H2I Workshop
Spatial Classification of Hyper-spectral Images
16/09/2021
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

input

Segmentation label per block

segmentor

Segmentation label per pixel

up sampling

label-per-block

low resolution classification mask

output

label-per-pixel of block

high resolution classification mask
Proposed Framework
Proposed Framework

input  \rightarrow \text{segmentor}  \rightarrow \text{segmentation}  \rightarrow \text{label}  \rightarrow \text{output}
Proposed Framework

input

segmentor

segmentation

label-per-block

low resolution classification mask

output
Proposed Framework

input

segmentor

segmentation

label-per-block

low resolution classification mask

output
Proposed Framework

input → segmentation → segmentor → label-per-block → low resolution classification mask → output
Proposed Framework
Proposed Framework

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
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 incorrectly 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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