Projet IA201

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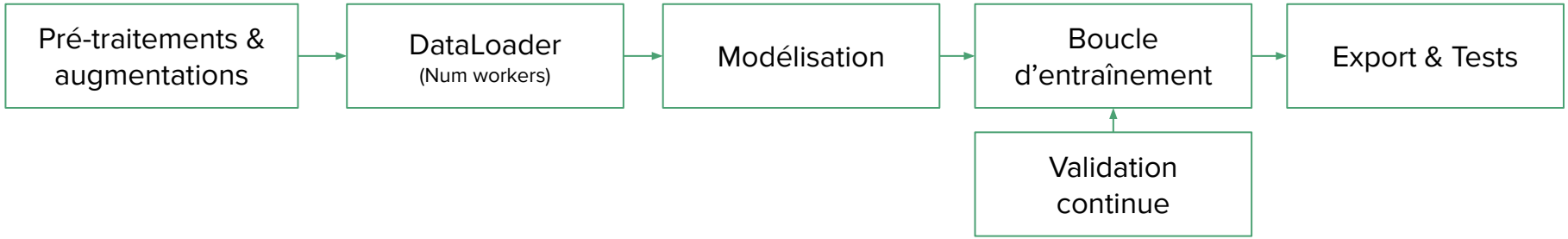
Contexte et objectif du projet

- Prendre en main la bibliothèque python : Pytorch
- Comparer l'intérêt du transfert learning plutôt que le learning from scratch autour de 2 datasets :
  - New Plant Disease
    - Images de 128 pixels
    - 38 classes : toutes ont entre 1600 et 2000 images pour un total de
  - Melanoma Cancer
    - Images de 224 pixels
    - 2 classes : Malignant (5590 images) & Benign (6289 images)

Protocole d’entrainement

- Pipeline générale
- Fonction de coût et optimiser
- Pas d'apprentissage adaptatif
- Arrêt de l'entraînement
- Amélioration possible ...

Pipeline générale



Composants de l'optimisation

- Fonction de coût et Optimiser
  - AdamW
  - Cross Entropy
- Pas d'apprentissage adaptatif
  - ReduceLROnPlateau
  - StepLR
- Eviter le sur apprentissage
  - Early stopping

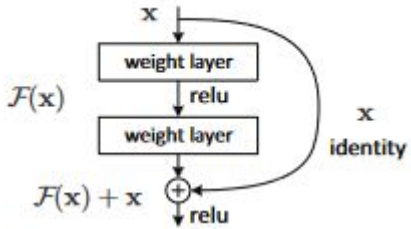
Architecture du CNN Fait Maison

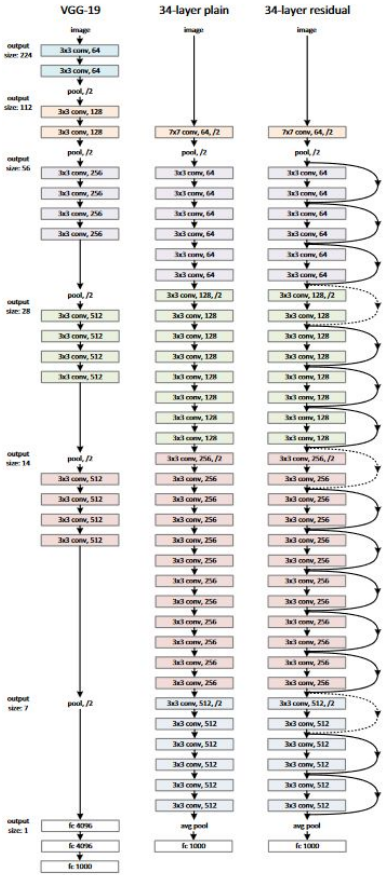
- Schéma du Réseau
- Hyper-Paramètres Clefs

Schéma du Réseau

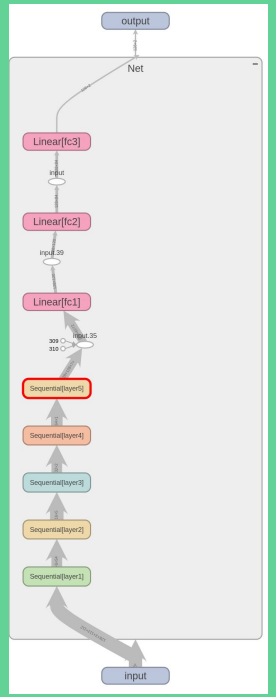
Schéma initial : (Conv (5x5) → BN → ReLU → MaxPool)* → FC

