DeCloud: Reconstructing cloud free satellite image time series

Meeting 08/29/2024

Fillinger Mathys

downstream task

U-Tilise model

Evaluation metrics:

- MAE and RMSE: quantitative error
- PSNR: qualitative error
- SAM: spectral fidelity
- SSIM: image structure fidelity

with ood test dataset
to evaluate the robustness of the models

U-Tilise model

Evaluation metrics of my model (for all pixels):

MAE : 0.0204->0.0174

RMSE: 0.03944->0.0364

SSIM: 0.8907->0.9153

PSNR: 29.24714->30.1632

SAM: 4.2619->3.6793

test with the dataset of crops of Ethiopia

from scratch

6-channel images (RGB+NIR+VV+VH)

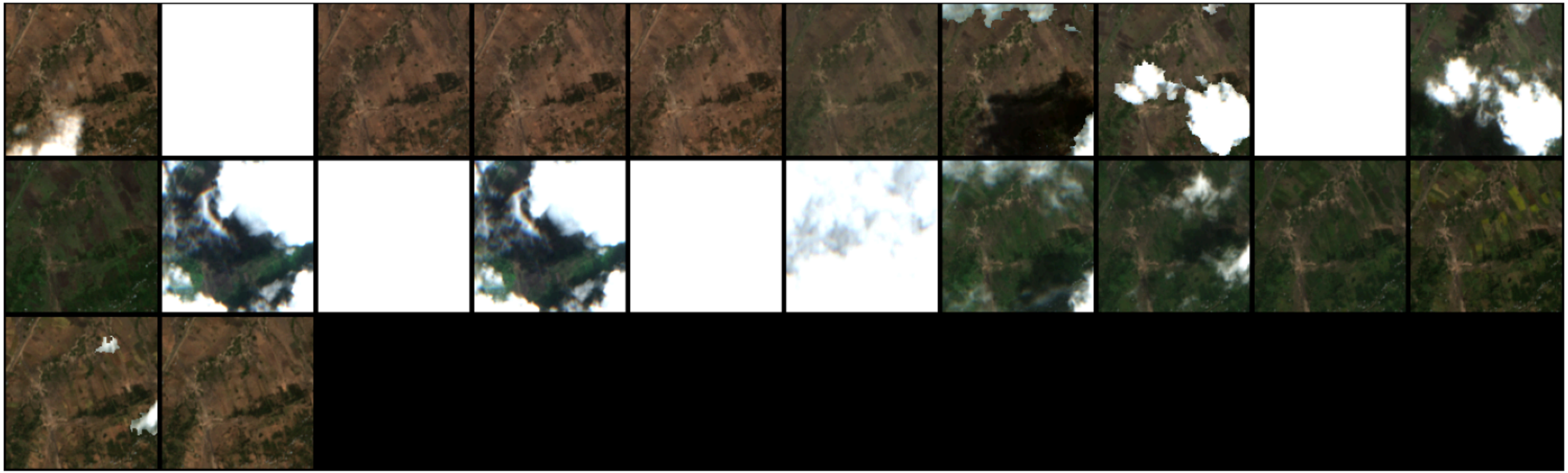
ood test

epoch: 25 -> 29

incremental training with another training dataset

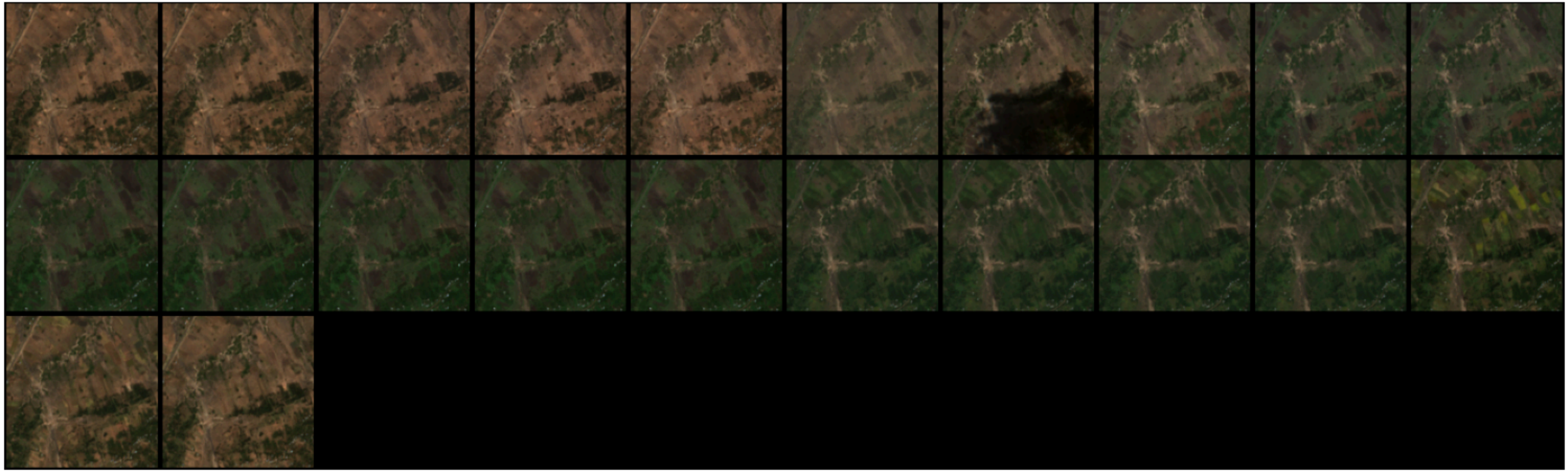
U-Tilise model

Input sequence



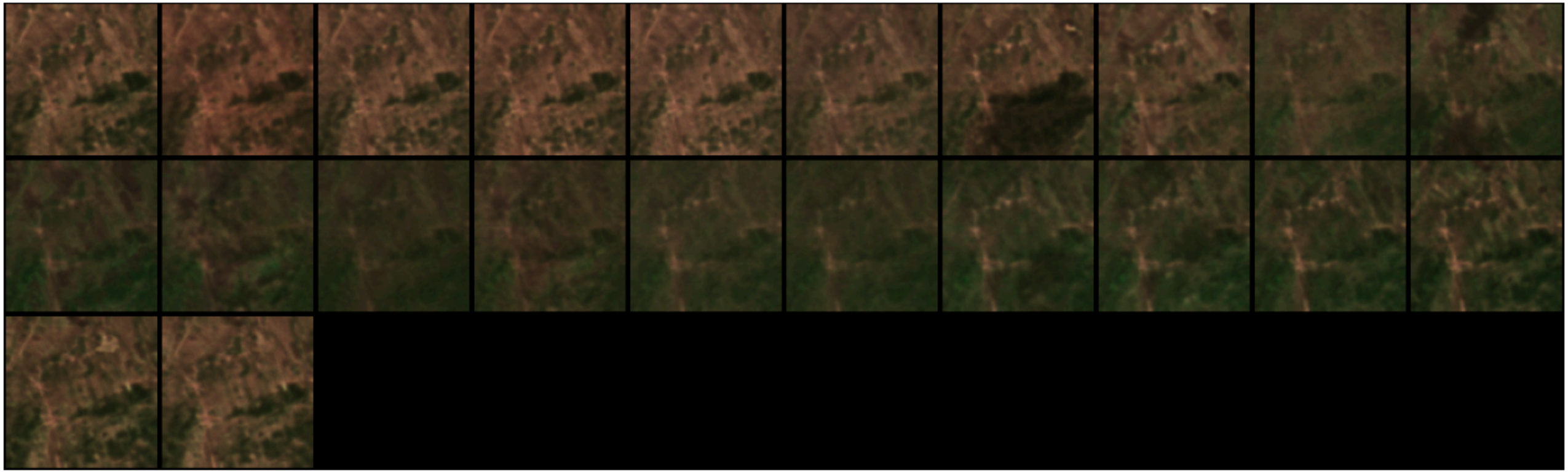
U-Tilise model

Target sequence



U-Tilise model

U-TILISE predictions



U-Tilise model

Conclusion about these results :

