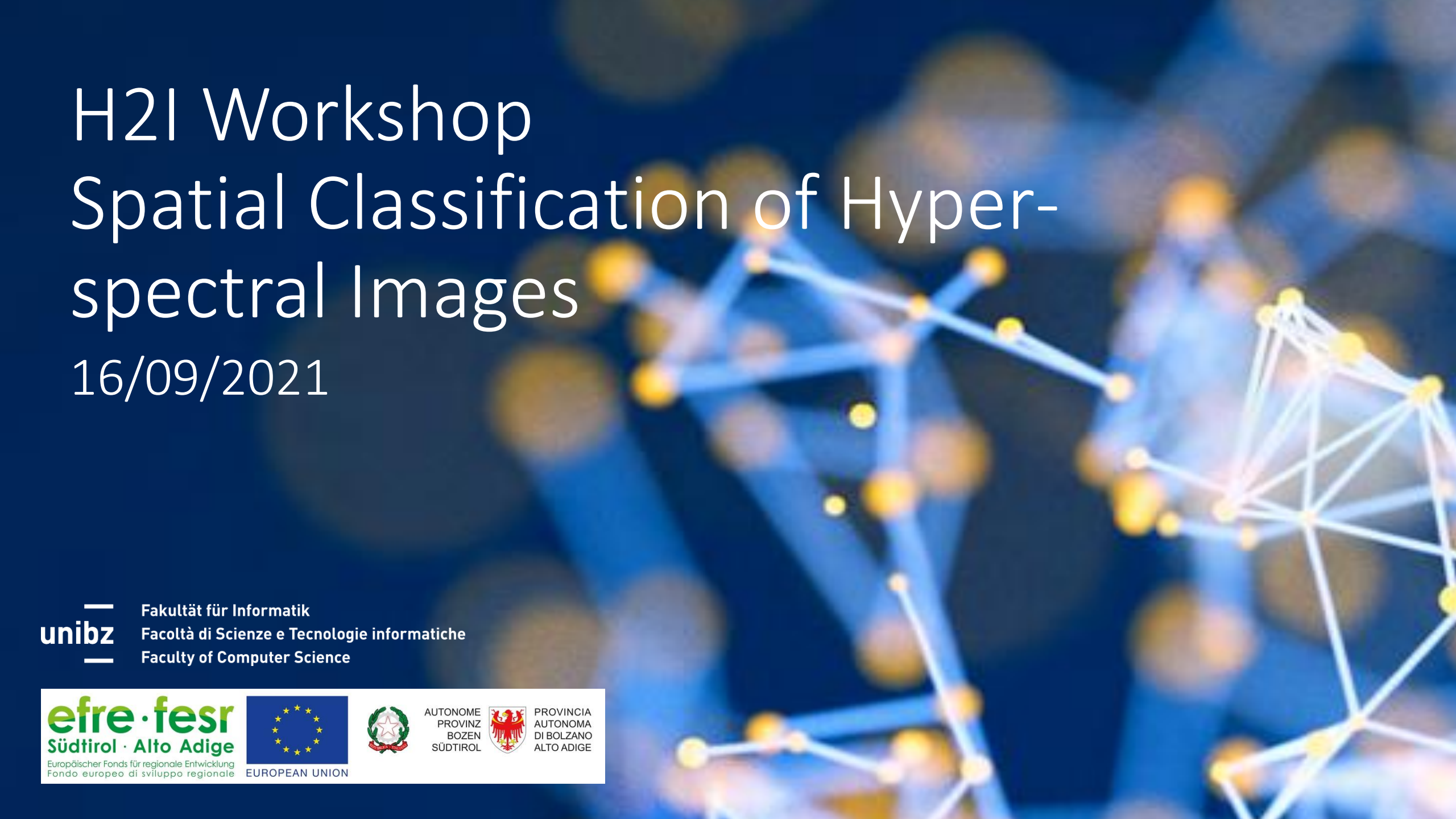
H2I Workshop
Spatial Classification of Hyper-spectral Images