Blocs Résiduels et dropouts :

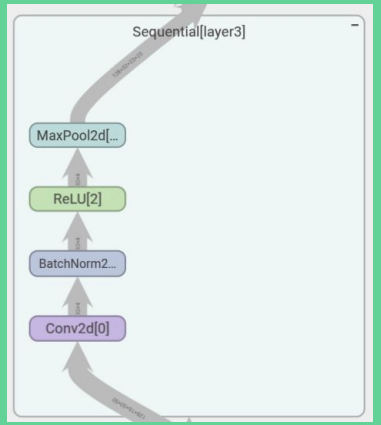




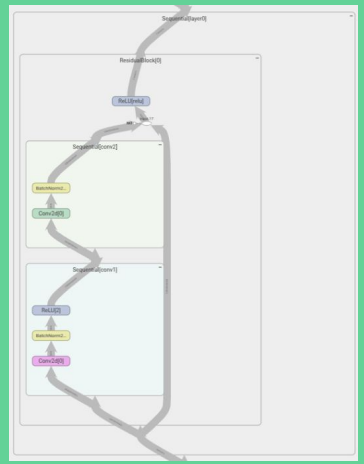
Hyper paramètres et architectures finales

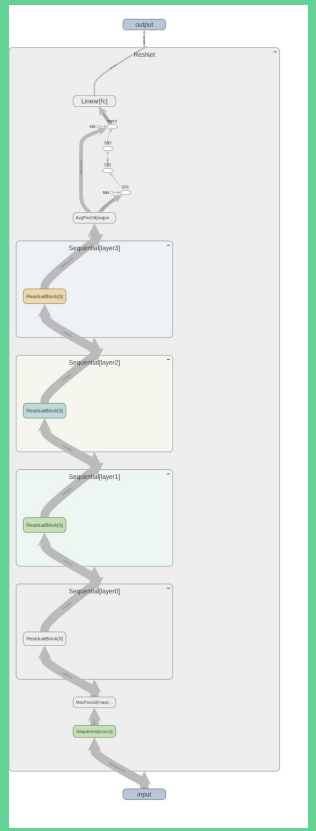


5 couches



[1, 1, 1, 1], 4 Blocs Résiduels

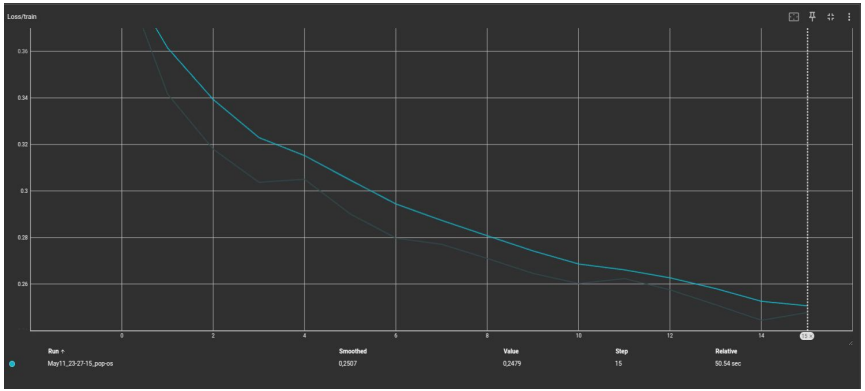




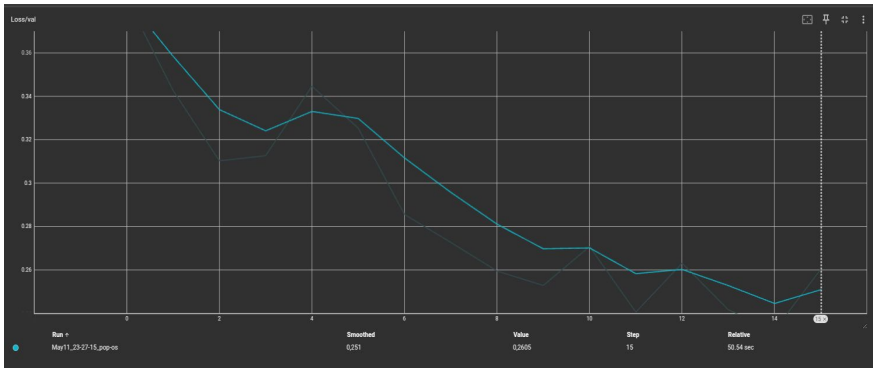
Melanoma Cancer

CNN

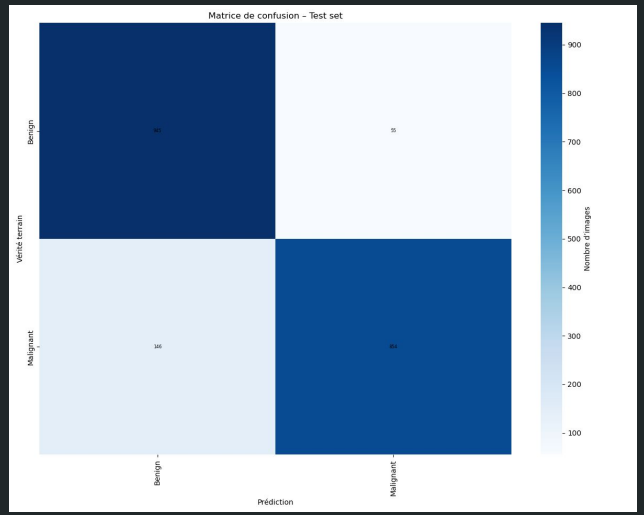
Training loss



