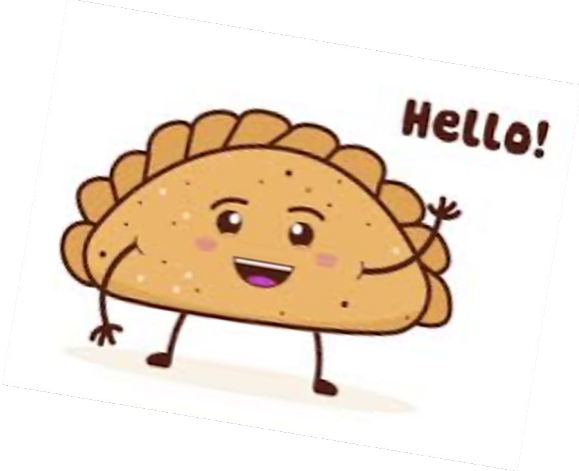
Tea leaves classification

NMA project

Pod empanada



Angarita peña, yeselth; Armas, Miguel; cebrián Baca, jose enrique; chicchon, miguel and maestri, maría laura

Something about Tea

Tea is one of the most popular drinks in the world, second only to water.

Originating in China, contains medical properties and health care functions, and is quite effective in enhancing human immunity.

Problematic

At present, the diagnosis of tea leaf diseases relies on the manual method, making results largely subjective and sometimes inaccurate.

Due to machine learning and image processing methods that do not require manual intervention have been widely used in the detection and identification of plant diseases.

Data set:

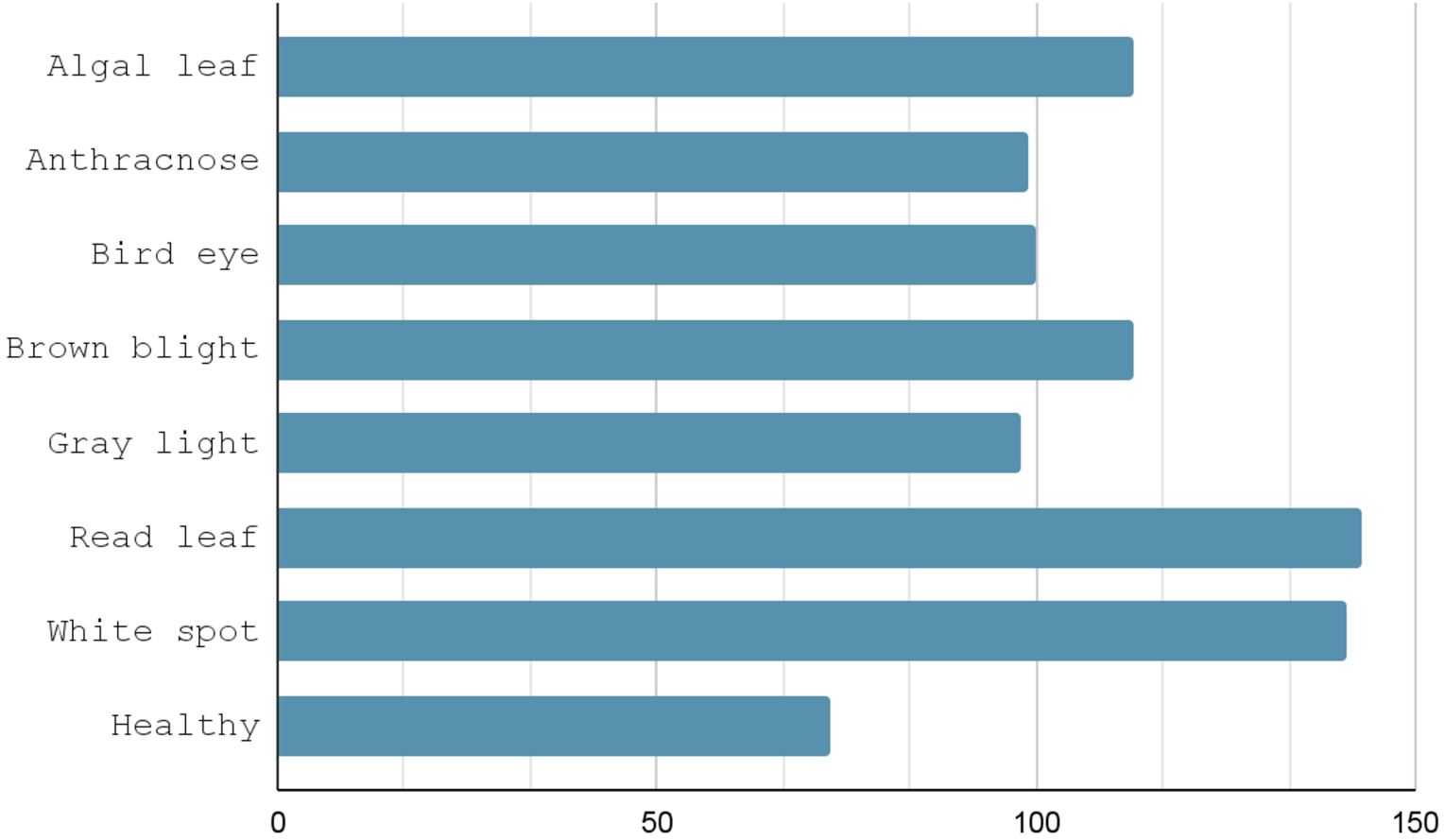
→ From Kaggle

→ 886 images of leaves

