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Image Classification & Segmentation on VGG dataset

By

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(COMP4106)

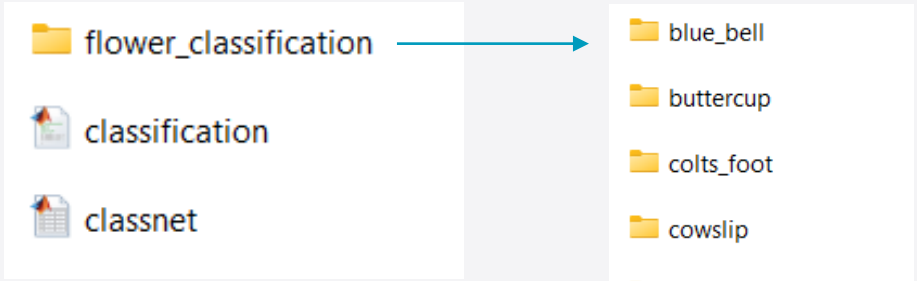
Topics

- Image Classification
- Semantic Segmentation

Image Classification: Dataset

- 17 flower categories
- 80 images in each category

Image Classification: Data folder structure



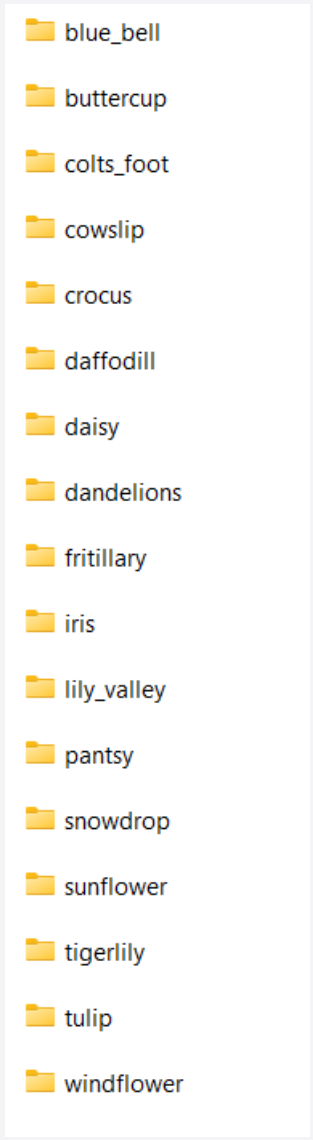


Image Classification: Data Pipeline

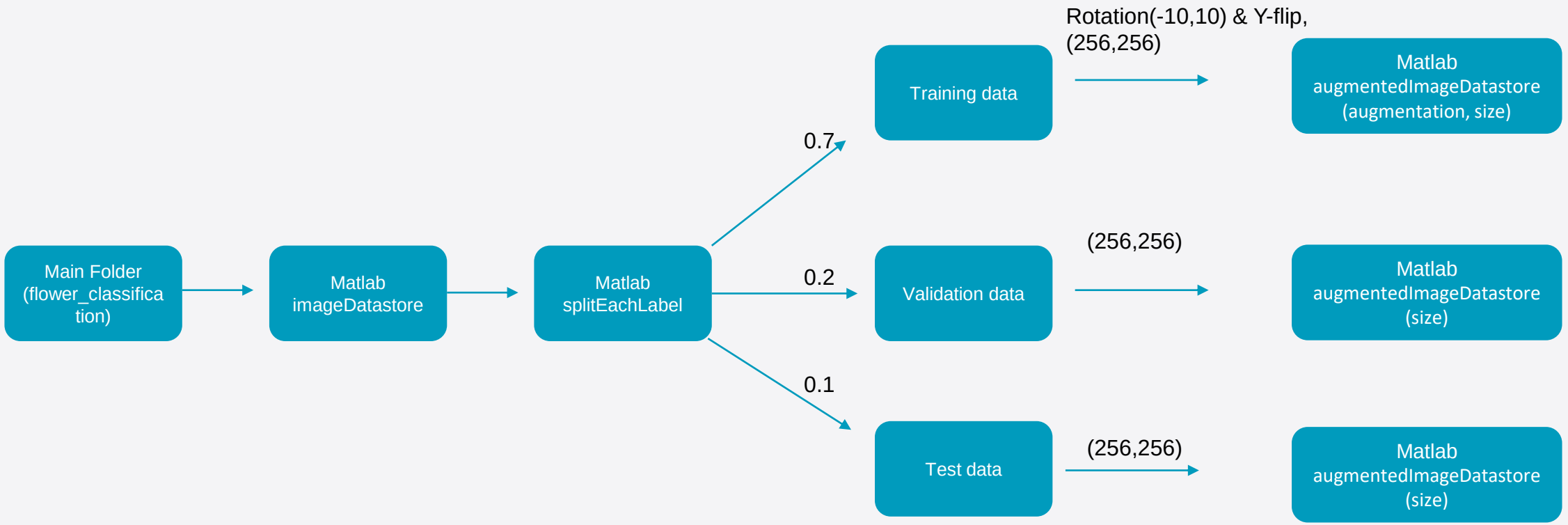
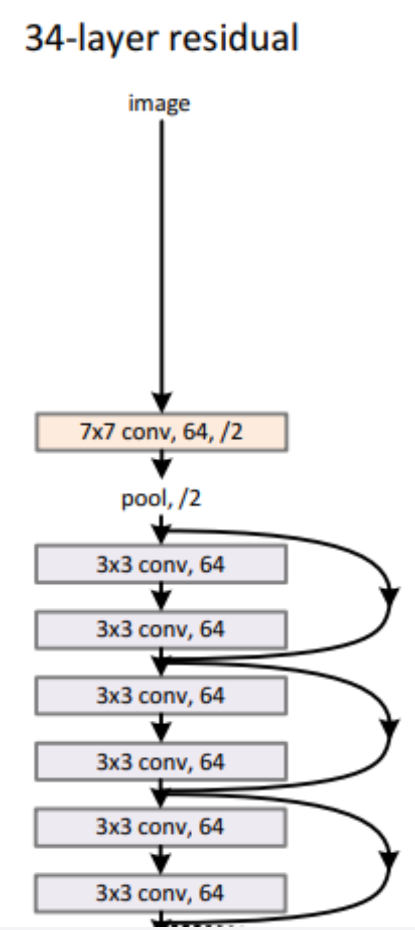
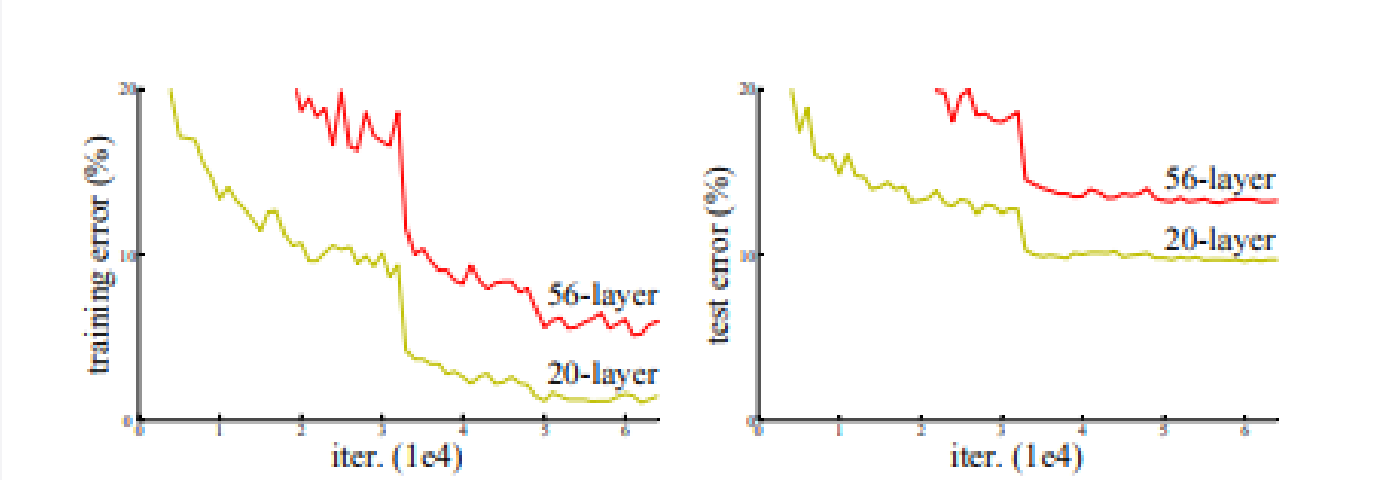