16/09/2021



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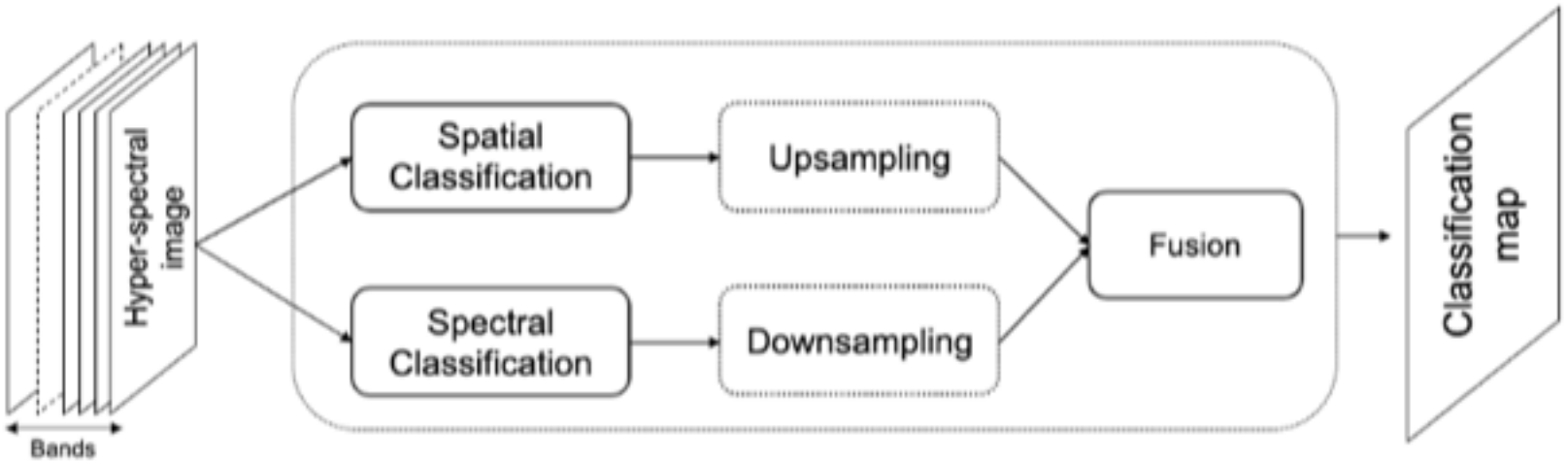
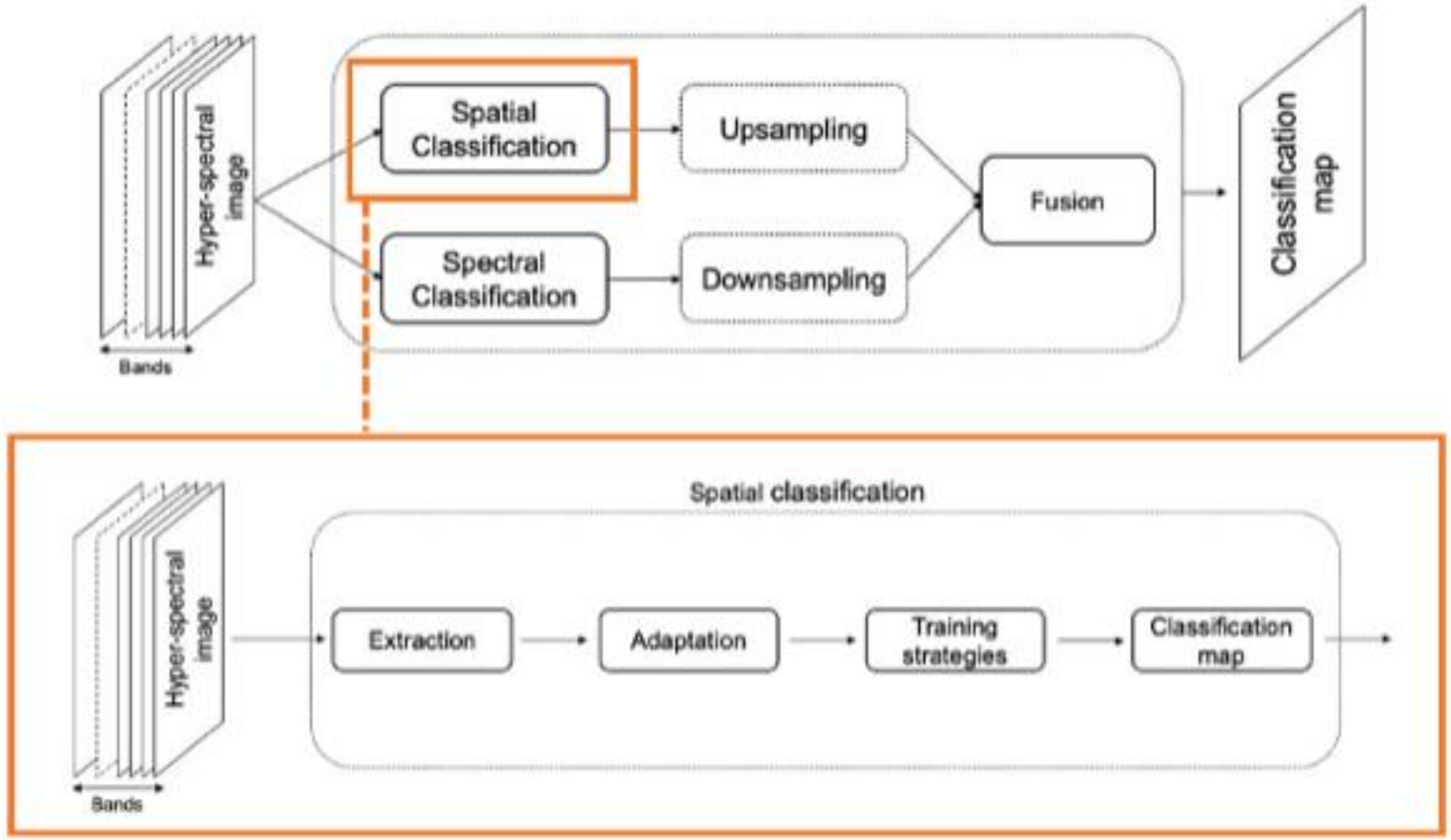
Outline

- Segmentation Framework for Hyper-spectral Images Classification
- Segmentation Framework – Spatial Classifier
- Segmentation Framework
- Architecture of classifier
- Apply methodologies
- Training the output unit
- Training the input unit
- Single block classifier into multi block classifier – called segmentor
- Segmentation result
- Expected Benefits

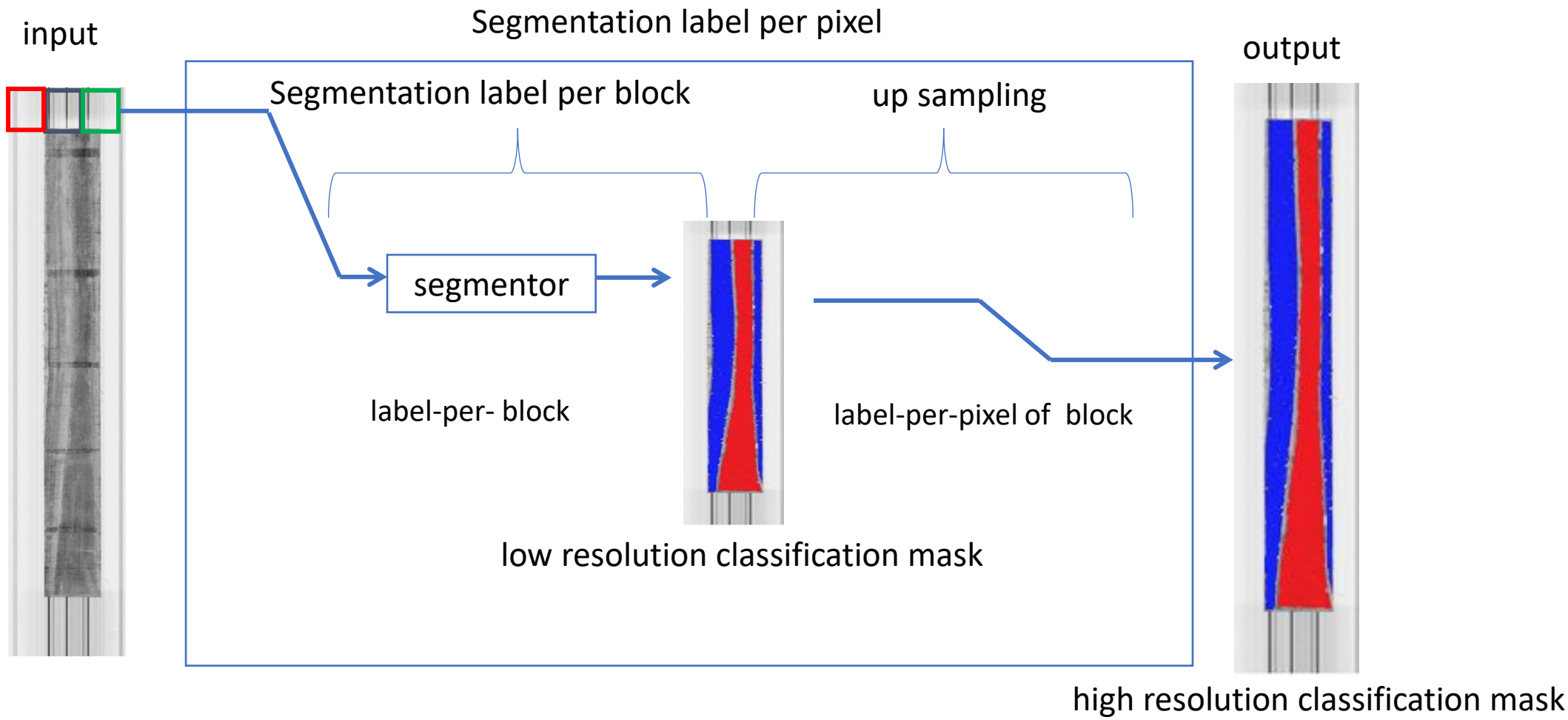
Segmentation Framework for Hyperspectral Images Classification



