From these two figures, it can be seen that the VGG16 model predicted correctly 61 times diseased crops when the image was actually that of diseased and 74 times predicted healthy for healthy images. In total it predicted 21 times wrongly the diseased as healthy or vice versa both cases included, thus leading to an 86.538% testing accuracy. Whereas the VGG19 model on the same data set gave the testing accuracy of 83.974%, wherein correctly predicting diseased as diseased 55 times and healthy as healthy 76 times. This model failed 25 times to correctly predict the class of test image. The table is given which contains the comparison between VGG16 and VGG19.

TABLE I COMPARISON BETWEEN VGG16 AND VGG19

	VGG16	**VGG19**
Weight Layers	16	19
Total Parameters	13,42,62,546	13,95,72,248
Trainable Parameters	2,002	2,008
Non-Trainable Parameters	13,42,60,544	13,95,70,240
Average Training Accuracy	93.825%	93.675%
Average Training Loss	62.207%	62.301%
Average Validation Accuracy	82.993%	75.504%
Average Validation Loss	63.953%	65.388%
Testing Accuracy	86.538%	83.974%

VI. CONCLUSION AND FUTURE SCOPE

Through this paper, a comparison can be drawn between the models of existing deep neural networks in terms of their efficiency to detect wheat rust in crop images. It has been found that the VGG16 performs much better than the VGG19 for this task with both average training and average testing accuracies more for VGG16 than VGG19. These findings can be used further in future for the purpose of making choice between using the two CNN models present in the Keras library. Also, these findings can be used extensively for the purpose of designing automated systems which can directly detect the wheat rust in infected crops, this purpose can be achieved by making an application which when fed with the crop image can classify it into a healthy or infected crop. This is an efficient method to prevent a huge amount of crop wastage due to these kinds of crop diseases. Also, the accuracies of the existing models can be further improved by using the techniques like dropout in hidden layers, random weight initialisation and parameter tuning.

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