Image Classification: Data Augmentation

Different orientations of blue bell flower

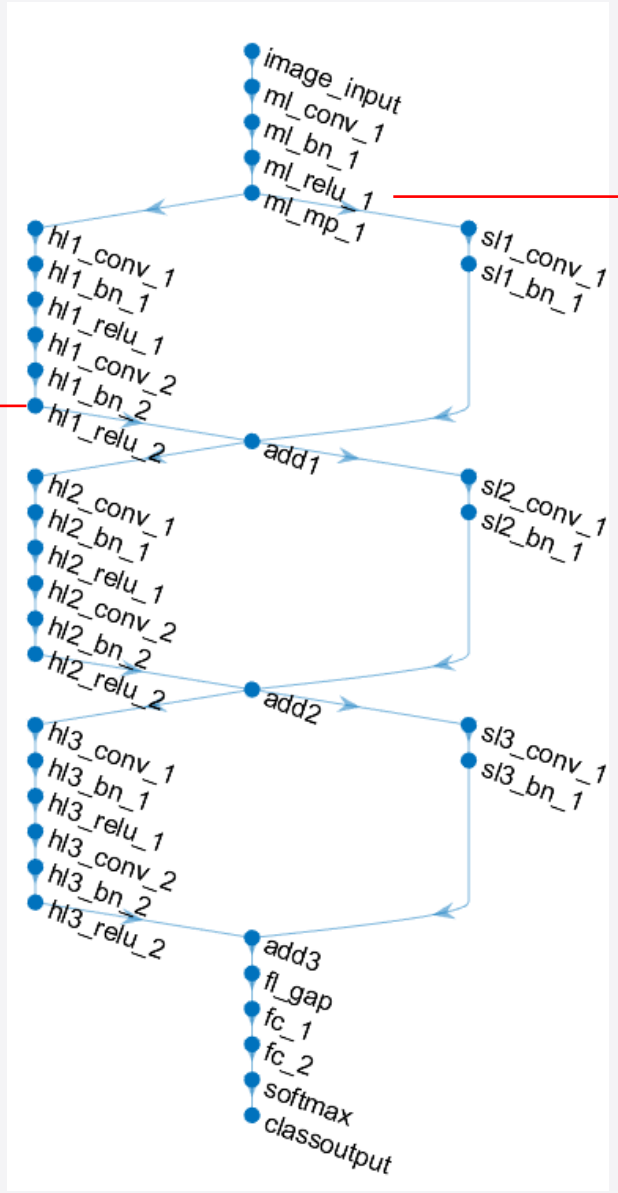
Image Classification: Skip Connections





He, 2015, https://arxiv.org/pdf/1512.03385.pdf

Image Classification: Model Architecture



(64,64,32)

Kernel size : (1,1,32)
Kernels : 64

(64,64,64)