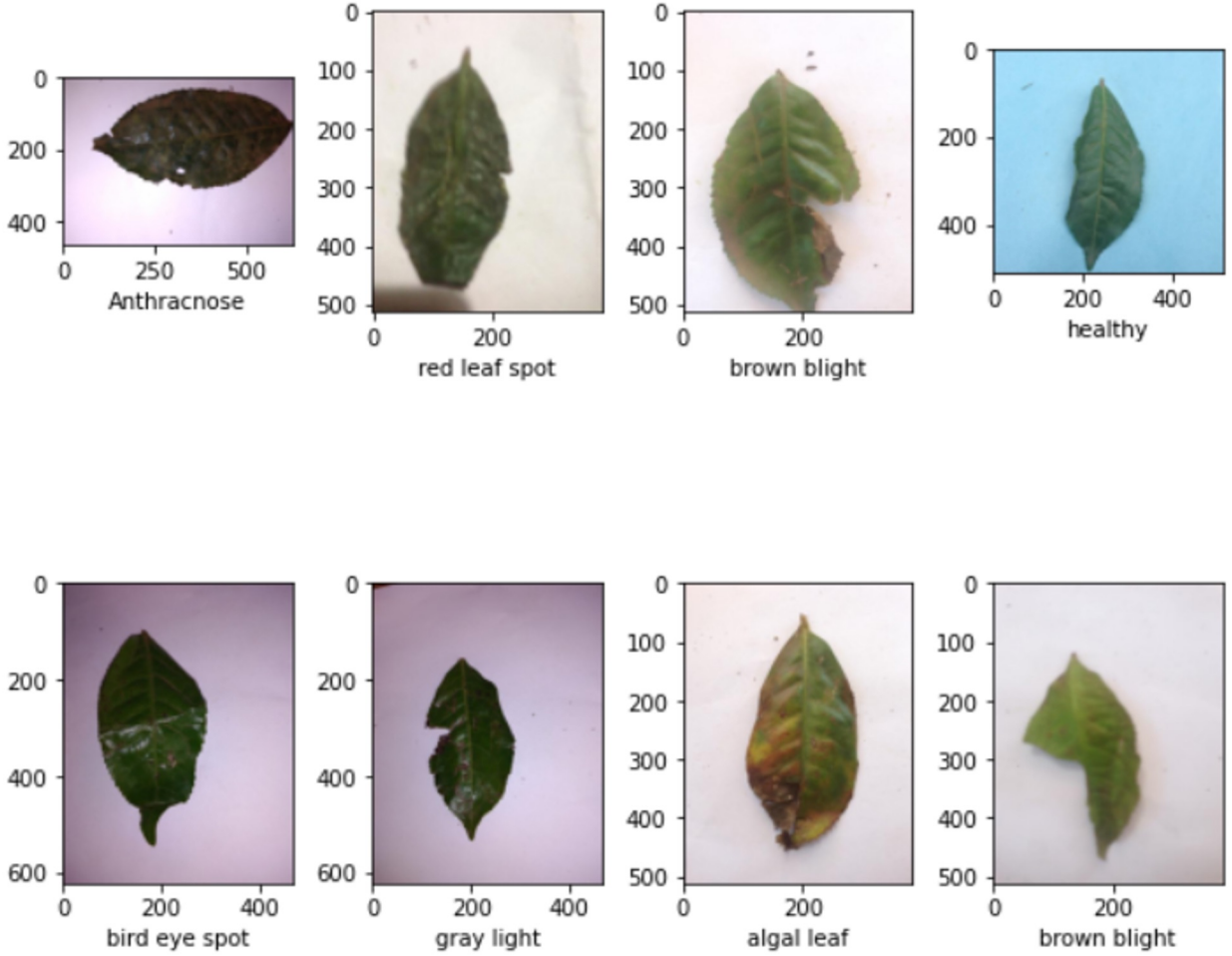
↳ contains 7 common diseases of tea classes and a class of healthy leaves:

↳ (1) Red leaf spot; (2) Algal leaf spot; (3) Bird's eyespot; (4) Gray blight; (5) White spot; (6) Anthracnose; (7) Brown blight

Data set distribution

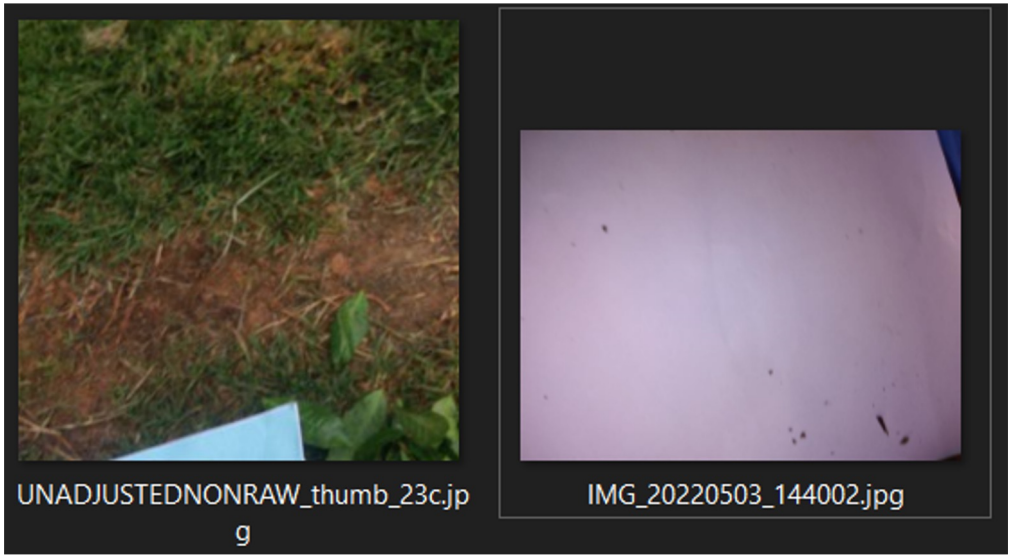


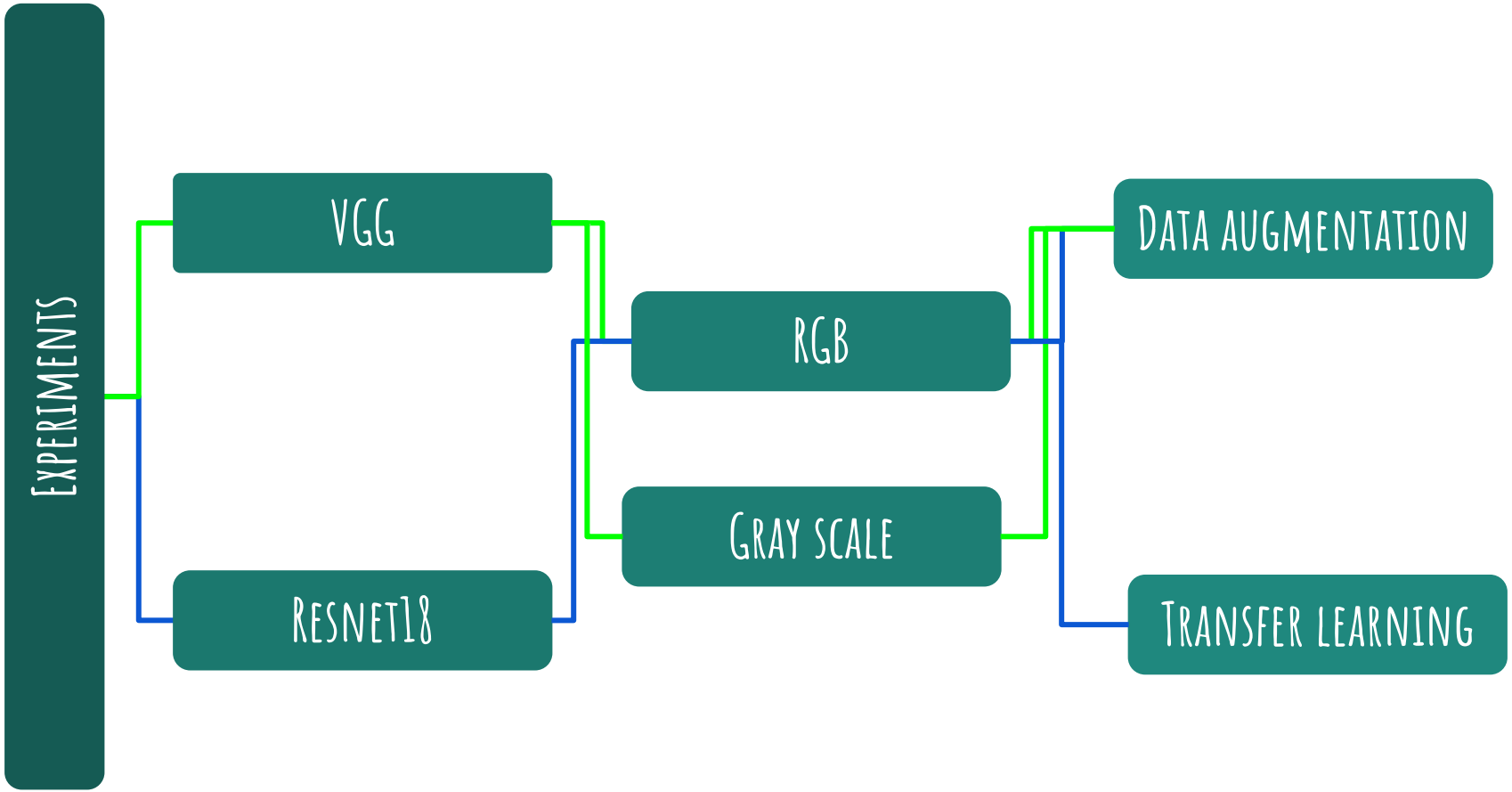
Sample


Anthracnose
red leaf spot
brown blight
healthy
bird eye spot
gray light
algal leaf
brown blight

