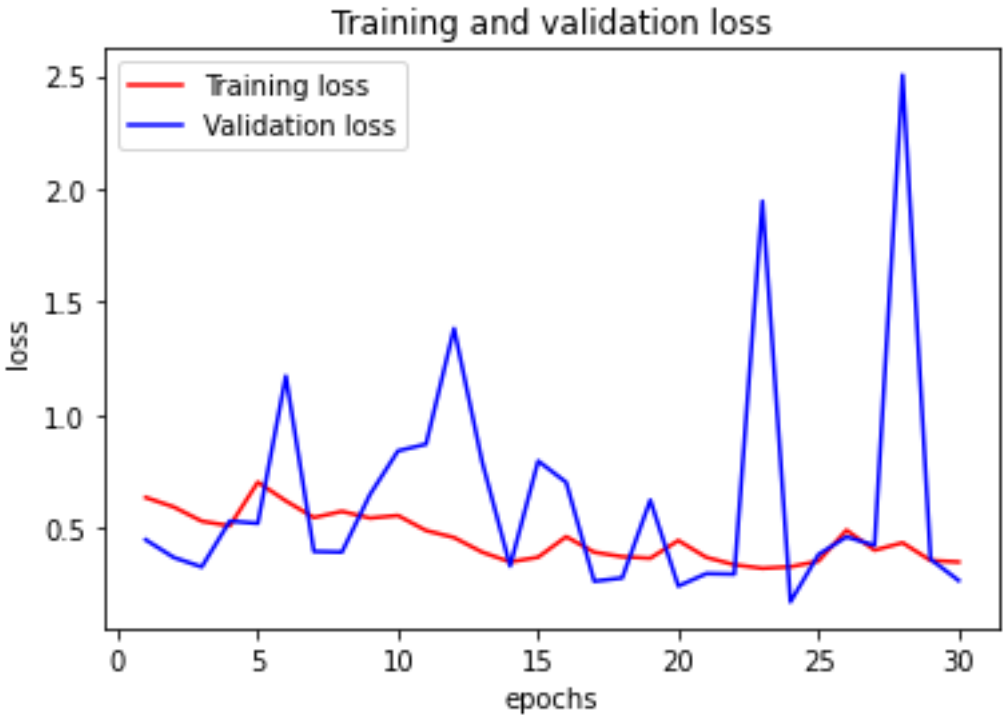
MODEL BUILDING

- In this step, we build the architecture of the CNN model by adding three types of layers: convolutional layers, pooling layers, and fully connected layers.
- Next, we plot a graphical representation of the model.
- We then generate a summary of the model.
- After that, we compile the model.
- The final step is to train the model.
- Upon completion of training, the model achieves a validation accuracy of 91.67% and an overall accuracy of 84.38%.
- Finally, we save the trained model.

PLOTTING THE TRAINING ACCURACY AND VALIDATION ACCURACY:



PLOTTING THE TRAINING LOSS AND VALIDATION LOSS:



MODEL EVALUATION:

- In this case, the loss is 0.53, and the model's accuracy is 91.66%.

MODEL TESTING:

In this step, we create a function to test multiple images from the test dataset.

RESULT:

Actual: Bacterial leaf blight,
Predicted: Bacterial leaf blight.
Confidence: 87.84%

Actual: Brown spot,
Predicted: Bacterial leaf blight.
Confidence: 70.94%

Actual: Bacterial leaf blight,
Predicted: Bacterial leaf blight.
Confidence: 73.29%

Actual: Brown spot,
Predicted: Brown spot.
Confidence: 98.83%

Actual: Bacterial leaf blight,
Predicted: Bacterial leaf blight.
Confidence: 55.05%

Actual: Leaf smut,
Predicted: Leaf smut.
Confidence: 62.17%

Actual: Brown spot,
Predicted: Bacterial leaf blight.
Confidence: 51.1%

Actual: Leaf smut,
Predicted: Leaf smut.
Confidence: 63.67%

Actual: Brown spot,
Predicted: Leaf smut.
Confidence: 44.63%