Image Classification: Results

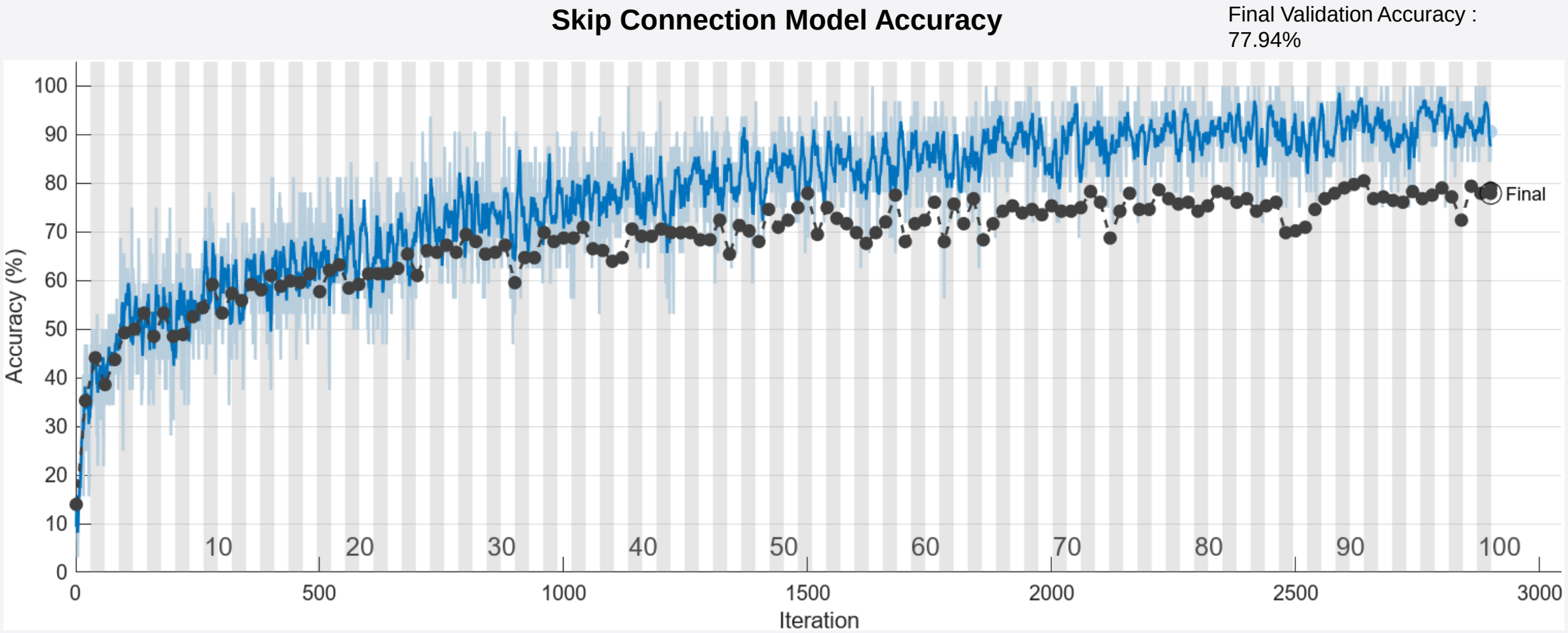


Image Classification: Results