Validation loss



Matrice de confusion

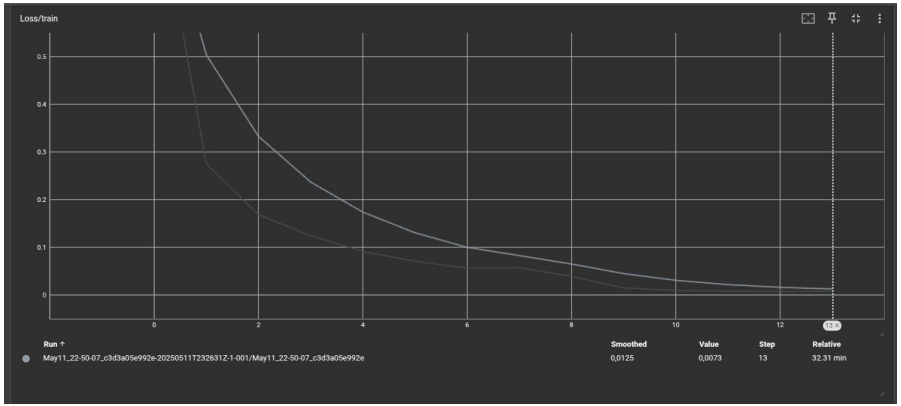


Accuracy : 92.05%
Loss Validation : 0.22
18 epochs

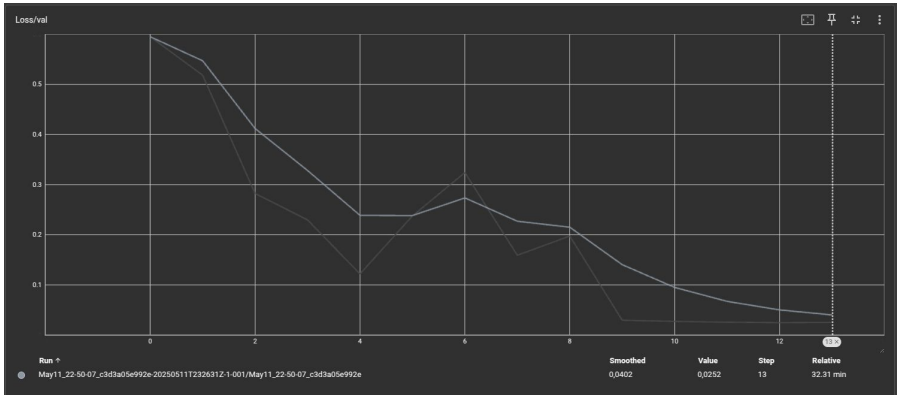
Plants Disease

CNN

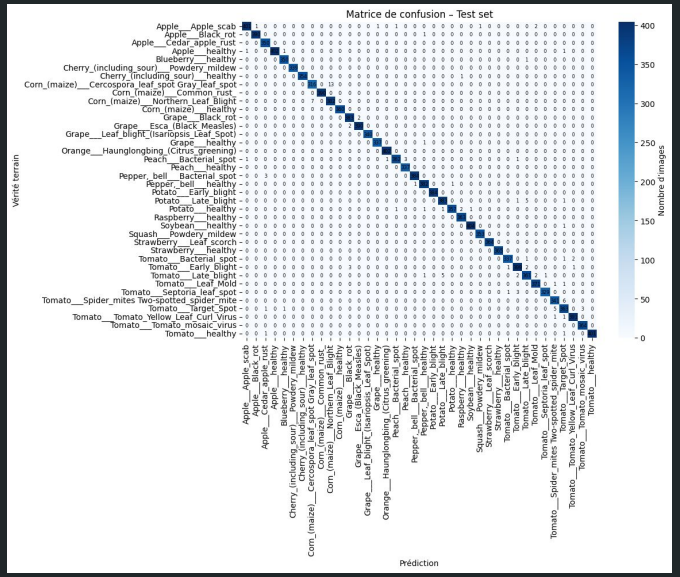
Training loss



Validation loss



Matrice de confusion



Accuracy : 98.05%

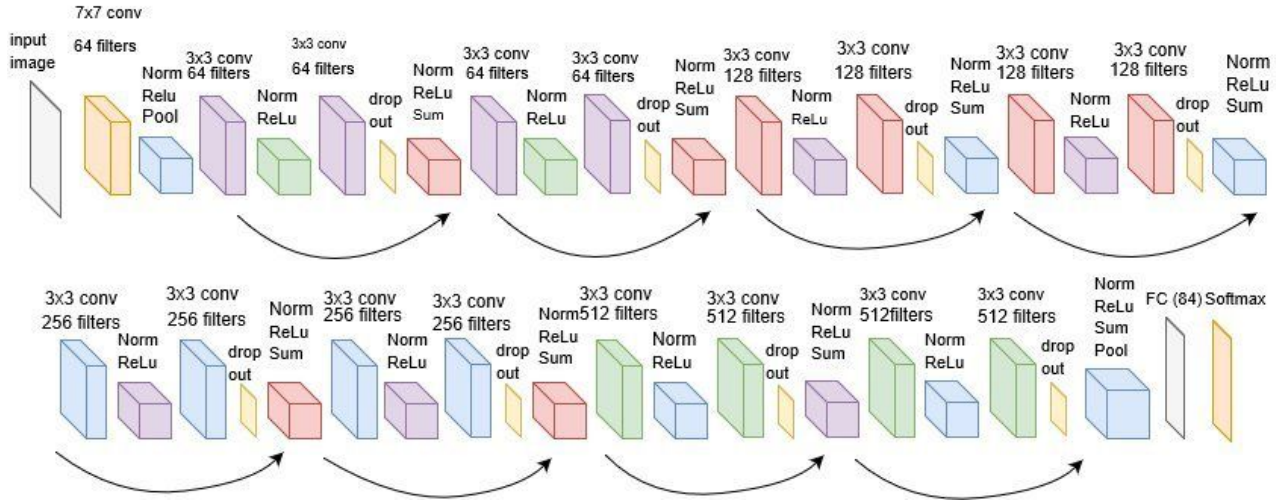
Loss Validation : 0.03

15 epochs

Fine Tuning: ResNet18