Preprocessing

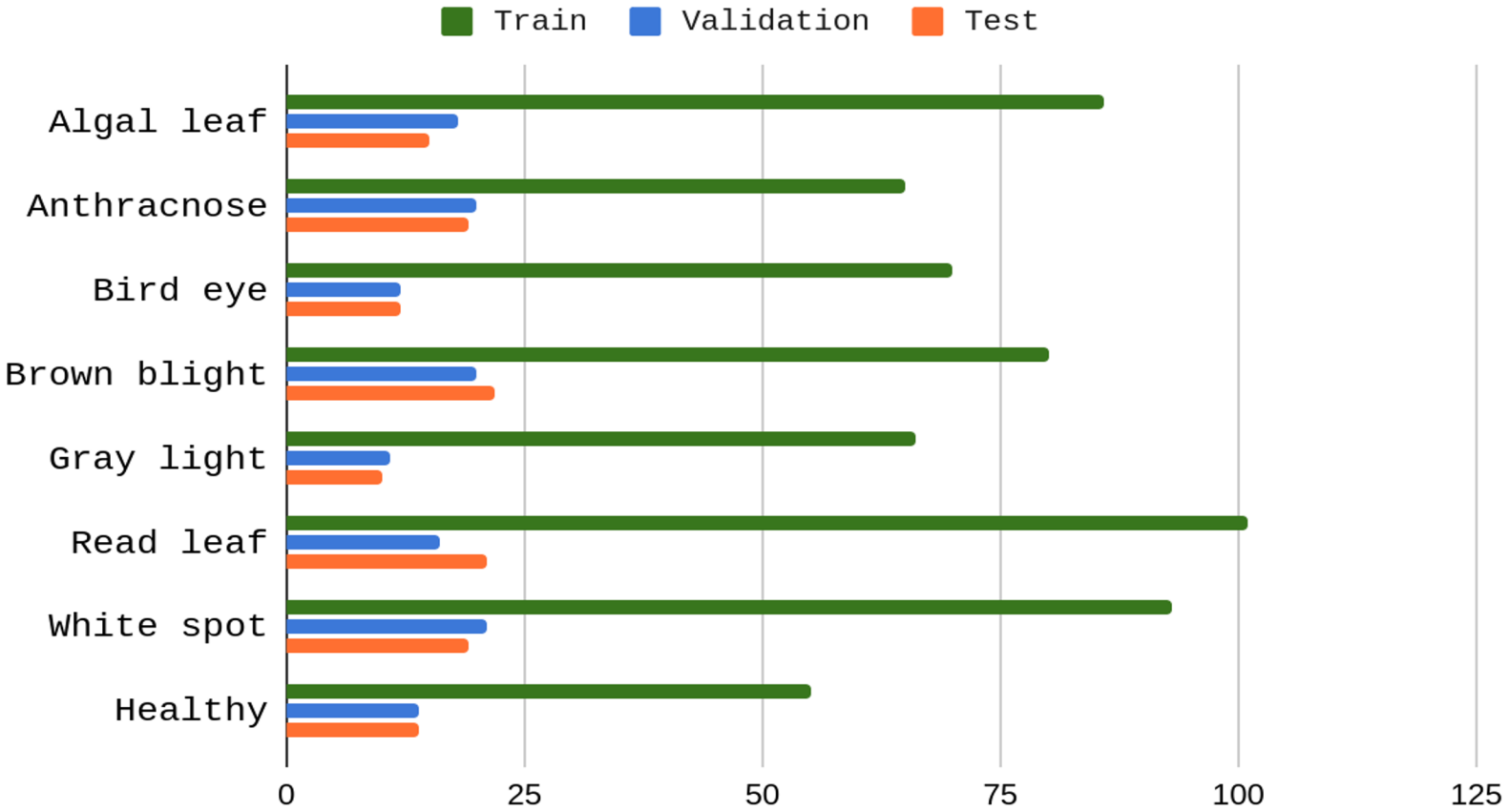
→ we work with 880 images: we remove duplicates and "empty" images