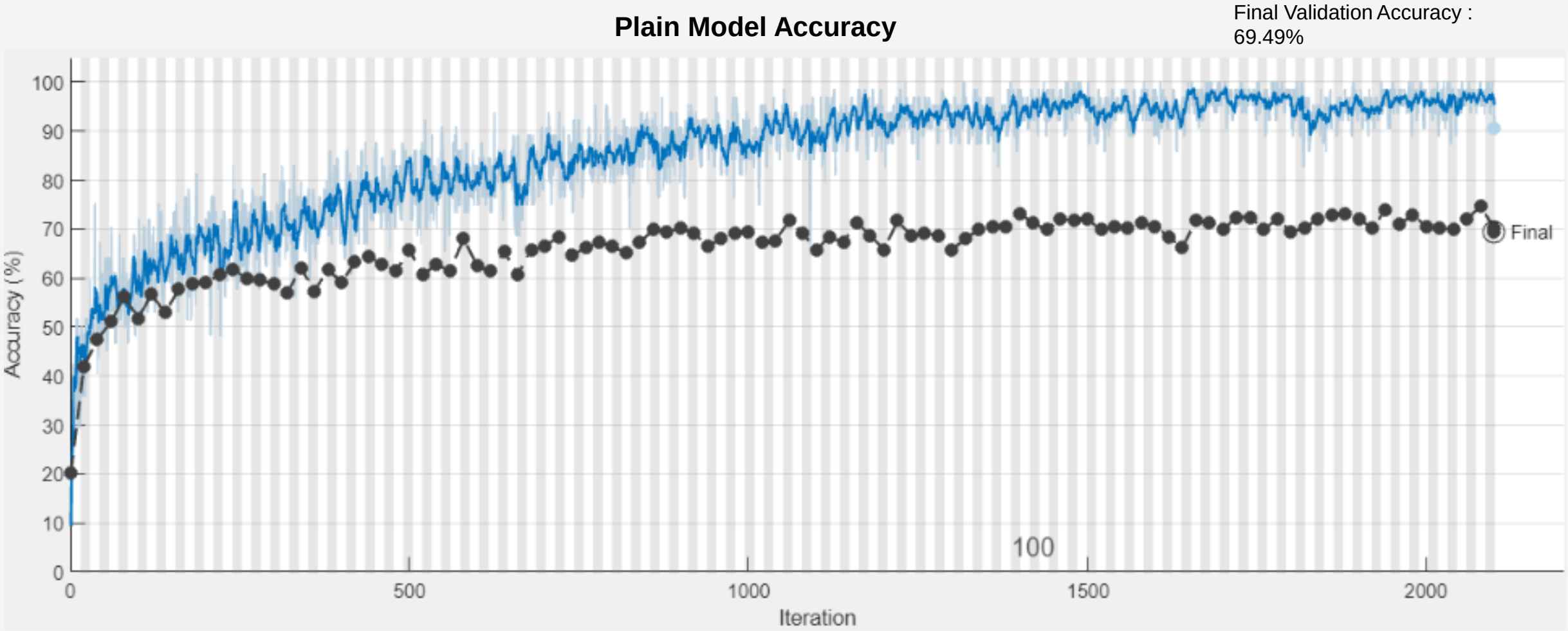
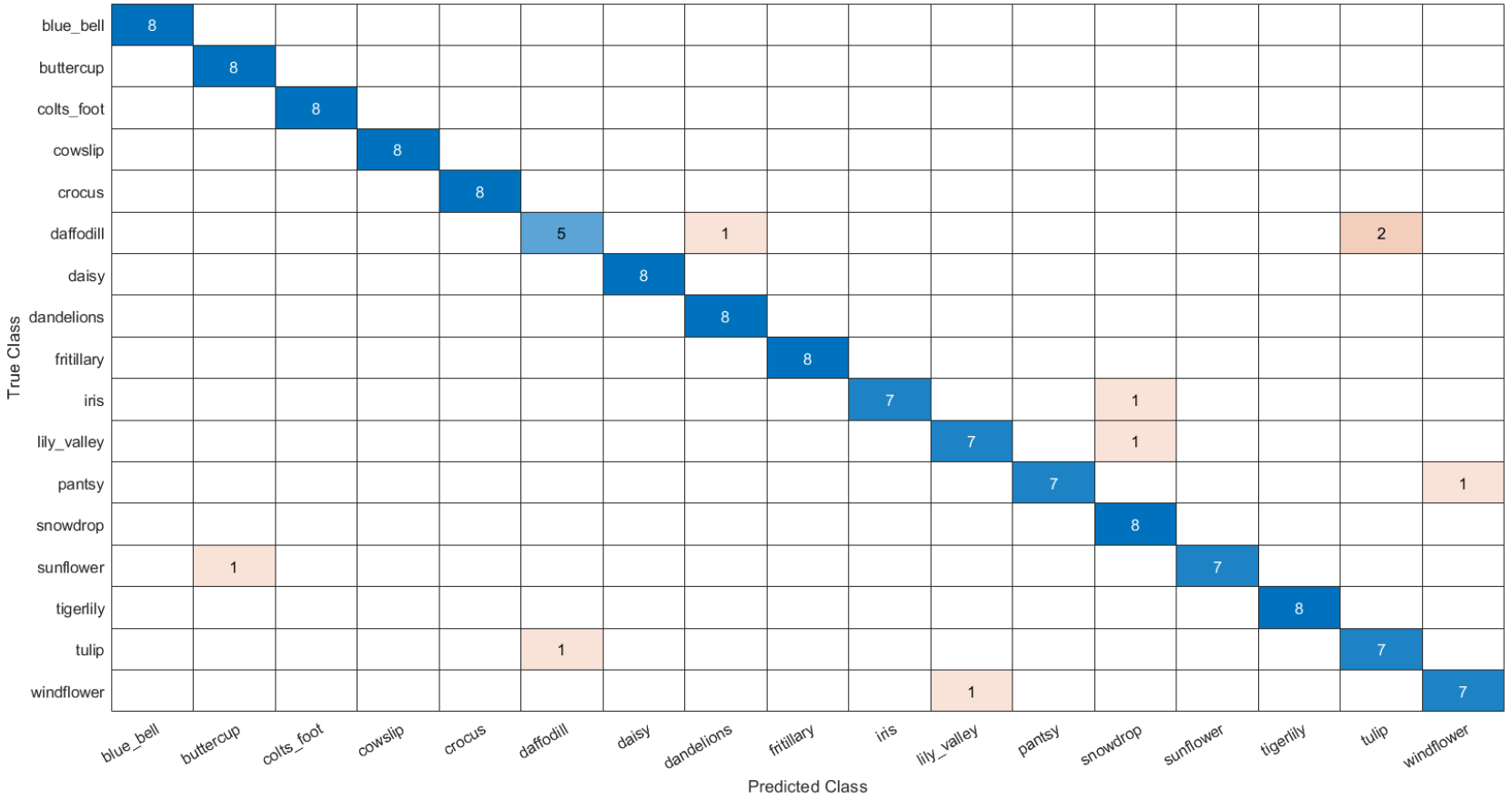