- ResNet18 et ImageNet
- Courbes d’apprentissage

ResNet18



ImageNet

- 14 millions d'images
- 1000 classes

Spécialisation

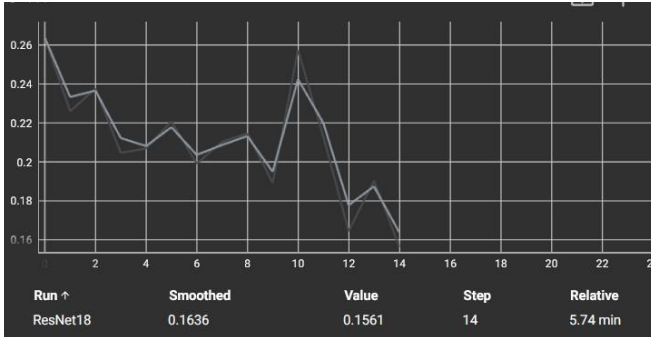
New database

- ≤ 300 000 images
- ≤ 50 classes

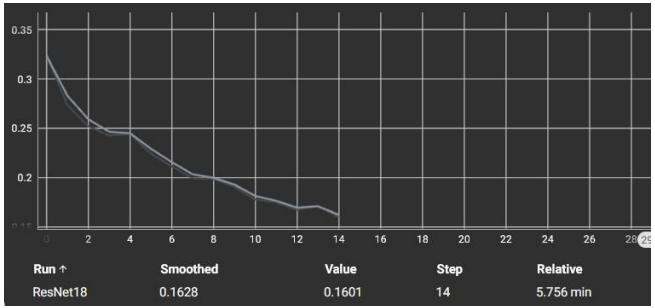
Melanoma Cancer

ResNet 18

Validation loss

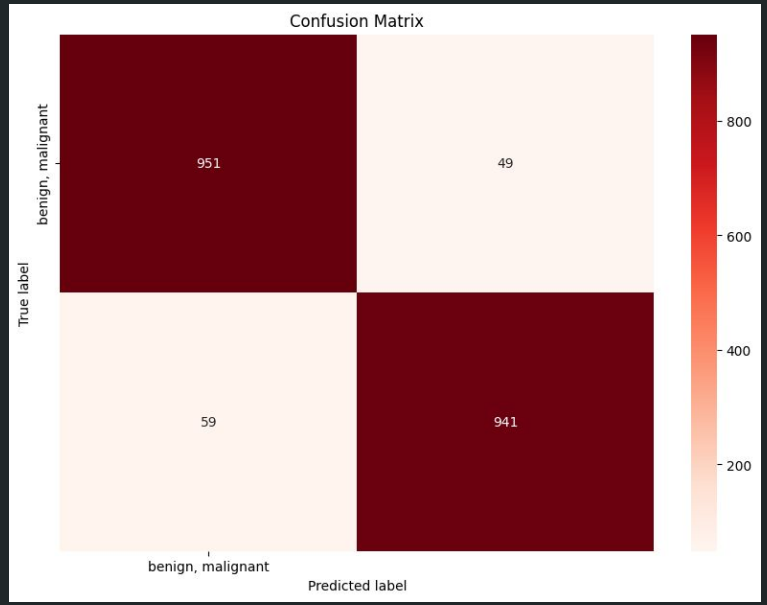


Training loss



- Final accuracy: 94.60%
- Final loss: 0.16

