IBM Coursera Advanced Data Science Capstone

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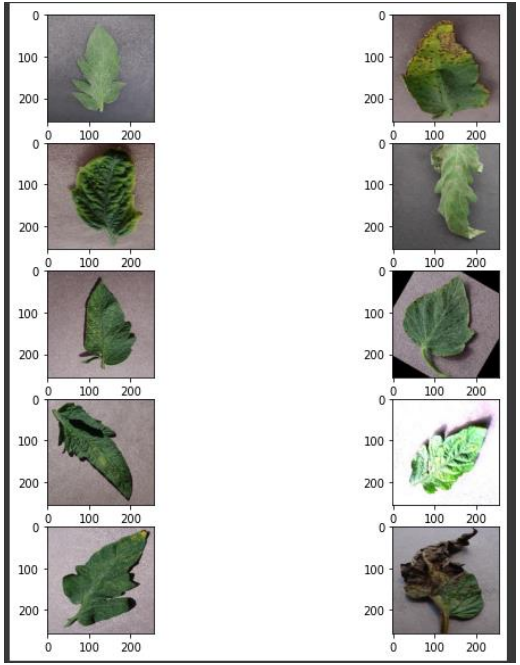
https://github.com/Wardmisp/IBM-Coursera-Data-Science-Capstone

Data set - images

- Images data
- Kaggle - Tomato leaf disease detection
- Task: Classify the disease for each plant

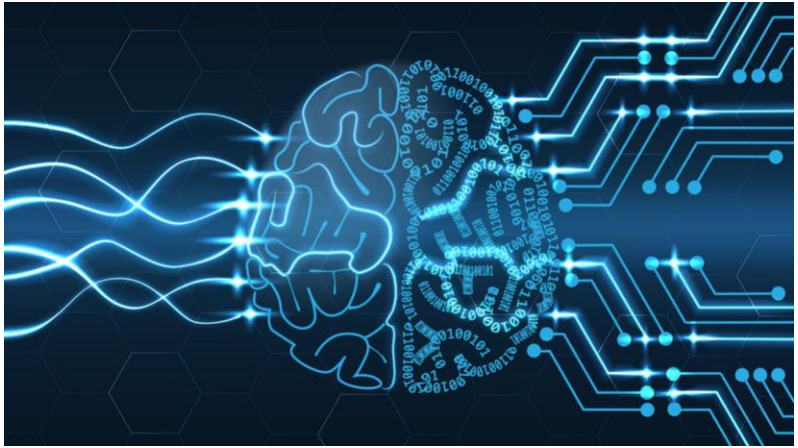


Use case - prevents disease

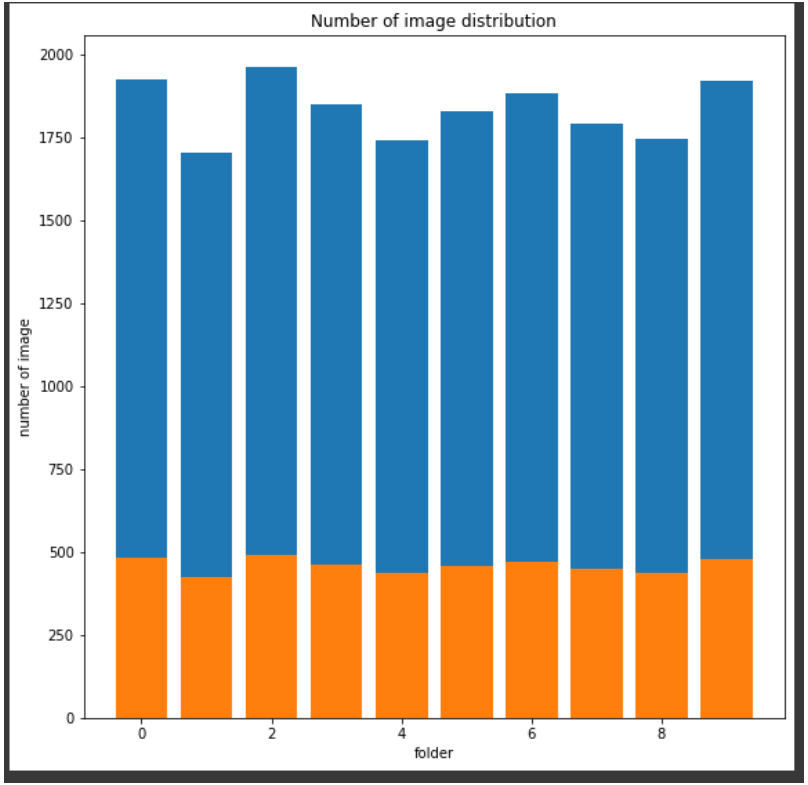
- Maximize rentability for each plant
- Global issue : how to feed the world

