Hu et al

Patch Extraction and CNN

<https://www.mdpi.com/2072-4292/12/1/86> (Convolutional Neural Network for RS Scene Classification: Transfer Learning Analysis)

* “we find transfer learning from models trained on larger, more generic natural images datasets outperformed transfer learning from models trained directly on smaller remotely sensed datasets”
* Conventional scene classification techniques rely on low-level visual features to represent the images of interest. Such low-level features can be global or local. Global features are extracted from the entire remote-sensing image, such as color features, texture features and shape features. Local features are extracted from image patches that are centered about a point of interest. However, these global and local features are handcrafted, time-consuming, needs heuristic or ad hoc design decisions.
* Hu et al: the more representative and higher-level features, which are abstractions of the lower level features, are desirable and play a dominant role in scene classification task. The extraction of high-level features promises to be one of the main advantages of deep learning models.
* “Despite CNN’s powerful feature extraction capabilities, Hu et al found that in practice it is difficult to train CNNs with small datasets”
* Yosinski anf Yin observed that parameters learned by the layers in many CNN models trained on images exhibit a very common behaviour. The layers closer to the input data tend to learn general features, resulting in convolutional operators akin to edge detection filters, smoothing, or color filters.

<https://www.mdpi.com/journal/remotesensing/special_issues/DeepTransfer_Learning> (Special Issue)

<https://ieeexplore.ieee.org/document/8809071/references#references> (what data are needed for semantic segmentation in EO)

* Pretrained converges faster and better accuracy than from scratch

<https://ieeexplore.ieee.org/document/7301382/citations#citations> (Do deep features…)

* Evaluation of generalization power of pretrained ConvNets from everyday objects to the aerial and remote sensing domain
* “ConvNets have shown astounding results even in datasets with different characteristics from which they were trained, feeding the theory that deep features are able to generalize from one dataset to another.”
* “Although ConvNets were not the best descriptors for the coffee dataset, they could still perform well. This is interesting specially because the ConvNets used here were trained to recognize objects which is a very different scenario in relation to recognizing coffee regions. This also shows the generalization power of ConvNets”