PRESENTATION - BLOCK B

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TABLE OF CONTENT

PROBLEM DEFINITION

Problem overview
- U-net model
- Segmentation
- Detecting and analyzing
- Plant organs

Problem definition
- Time-consuming manually
- Subjective

Key features of the solutions
- Automated U-Net Model Training
- Labeling

Application in plant science
- Phenotyping → Growth
- (Disease) Detection and Management

RESULTS AND EVALUATION

Training History (First Few Rows):

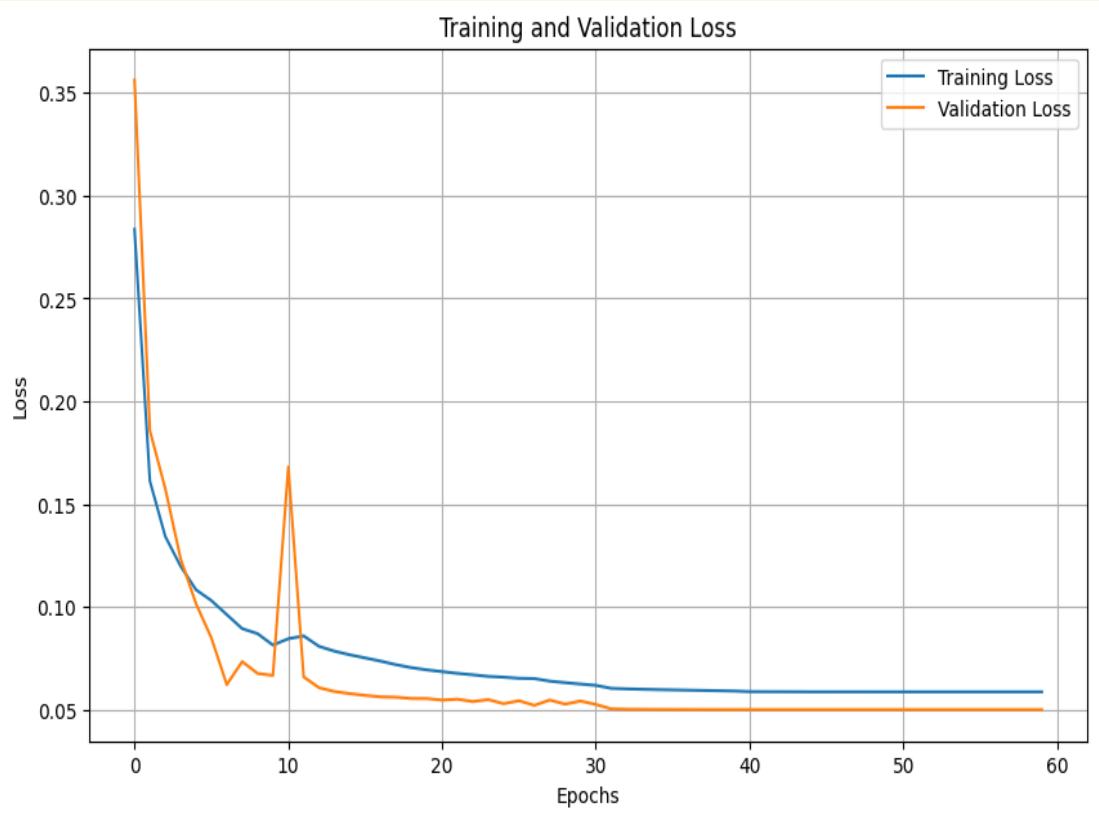
	loss	accuracy	compute_f1_score	val_loss	val_accuracy	val_compute_f1_score
0	0.283599	0.945664	0.556412	0.356195	0.957991	0.000000
1	0.161240	0.968719	0.666328	0.185759	0.957911	0.000026
2	0.134298	0.971034	0.698631	0.157507	0.955253	0.034840
3	0.119806	0.972004	0.716442	0.123415	0.959215	0.415528
4	0.108376	0.973230	0.729512	0.101576	0.968795	0.625137