Solution algorithm

- Neural Network
- **Convolutional Neural Network**
- KNN
- **Random Forest**



Data assessment



Data assessment

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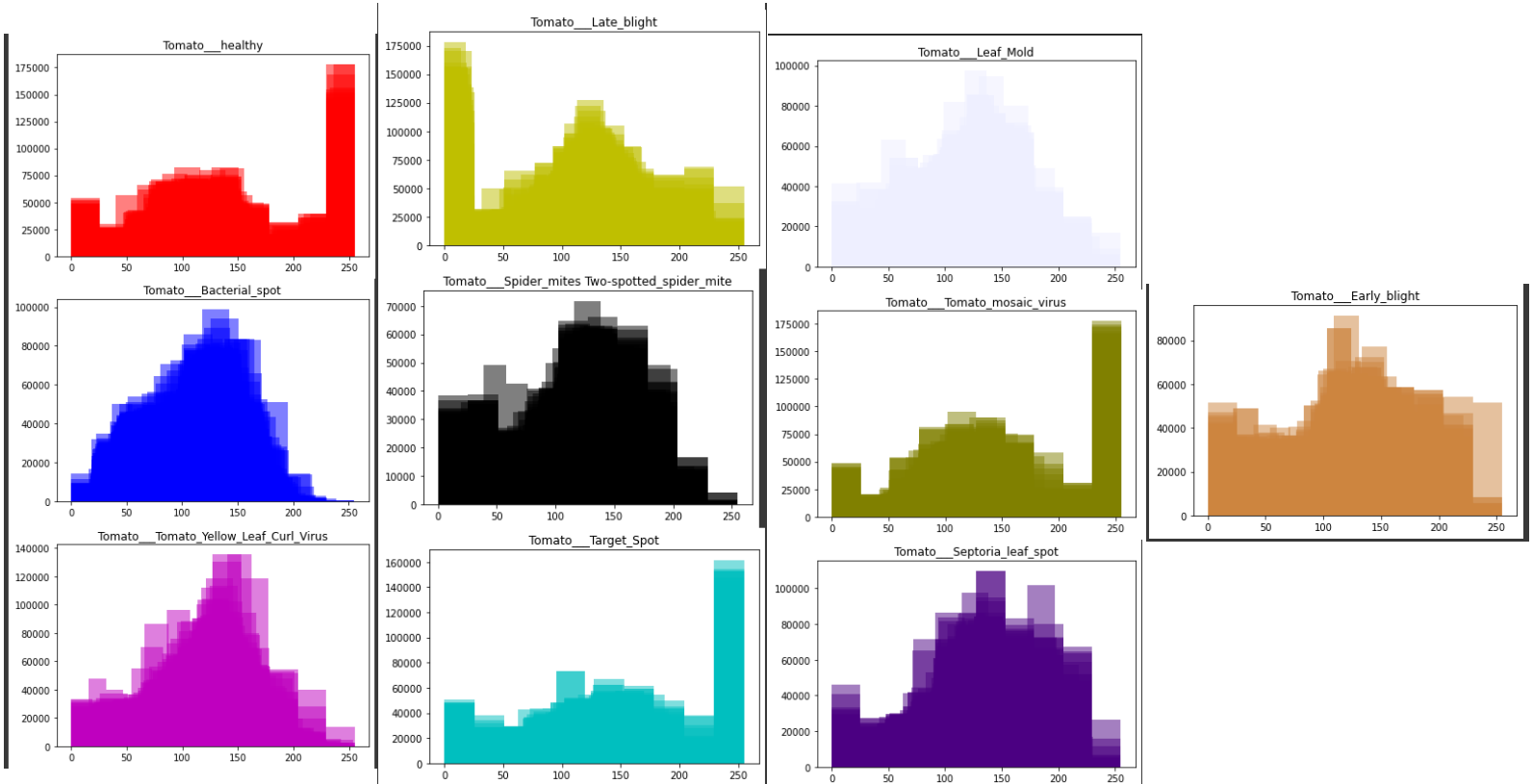


CNN Layers & Random Forest Parameters

For the random forest :

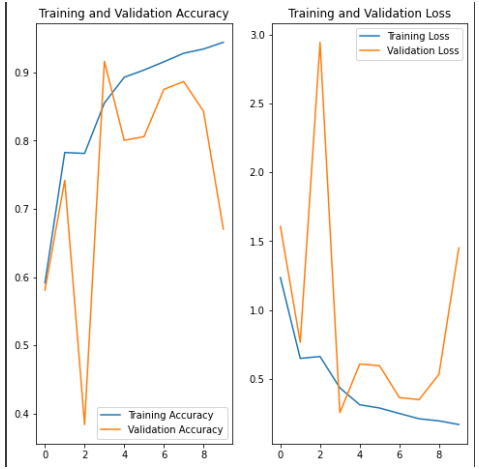
100 estimator with default parameter from scikit-learn.