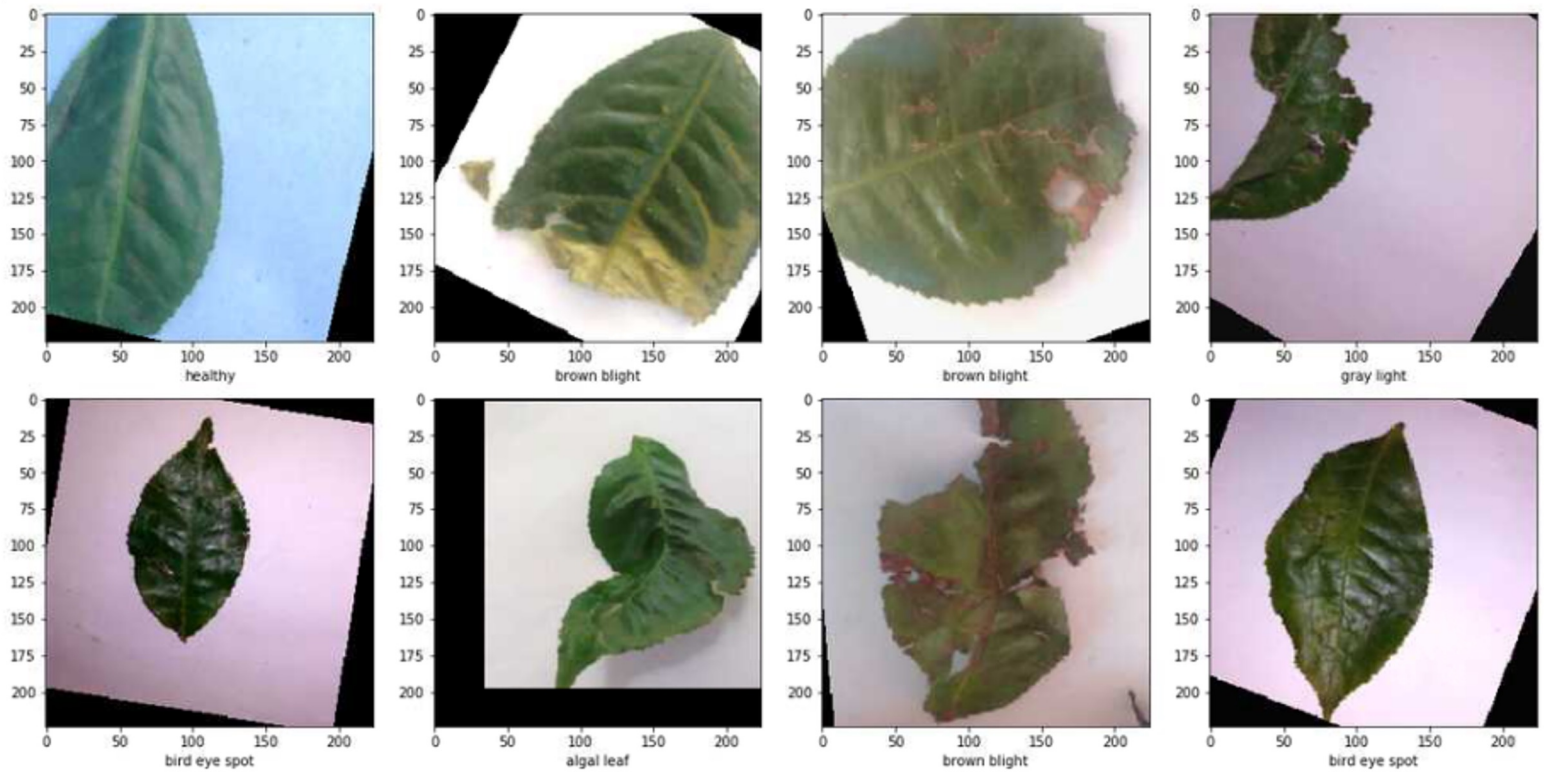


*Early stopping was used in all the experiments

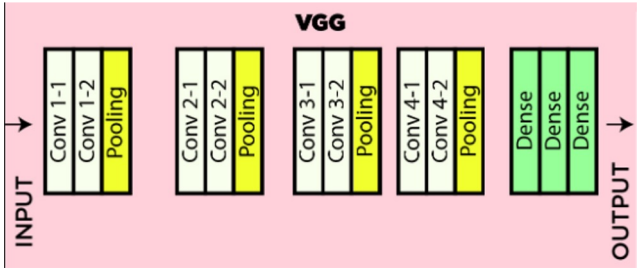
→ WE SPLIT THE DATA SET IN: TRAINING (70%), VALIDATION (15%) AND TEST (15%)