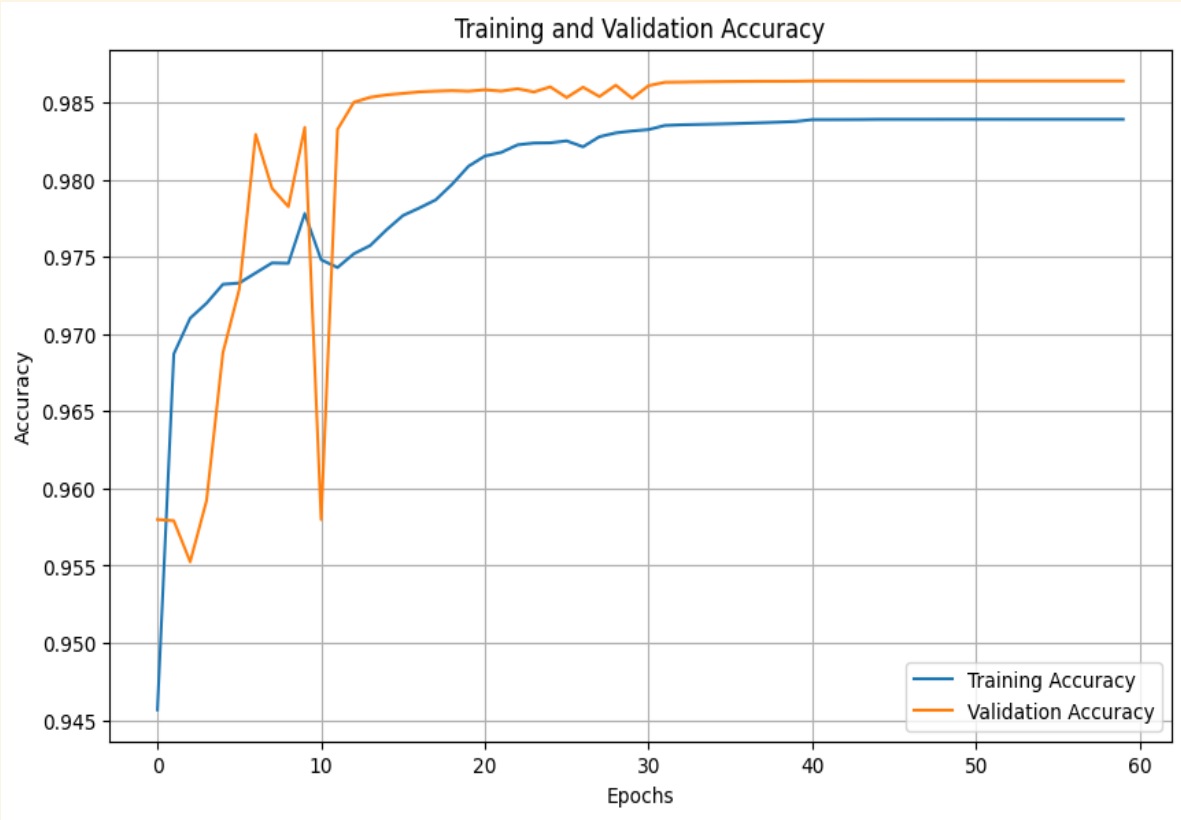
Best Validation Loss: 0.0501 at Epoch 40

Final Training Metrics:
Loss: 0.0588
Accuracy: 0.9839
Compute_f1_score: 0.8167

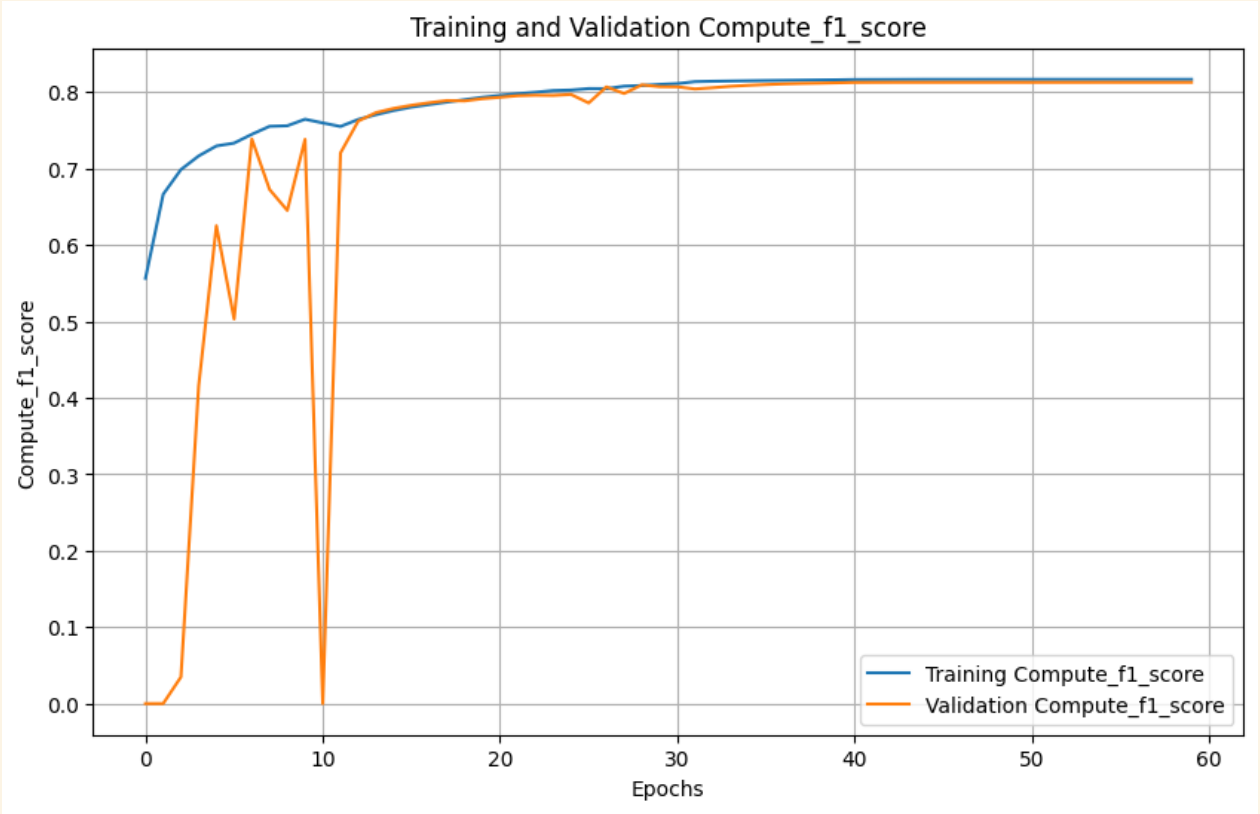
Final Validation Metrics:
Loss: 0.0501
Accuracy: 0.9864
Compute f1 score: 0.8128