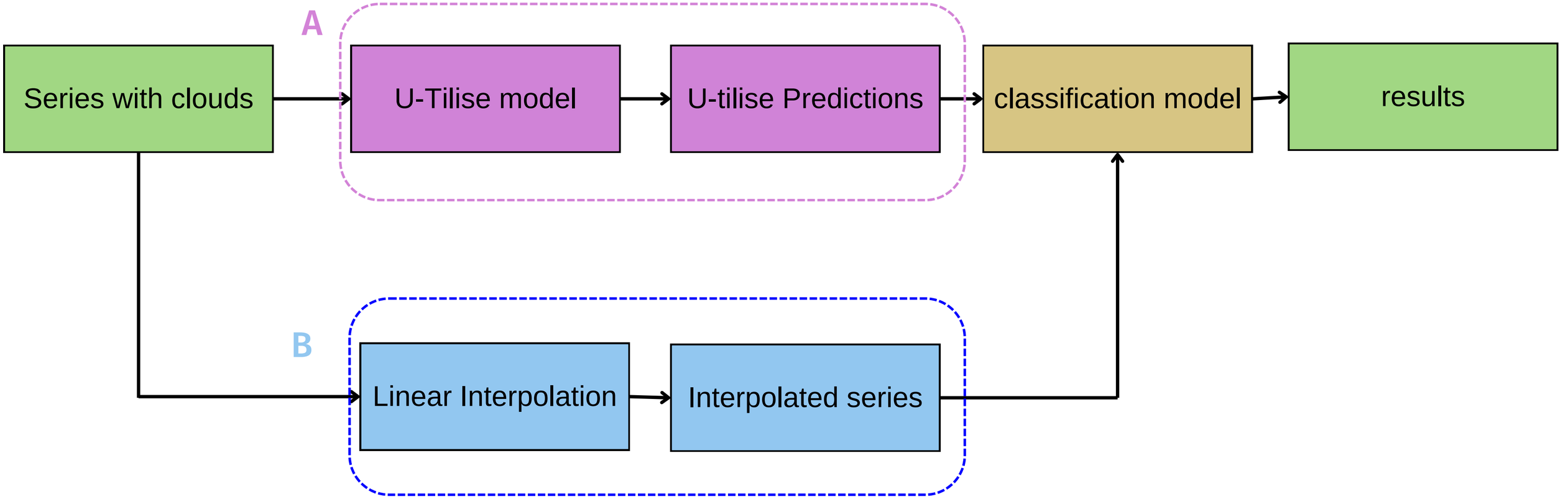
good accurancy

good image structure fidelity

good clarity of images

The model is better than the last week. It can be used for the classification model now

downstream task organizational chart



Which method will enable to achieve the best results ?

downstream task

achieved collection of data

Training dataset:

Python codes to collect 1536 series of images of :

- wheat crops
- barley crops
- maize crops
- teff crops

... But crops are collected from all Ethiopia and not in a selected region

*-> I can use **a part of** this dataset to train the classification model*

-> And the resting crops for the testing part

downstream task

achieved collection of data

Bounding box :

Python code to collect all crops from the Mendeley Data (EthCT2020) in the bounding box

95% of the crops are wheat crops

Is the presentation of the bounding box in my internship report a good idea ?

Classification model

4 labels :

- wheat
- teff
- maize
- barley

Structure : CNN - LSTM model

Loss : Binary Cross-Enthropy loss (BCE loss)

Optimizer: Adam

Learning rate: 0.0001

Number of epochs : 11

Validation loss: 0.31

an another model

No data augmentation

Classification model

evaluation metrics:

Accuracy : (True positive + True Negative)/Total of predictions

Precision: True positive /(True positive + False positive)

Recall: True positive /(True positive + False negative)