Image Classification: Evaluation (Test Data)



Tulip

Daffodil

Image Classification: Evaluation (Grad-Cam)

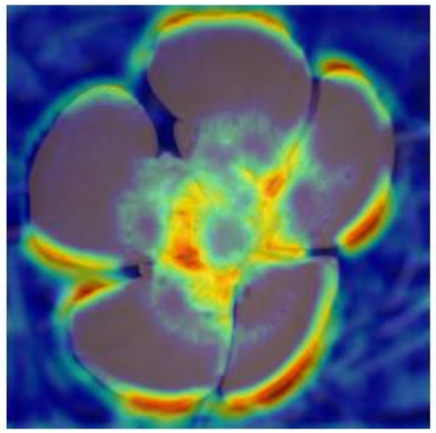


Image Segmentation: Folder Structure

Image Segmentation: Data Pipeline

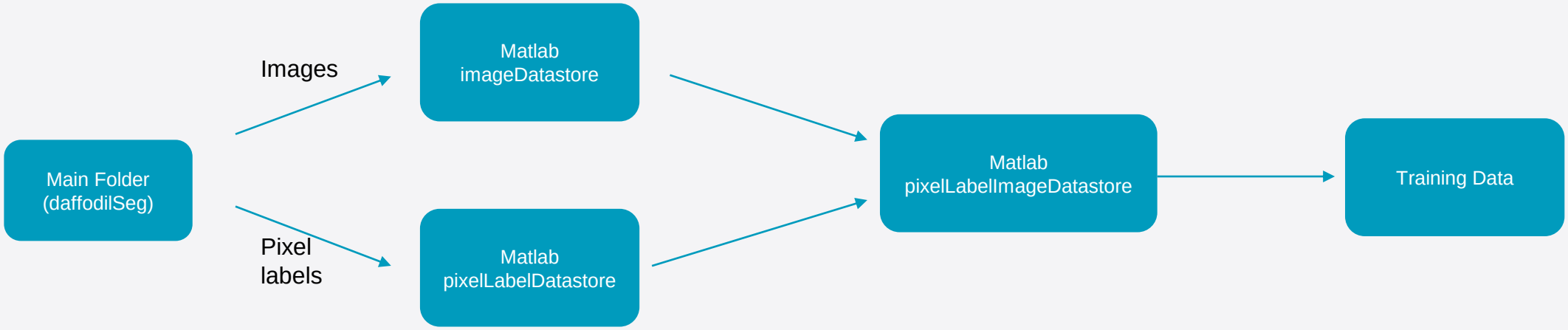
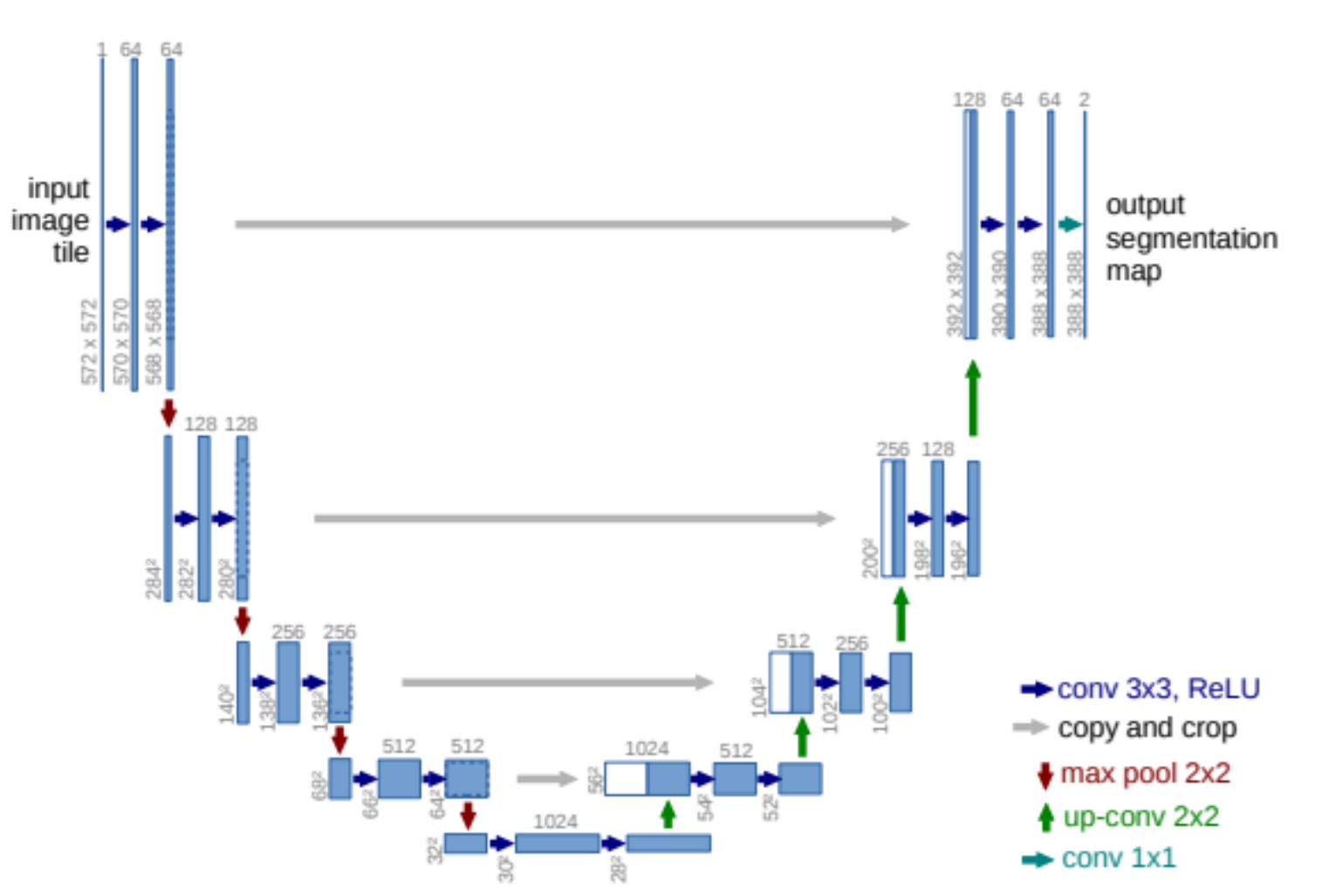
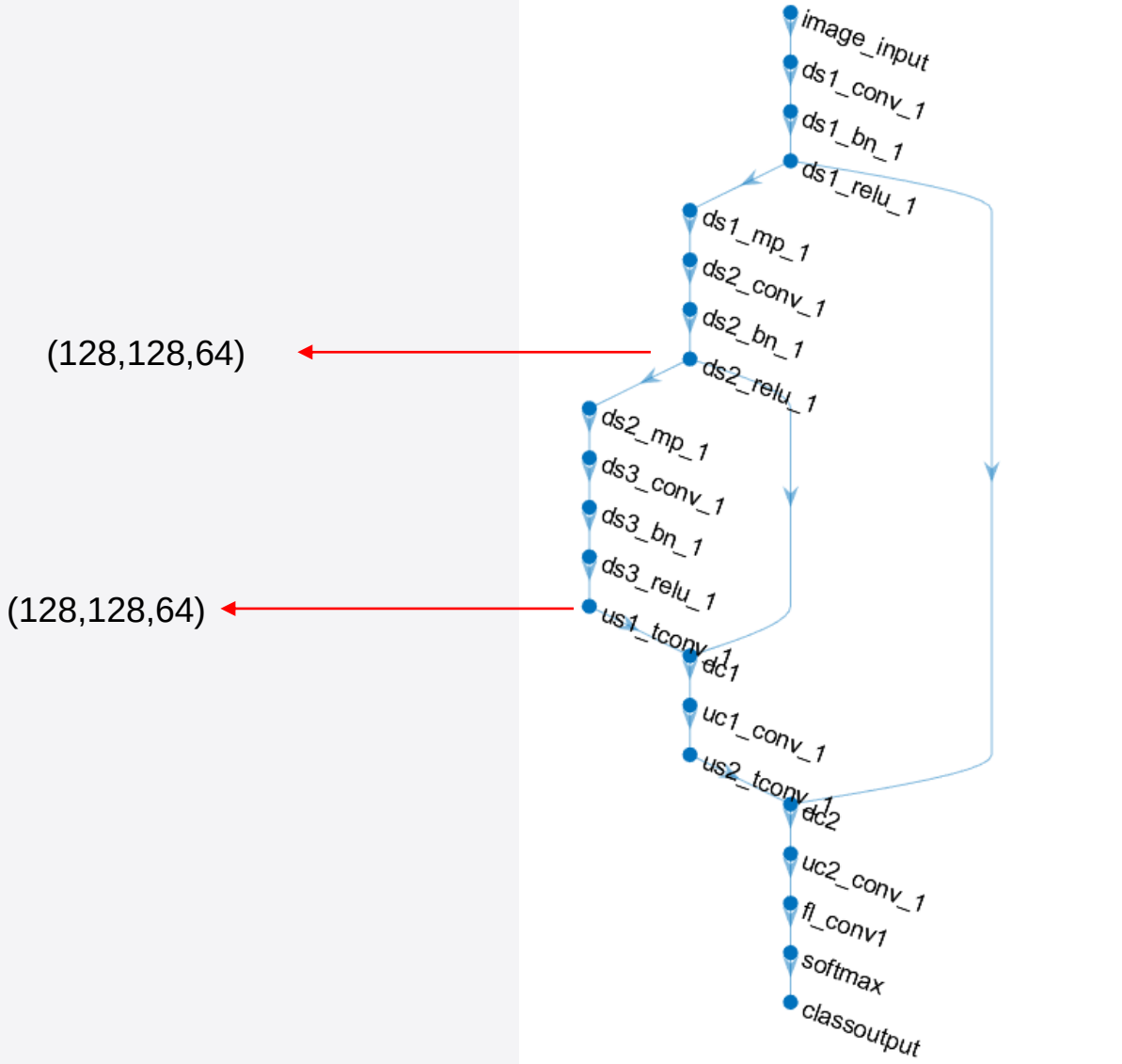