Segmentation Framework – Spatial Classifier

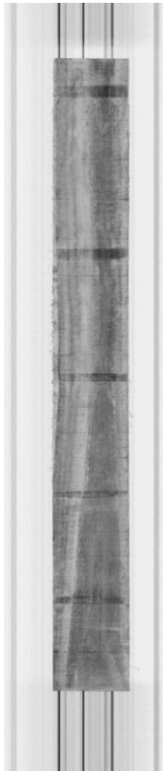


Proposed Framework



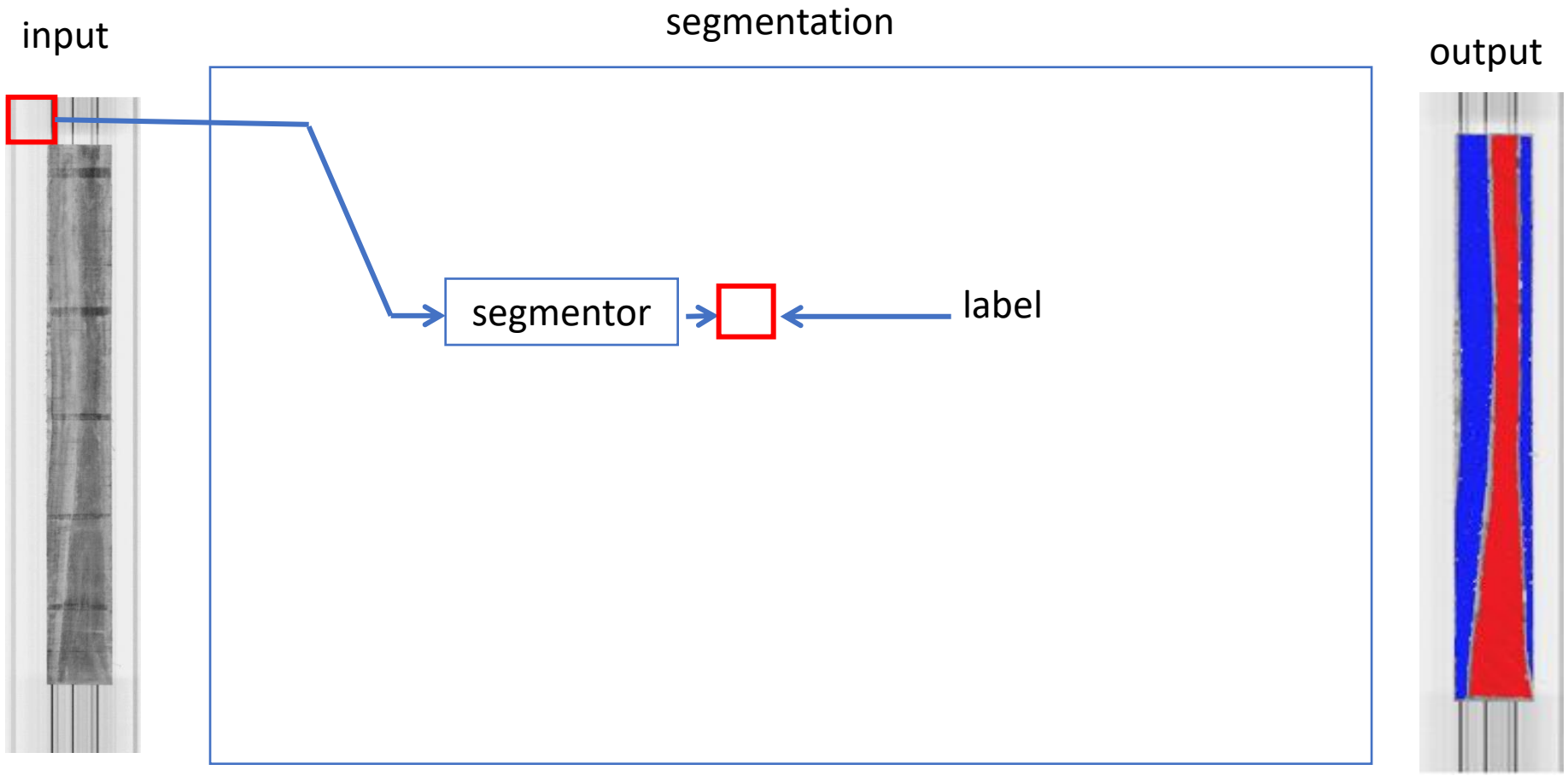
Proposed Framework

input

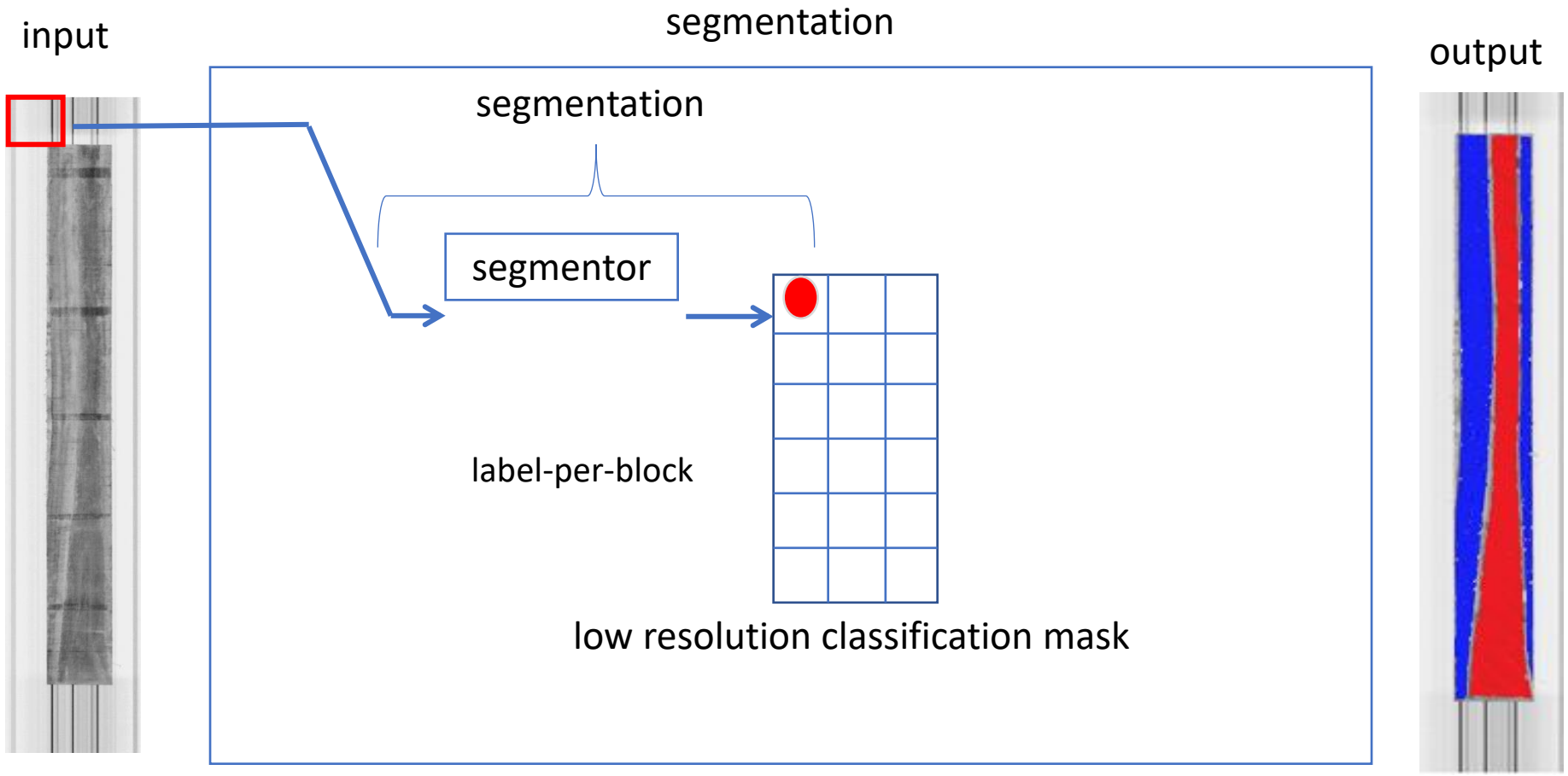