F1 score: 2*precision*recall/(precision+recall)

sklearn library calculates automatically the average between all classes

Classification model

Nothing

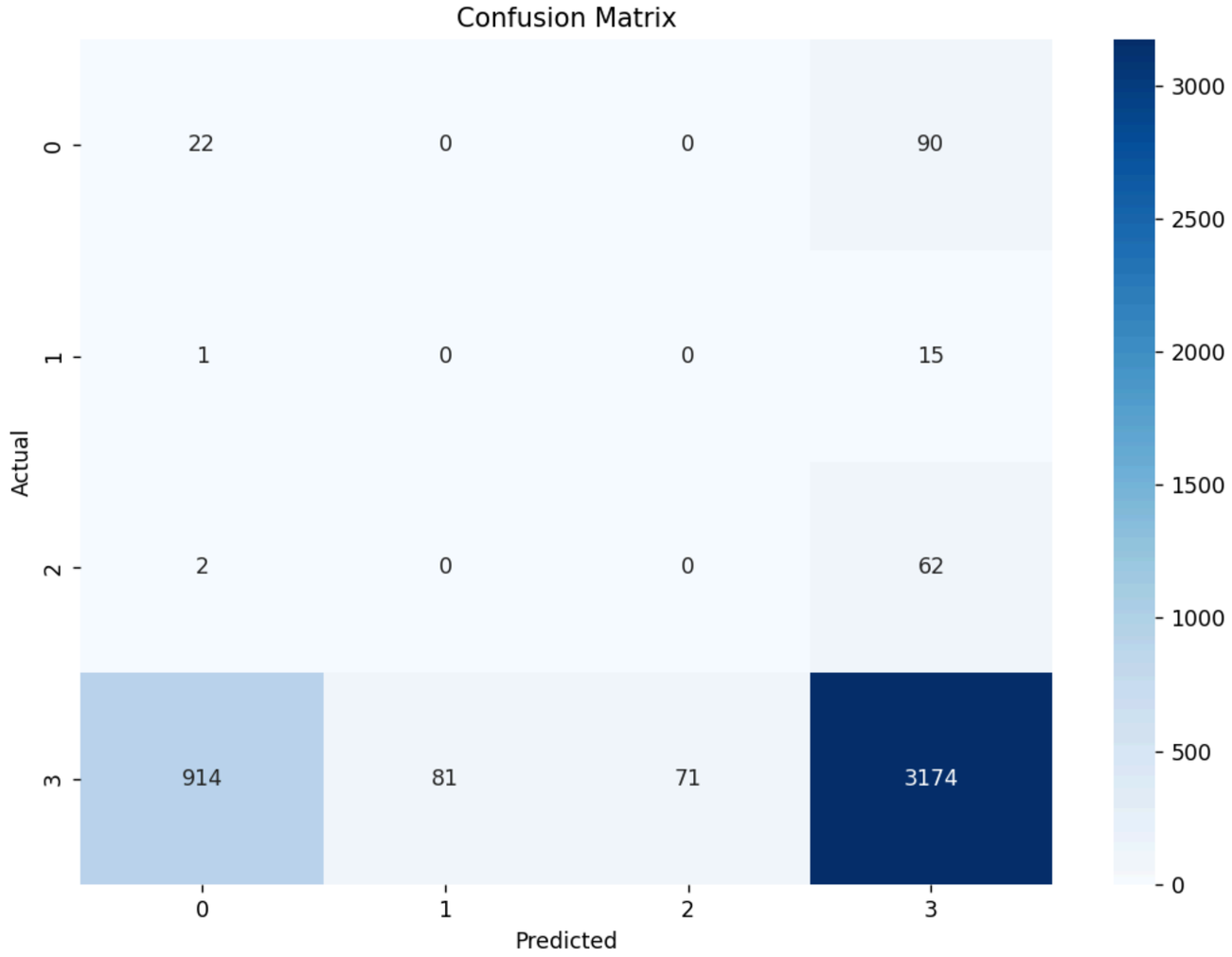
evaluation metrics:

Accuracy : 72.1%

Precision: 91,0%

Recall: 72.1%

F1 score: 80.2%



tests on the bounding box test dataset ood

Classification model

with U-Tilise Predictions

École d'ingénieurs
Télécom Physique
Université de Strasbourg
Partenaire stratégique
Institut Mines-Télécom