Image Segmentation: Unet



Ronneberger, 2015, https://arxiv.org/pdf/1505.04597.pdf

Image Segmentation: Model Architecture



ds: downsampling

us: upsampling

dc: depthwise concatenation

uc: upsampling convolution

Image Segmentation: Evaluation

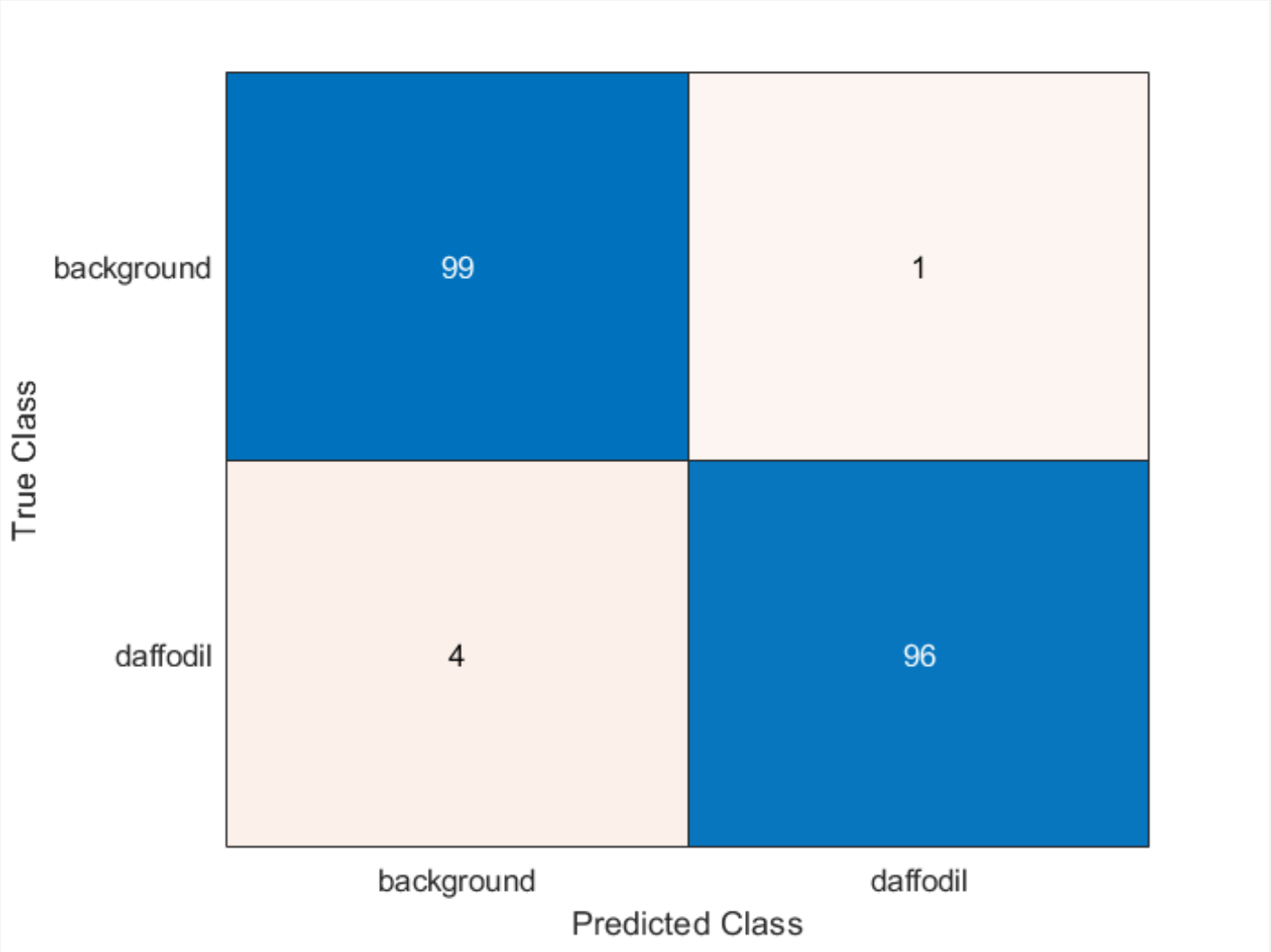
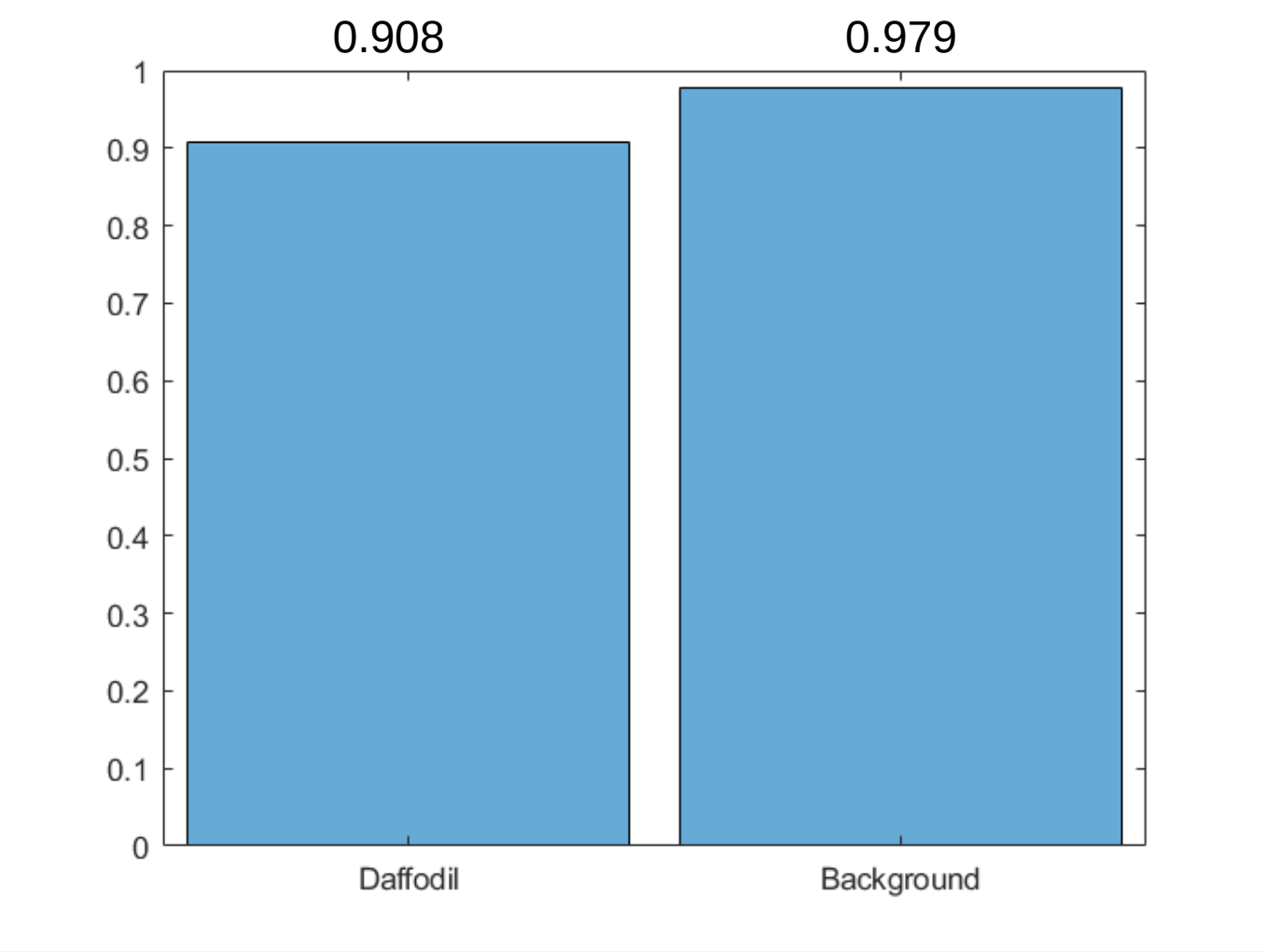