output

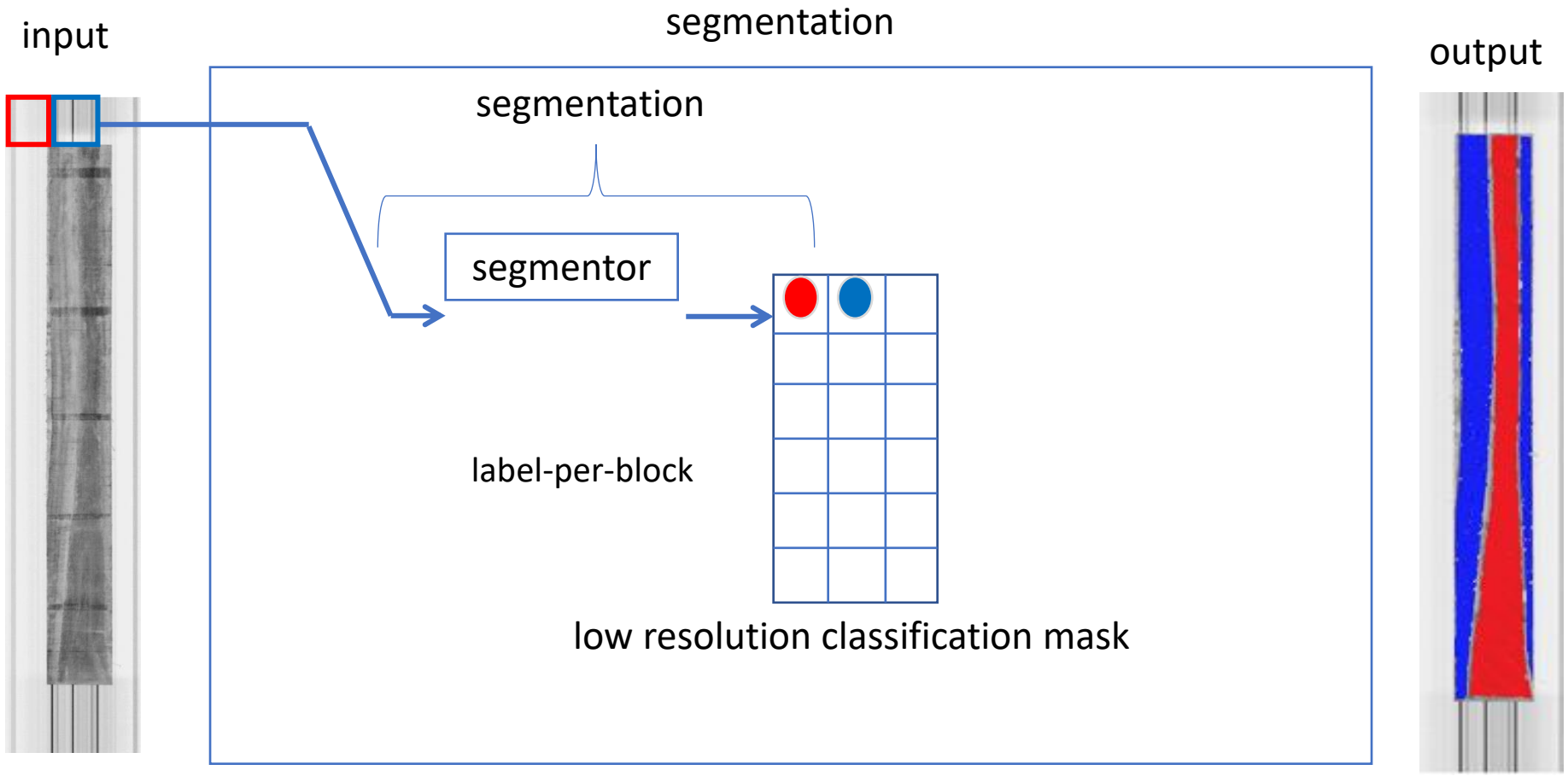
Proposed Framework



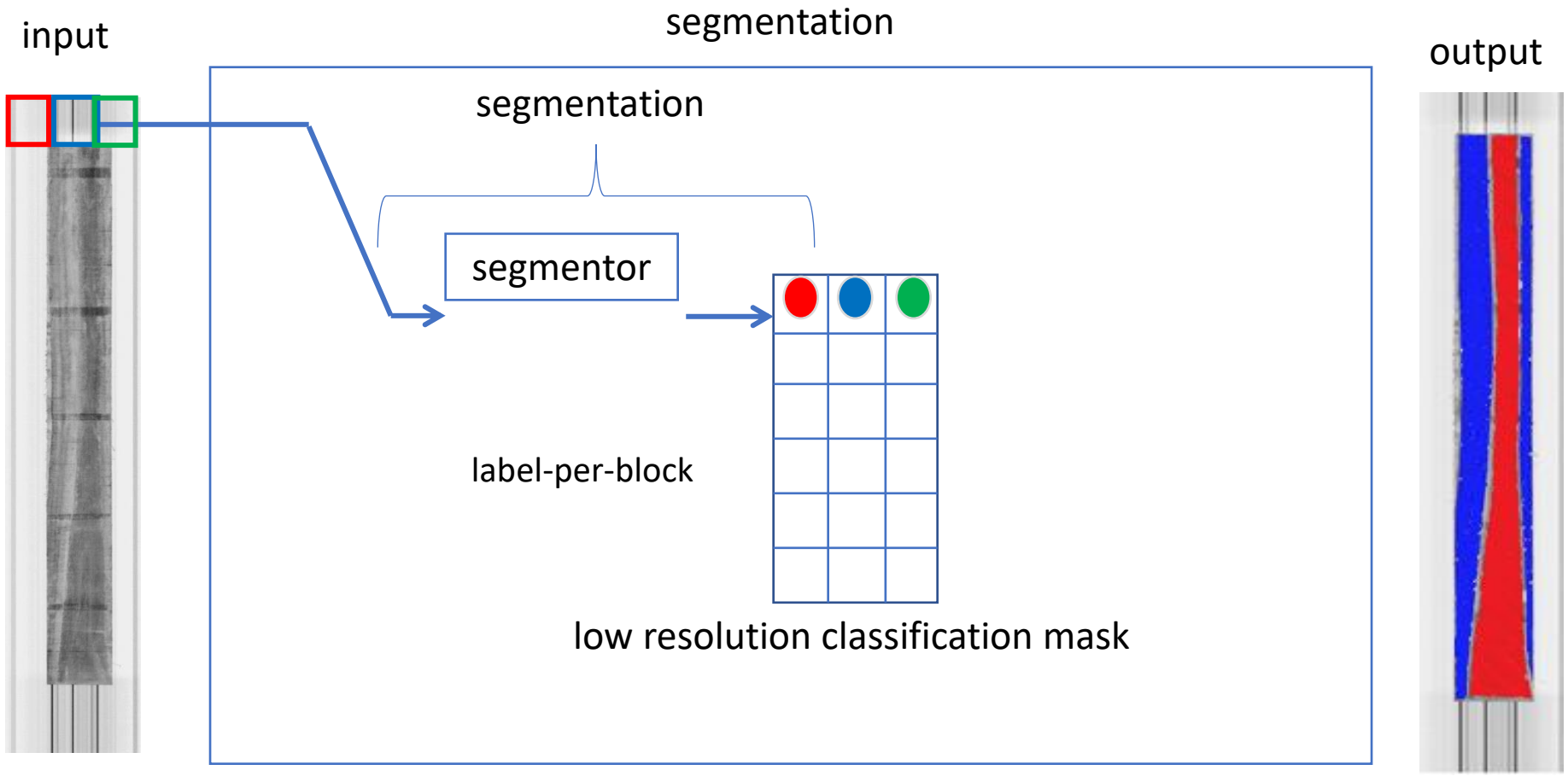
Proposed Framework



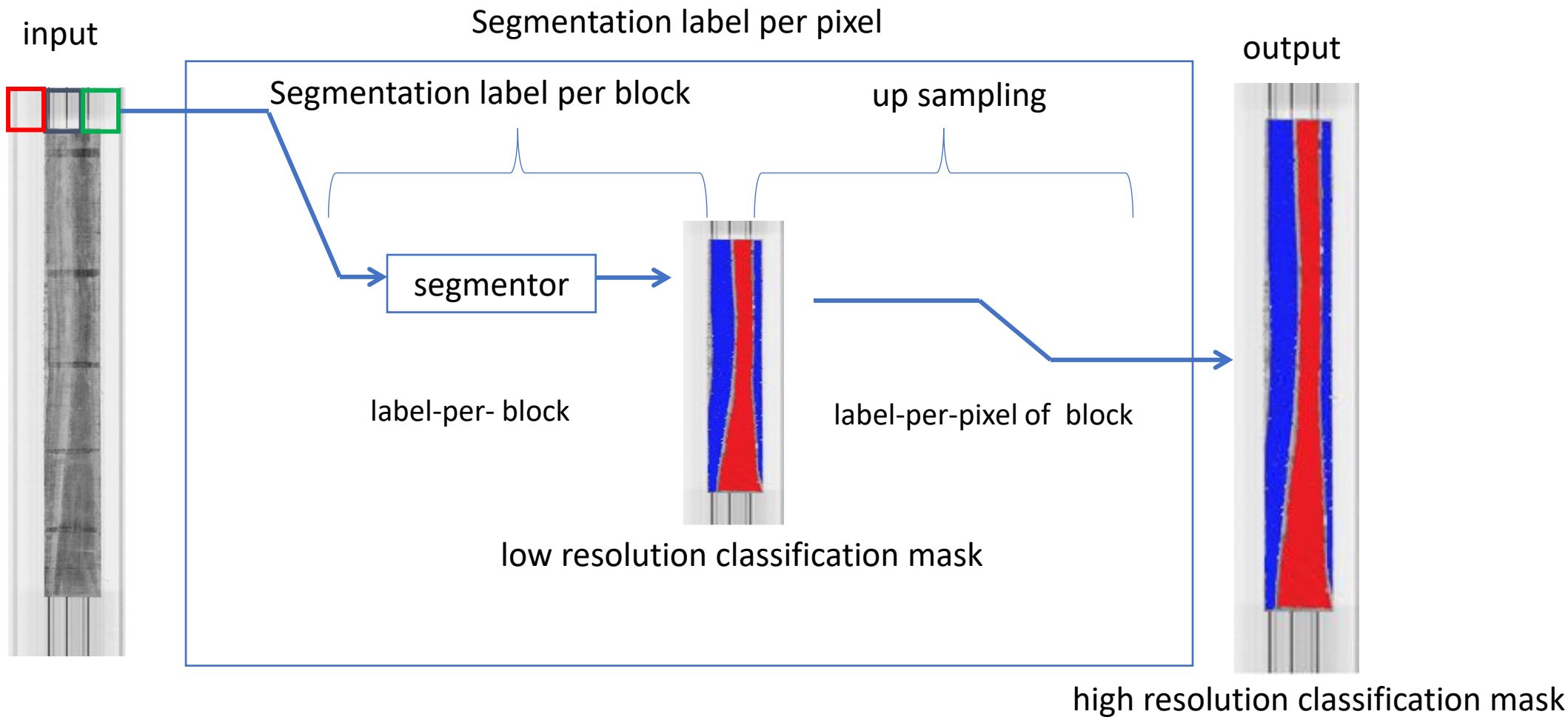
Proposed Framework



Proposed Framework