- Optimiser: AdamW
- Scheduler: StepLR
- 15 Epochs

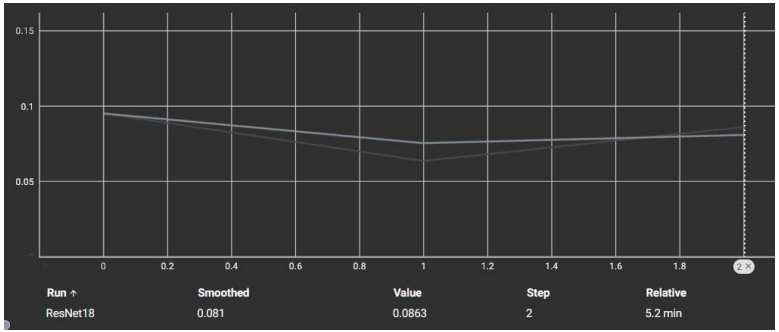


Matrice de confusion

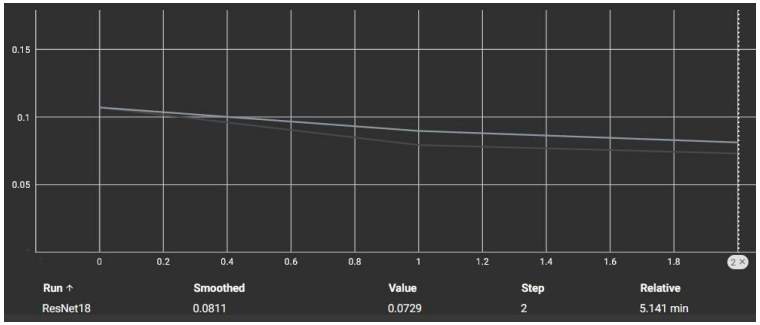
Plants Disease

ResNet 18

Validation loss

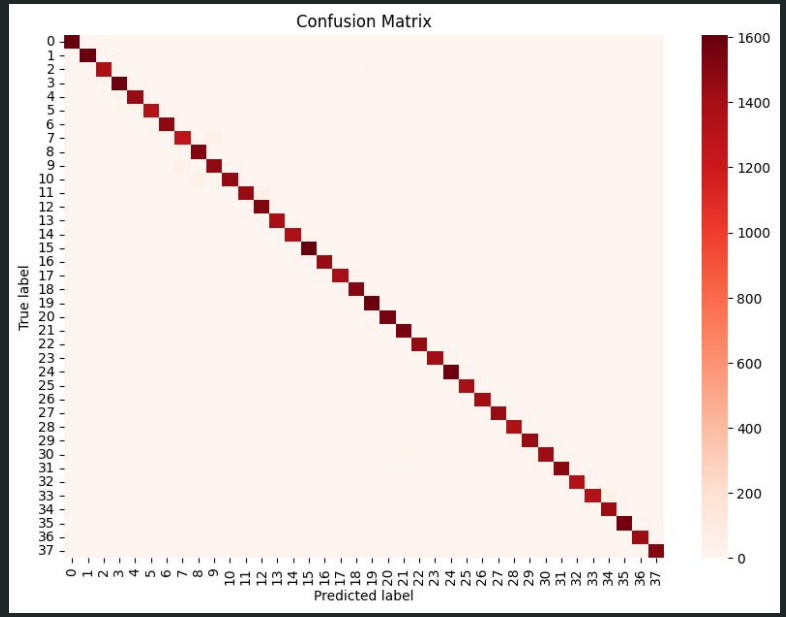


Training loss



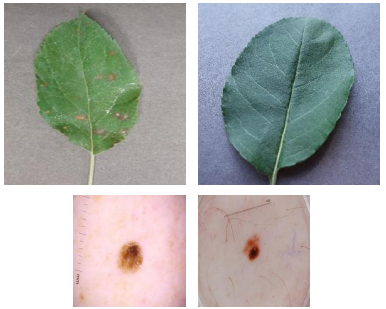
- Final accuracy: 98.08%
- Final loss: 0.06

- Optimiser: AdamW
- Scheduler: None
- 3 Epochs