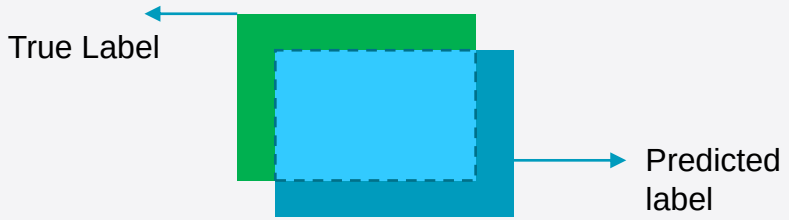


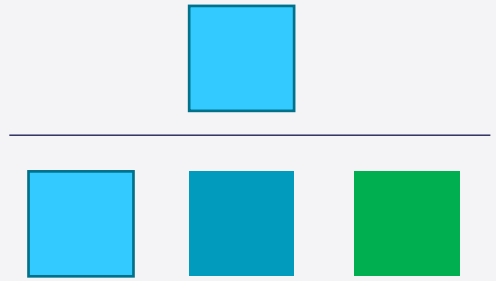
Image Segmentation: Evaluation



$$IOU = \frac{Area\ of\ Intersection}{Area\ of\ Union}$$



IOU =



Conclusion & Future Work

- Skip connections were effective for both classification and segmentation task.
- Grad-Cam , Rotation augmentation > 10 degrees, pixel weights for training