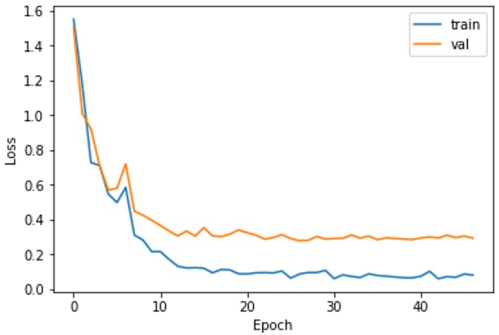
DATA AUGMENTATION

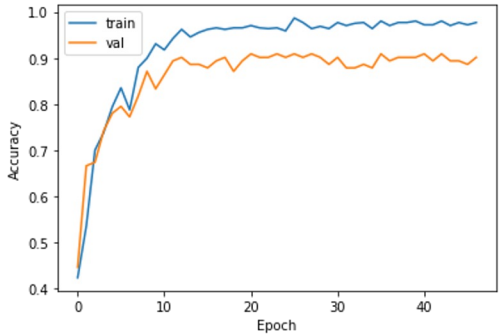


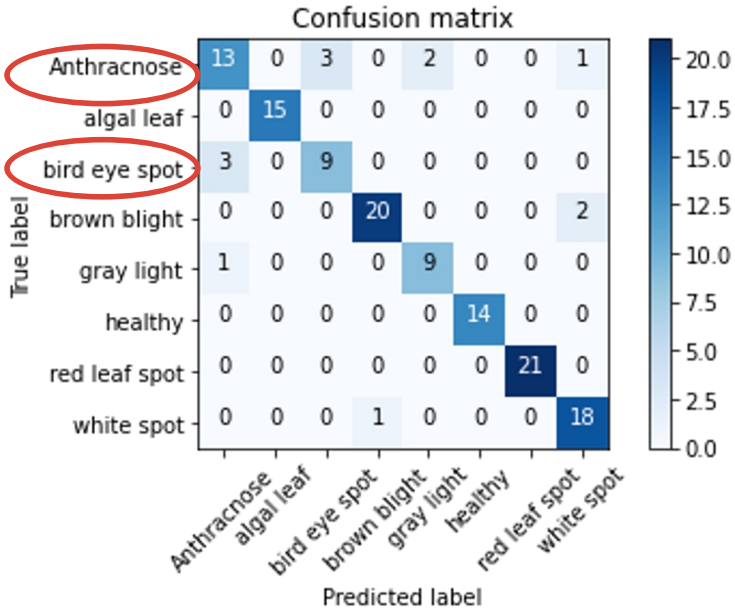
Results: VGG (RGB)



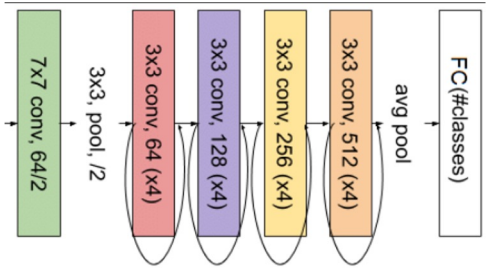

```
Input_size(3,224,224),
Batch_size_train(16),
Adam(lr=1e-4),
ReduceLROnPlateau(patience=10),
EarlyStop(patience=25),
stop_epoch(46), Best_epoch(20)
```