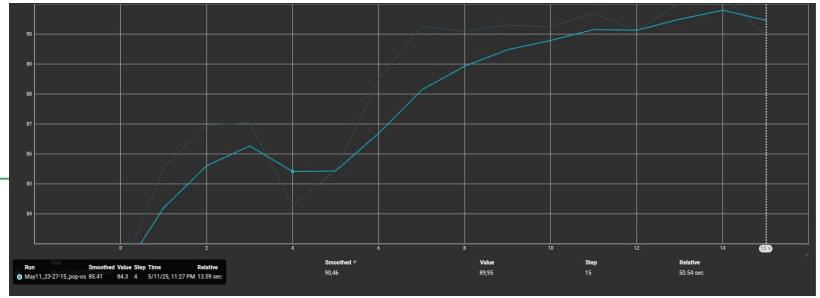


Matrice de confusion

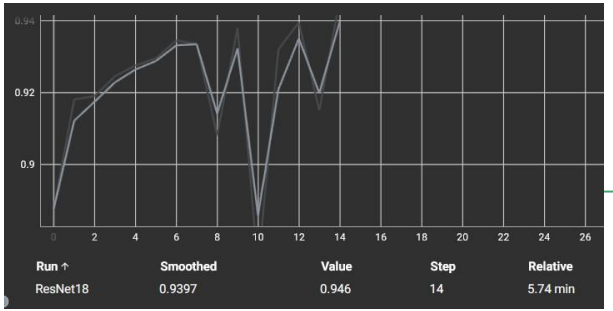
Comparatif des Performances



	CNN	ResNet18
Melanoma cancer	0.92 (16 epochs)	0.95 (15 epochs)
Plants Disease	0.98 (12 epoch)	0.98 (2 epochs)



CNN: Validation accuracy sur 16 epochs



ResNet18: Validation accuracy sur 15 epochs

Conclusion

- Compromis précision/complexité :

- Conditions d’entraînement limitées