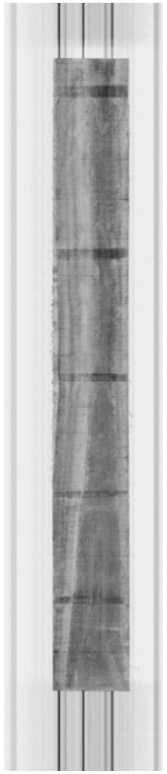


Proposed Framework



Proposed Framework

input



Which classifier used?

- Small size block classifier
- Used Convolutional Neural Network (CNN)
- cifar10Net available in MATLAB
- Simple classifier
- doesn’t use a lot of resources

output

Architecture of classifier

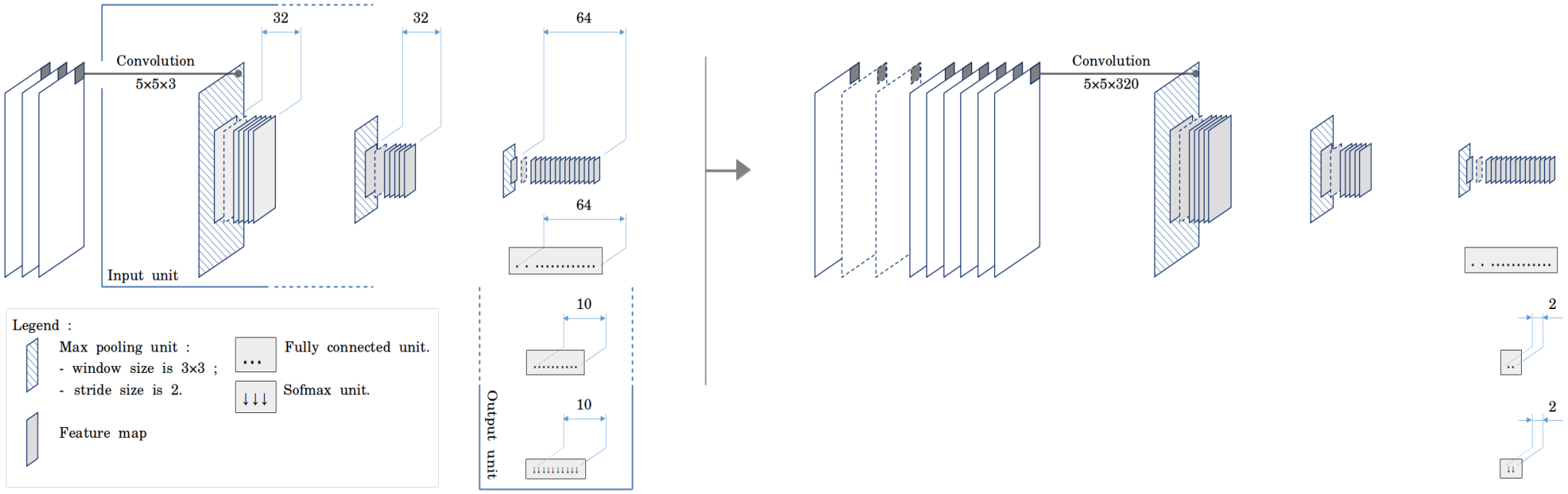


Fig. The architecture of cifar10Net (left) and the developed hyperspectral images classifier (right)