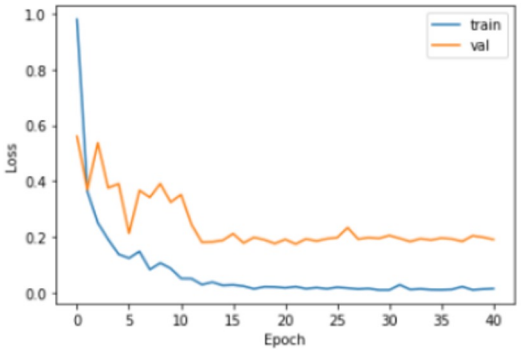


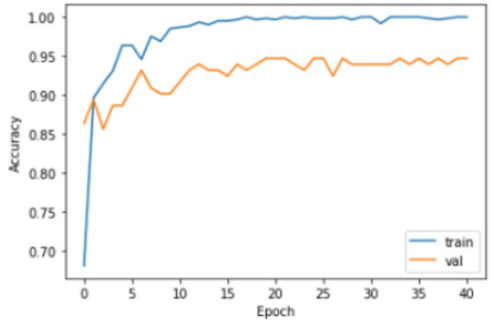


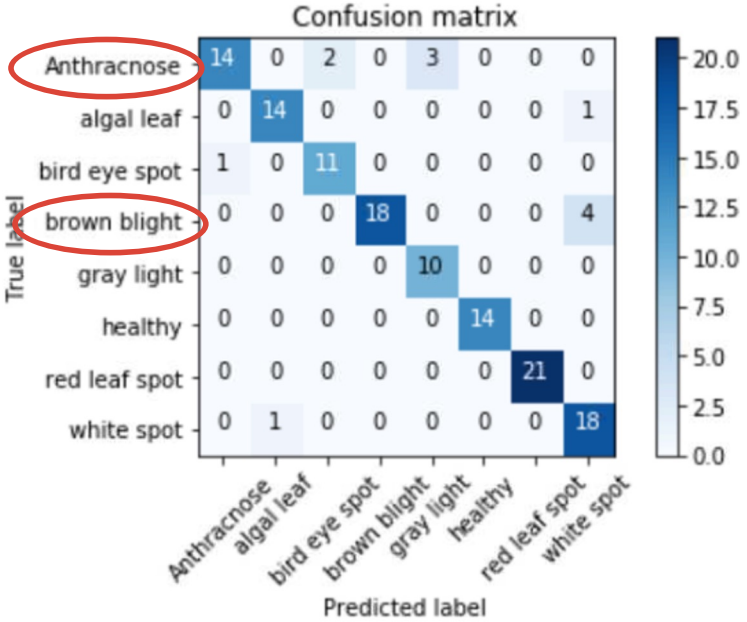
Results: ResNet18 (RGB) + DA + TL




```
Input_size(3,224,224),
Batch_size_train(16),
Adam(lr=1e-4),
ReduceLROnPlateau(patience=5),
EarlyStop(patience=20),
stop_epoch(40), Best_epoch(19)
```







Results from test dataset

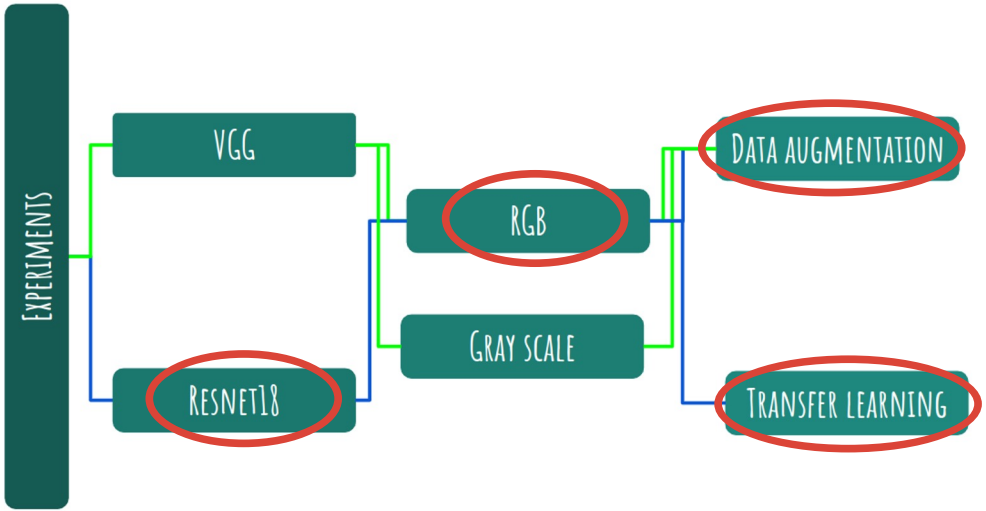
Model	Global metrics			
	Accuracy	Precision	Recall	F1-Score
Vgg RGB	0.90	0.90	0.90	0.90
ReSNET18 (RGB) + DA + TL	0.91	0.91	0.92	0.91

Model	accuracy							
	Anthracnose	Algal leaf	Bird eye spot	Brown blight	Gray light	healthy	Red leaf spot	White spot
Vgg RGB	0.68	1.00	0.75	0.91	0.90	1.00	1.00	0.95
ReSNET18 (RGB) + DA + TL	0.74	0.93	0.92	0.82	1.00	1.00	1.00	0.95

Conclusions

The best result were obtained using a resnet18 rgb with data augmentation and transfer learning.

The *anthracnose* disease was the most difficult to identify.



Thank you neuromatch academy!