ICUBE

HARVEST

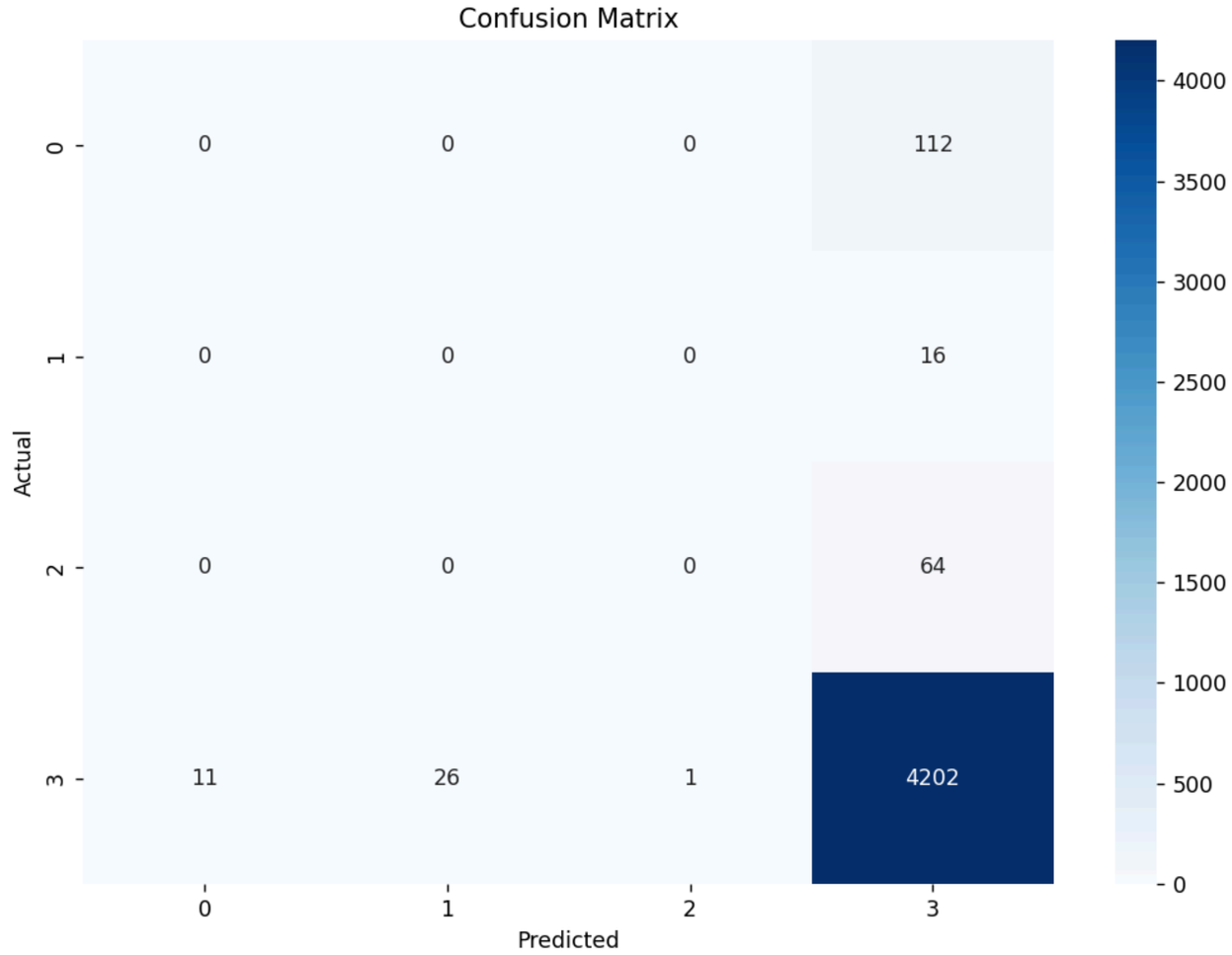
evaluation metrics:

Accuracy : 94.8%

Precision: 91,5%

Recall: 94.8%

F1 score: 93.1%



tests on the bounding box test dataset ood

Classification model

with Interpolated series

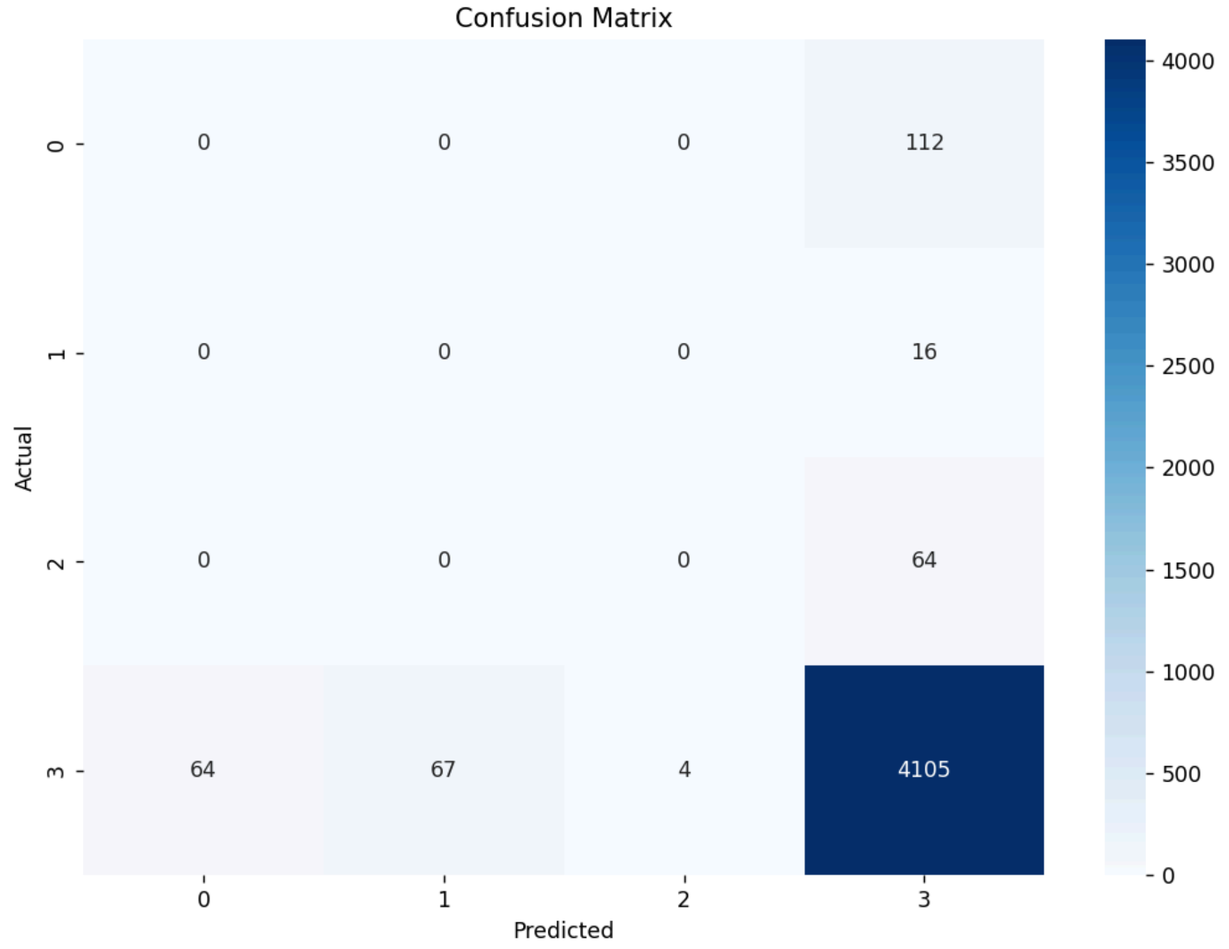
evaluation metrics:

Accuracy : 92.6%

Precision: 91,4%

Recall: 92.6%

F1 score: 92.0%



tests on the bounding box test dataset ood

Next steps :

Continue the improvement of the classification model

Get the results to conclude the internship with the new dataset

École d'ingénieurs
Télécom Physique
Université de Strasbourg

Partenaire stratégique
Institut Mines-Télécom

Thank you for your attention !