Architecture of classifier

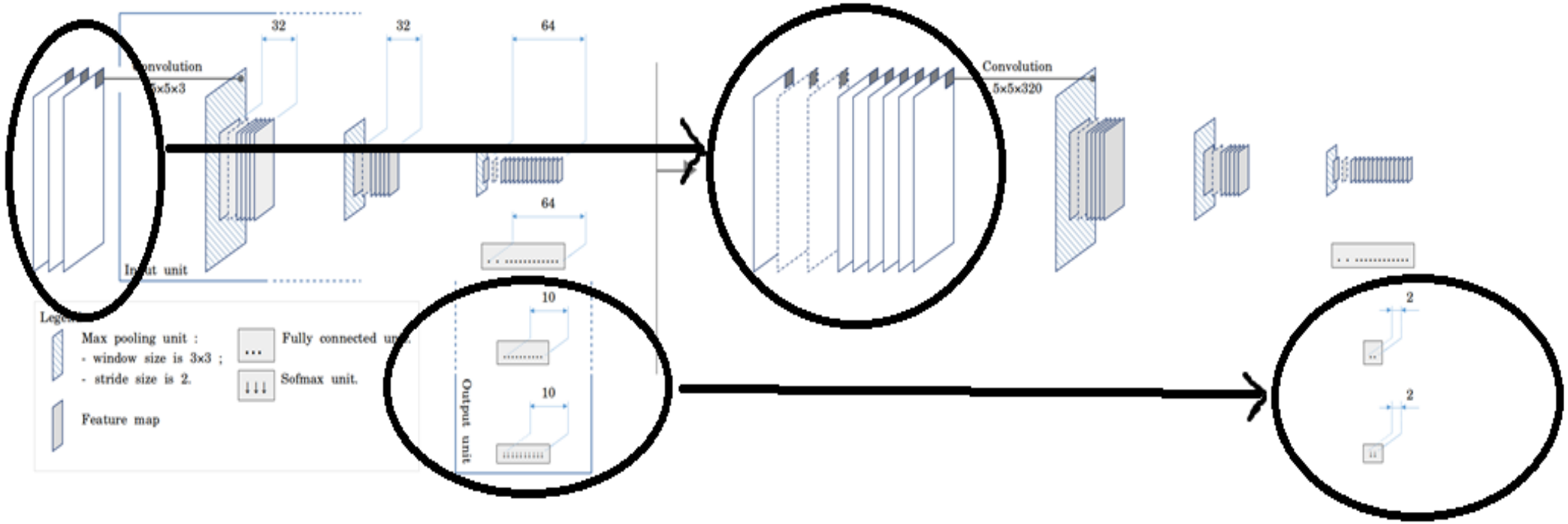


Fig. The architecture of cifar10Net (left) and the developed hyperspectral images classifier (right)

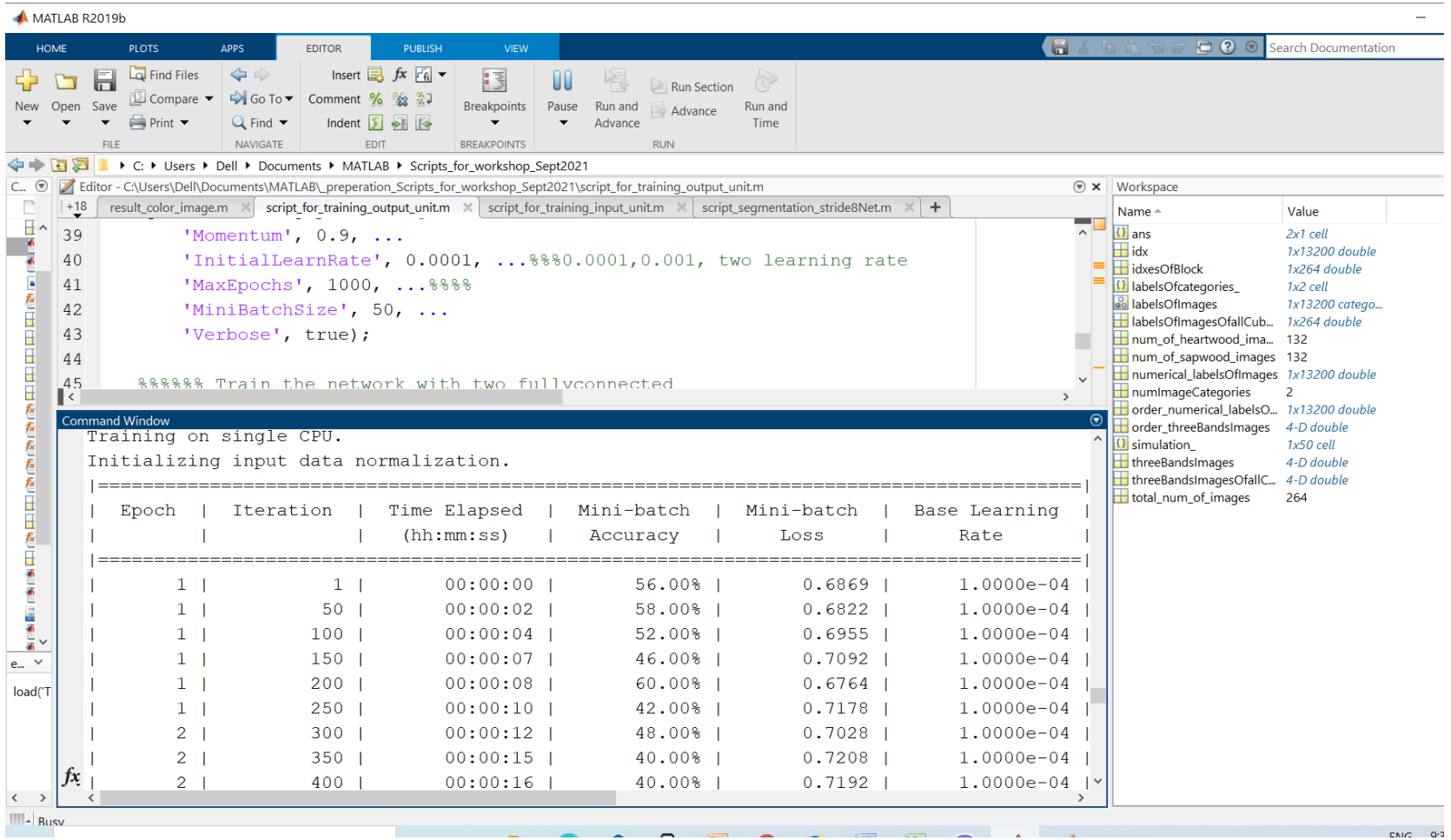
Architecture of classifier

- How to do?