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 254, 254, 32)	896
batch_normalization (BatchNo	(None, 254, 254, 32)	128
conv2d_1 (Conv2D)	(None, 252, 252, 32)	9248
batch_normalization_1 (Batch	(None, 252, 252, 32)	128
max_pooling2d (MaxPooling2D)	(None, 126, 126, 32)	0
dropout (Dropout)	(None, 126, 126, 32)	0
conv2d_2 (Conv2D)	(None, 124, 124, 64)	18496
batch_normalization_2 (Batch	(None, 124, 124, 64)	256
dropout_1 (Dropout)	(None, 124, 124, 64)	0
conv2d_3 (Conv2D)	(None, 122, 122, 128)	73856
batch_normalization_3 (Batch	(None, 122, 122, 128)	512
max_pooling2d_1 (MaxPooling2	(None, 61, 61, 128)	0
dropout_2 (Dropout)	(None, 61, 61, 128)	0
flatten (Flatten)	(None, 476288)	0
dense (Dense)	(None, 512)	243859968
batch_normalization_4 (Batch	(None, 512)	2048
dropout_3 (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 128)	65664
batch_normalization_5 (Batch	(None, 128)	512
dropout_4 (Dropout)	(None, 128)	0
dense_2 (Dense)	(None, 10)	1290

Total params: 244,033,002
Trainable params: 244,031,210
Non-trainable params: 1,792

Model performance : CNN

```
Epoch 1/10
574/574 [==============================] - 122s 199ms/step - loss: 1.7204 - accuracy: 0.4533
Epoch 2/10
574/574 [==============================] - 113s 196ms/step - loss: 0.6997 - accuracy: 0.7649
Epoch 3/10
574/574 [==============================] - 113s 196ms/step - loss: 0.8272 - accuracy: 0.7316
Epoch 4/10
574/574 [==============================] - 114s 197ms/step - loss: 0.5116 - accuracy: 0.8288
Epoch 5/10
574/574 [==============================] - 114s 197ms/step - loss: 0.3261 - accuracy: 0.8884
Epoch 6/10
574/574 [==============================] - 113s 196ms/step - loss: 0.2814 - accuracy: 0.9094
Epoch 7/10
574/574 [==============================] - 113s 196ms/step - loss: 0.2638 - accuracy: 0.9099
Epoch 8/10
574/574 [==============================] - 114s 198ms/step - loss: 0.2131 - accuracy: 0.9272
Epoch 9/10
574/574 [==============================] - 113s 197ms/step - loss: 0.2061 - accuracy: 0.9321
Epoch 10/10
574/574 [==============================] - 113s 196ms/step - loss: 0.1731 - accuracy: 0.9415
```



Accuracy before normalization : 0,9415

```
Epoch 1/10
574/574 [==============================] - 118s 203ms/step - loss: 1.4696 - accuracy: 0.5472 - val_loss: 3.2023 - val_accuracy: 0.3590
Epoch 2/10
574/574 [==============================] - 116s 201ms/step - loss: 0.7785 - accuracy: 0.7397 - val_loss: 0.4329 - val_accuracy: 0.8552
Epoch 3/10
574/574 [==============================] - 115s 200ms/step - loss: 0.5273 - accuracy: 0.8217 - val_loss: 0.8820 - val_accuracy: 0.7631
Epoch 4/10
574/574 [==============================] - 114s 197ms/step - loss: 0.4605 - accuracy: 0.8482 - val_loss: 1.2452 - val_accuracy: 0.5858
Epoch 5/10
574/574 [==============================] - 113s 196ms/step - loss: 0.4304 - accuracy: 0.8589 - val_loss: 1.4480 - val_accuracy: 0.6316
Epoch 6/10
574/574 [==============================] - 112s 195ms/step - loss: 0.3498 - accuracy: 0.8814 - val_loss: 0.3656 - val_accuracy: 0.8726
Epoch 7/10
574/574 [==============================] - 113s 195ms/step - loss: 0.2768 - accuracy: 0.9067 - val_loss: 0.3340 - val_accuracy: 0.8857
Epoch 8/10
574/574 [==============================] - 112s 195ms/step - loss: 0.2456 - accuracy: 0.9190 - val_loss: 0.2607 - val_accuracy: 0.9108
Epoch 9/10
574/574 [==============================] - 112s 195ms/step - loss: 0.2111 - accuracy: 0.9302 - val_loss: 0.4487 - val_accuracy: 0.8613
Epoch 10/10
574/574 [==============================] - 112s 195ms/step - loss: 0.2206 - accuracy: 0.9262 - val_loss: 0.4517 - val_accuracy: 0.8530
```

Accuracy after normalization : 0,9262

Model performance : Random Forest

```
Accuracy: 0.9838604143947656
```