RESULTS AND EVALUATION





RESULTS AND EVALUATION



ERROR ANALYSIS & ITERATION

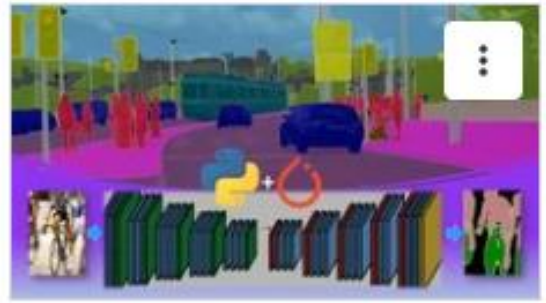
Iteration 1 U-net model.

- Checks for better accuracy.
- Checks for better f1 score.
- Saves new model automatically.

```
# Build and compile the U-Net model
unet_model = construct_unet_model(input_dimensions)
unet_model.compile(
    optimizer=tf.keras.optimizers.Adam(learning_rate=learning_rate),
    loss='binary_crossentropy',
    metrics=["accuracy", compute_f1_score]  # Include accuracy and F1 score
)

# Train the U-Net model
unet_model.fit(
    training_dataset,
    validation_data=validation_dataset,
    epochs=total_epochs,
    callbacks=training_callbacks
)

# Save the trained model in .h5 format
unet_model.save(model_save_path)
```



Deep Learning for Image Segmentation with Python ...

Dr. Mazhar Hussain, AI & Computer...

100% voltooid

☆☆☆☆☆

Geef een score

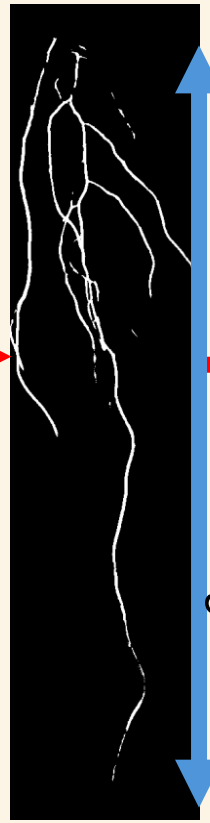
Iteration 2 – Followed a YouTube tutorial about segmentation.

- Improve knowledge about segmentation techniques for task 3

Iteration 3 – Completed a course on Udemy.

- Tried to improve my knowledge about encoders and decoders.

ASSUMPTIONS - PIPELINE

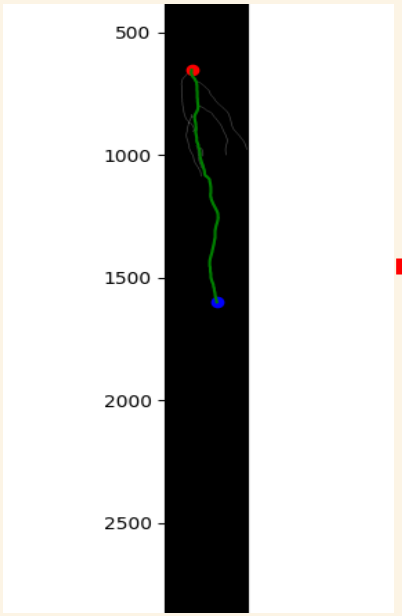


from skan import Skeleton, summarize

import networkx as nx

from skimage.morphology import skeletonize

Nodes



Predicted length in pixels.

LIMITATIONS

- Petri Dish detection boarder.
- Image slicer difficulties, detecting the main root.
- Image length.
- If too much noise in the image, difficulties with skeletonization.
- Segmentation with too much noise in the image.

NEXT STEPS

- Image length original image >> simple script.
- Image slicer >> segmentation.
- Robotics accuracy.

SUMMARY AND THE END

Problem definition

Results and evaluation

Error analysis & iteration

Assumptions – pipeline

Limitations

Next steps