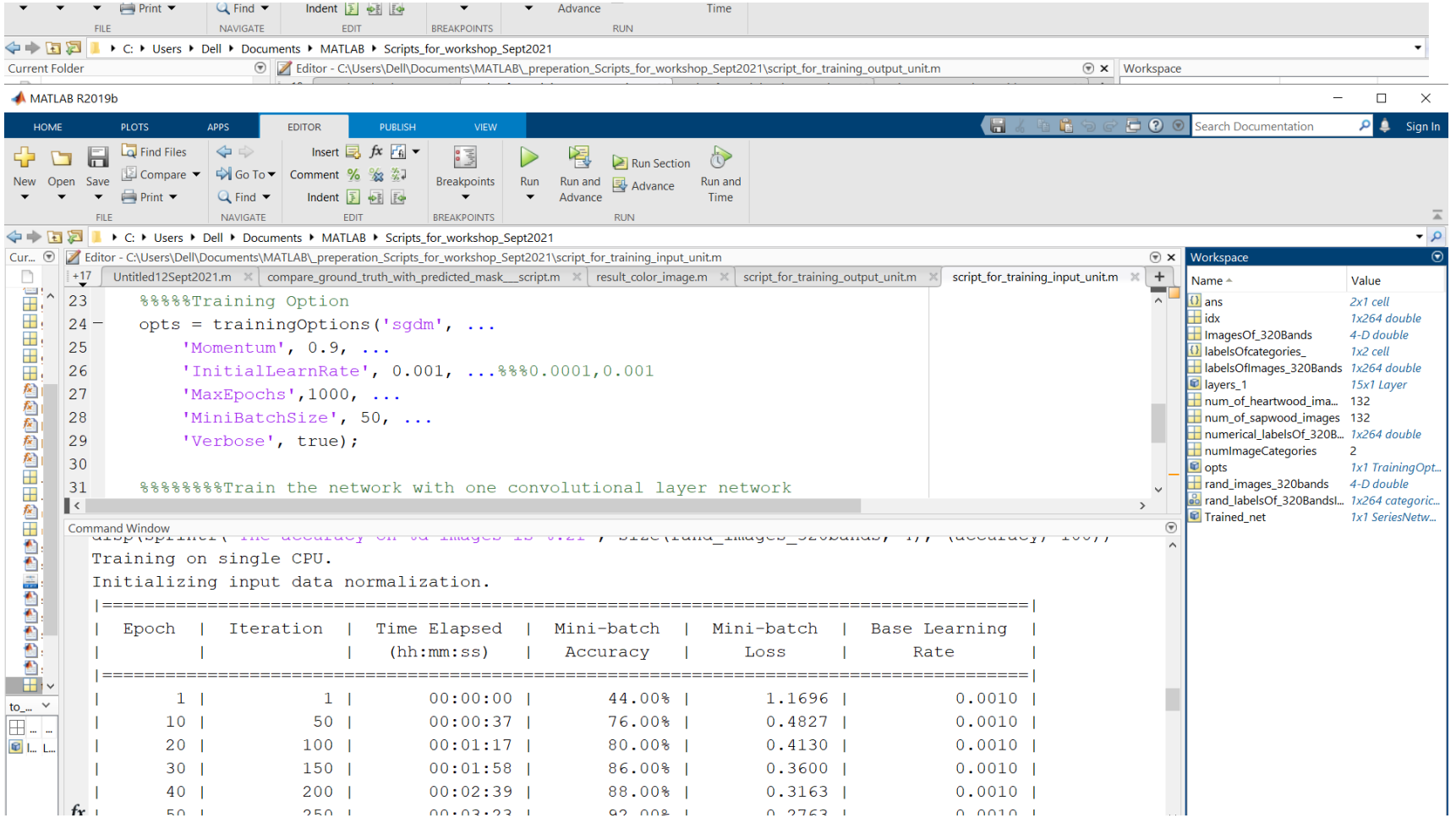
Adapting Methodologies

- Modifying the output units of general image classifier
- Modifying the input units of general image classifier
- Tuning the hyper parameters of the modified layers
- Training

Training the output unit



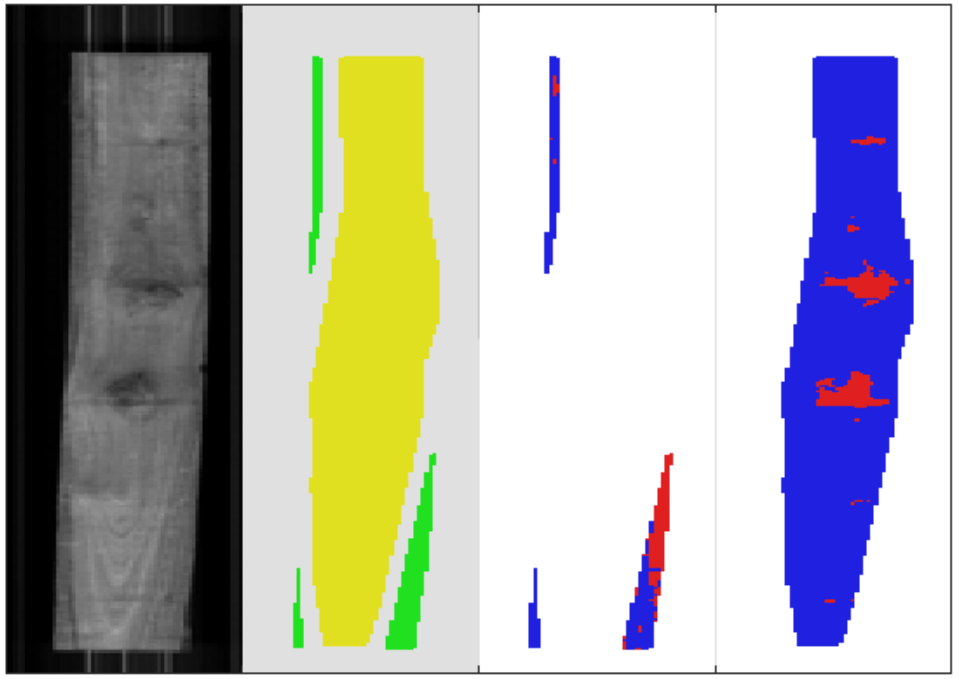
Training the input unit



Single block classifier into multi block classifier –called segmentor

- Modifying the output units of single block classifier
- Modifying the input units of single block classifier
- Tuning the parameters of the modified layers
- No Training

Segmentation result



a to b: input image, b to c: ground truth, c to d: sapwood, d to e: heartwood
green is sapwood, yellow is heartwood
blue is correctly classified, red is uncorrectly classified

Expected Benefits

- Classification process is maturely than segmentation process in image processing area therefore, searching a classifier to adapt for using as an engine in segmentation framework is more easier than searching a segmentor.
- Training with pure data to a classifier is more simple than training with the whole image into a segmentor.

Thanks!

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