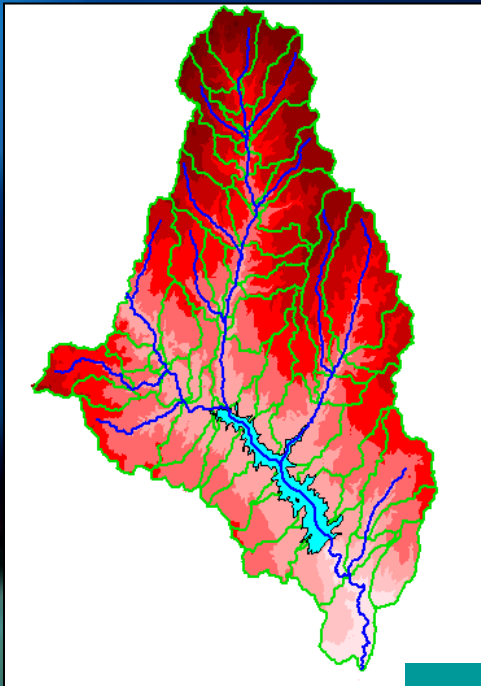# Course Title: Advances in Remote Sensing and GIS
Course Code: ENV-652
Topic: Image Classification

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Image Classification

Image classification is sorting pixels into a finite number of individual classes, or categories of data, based on their DN values.
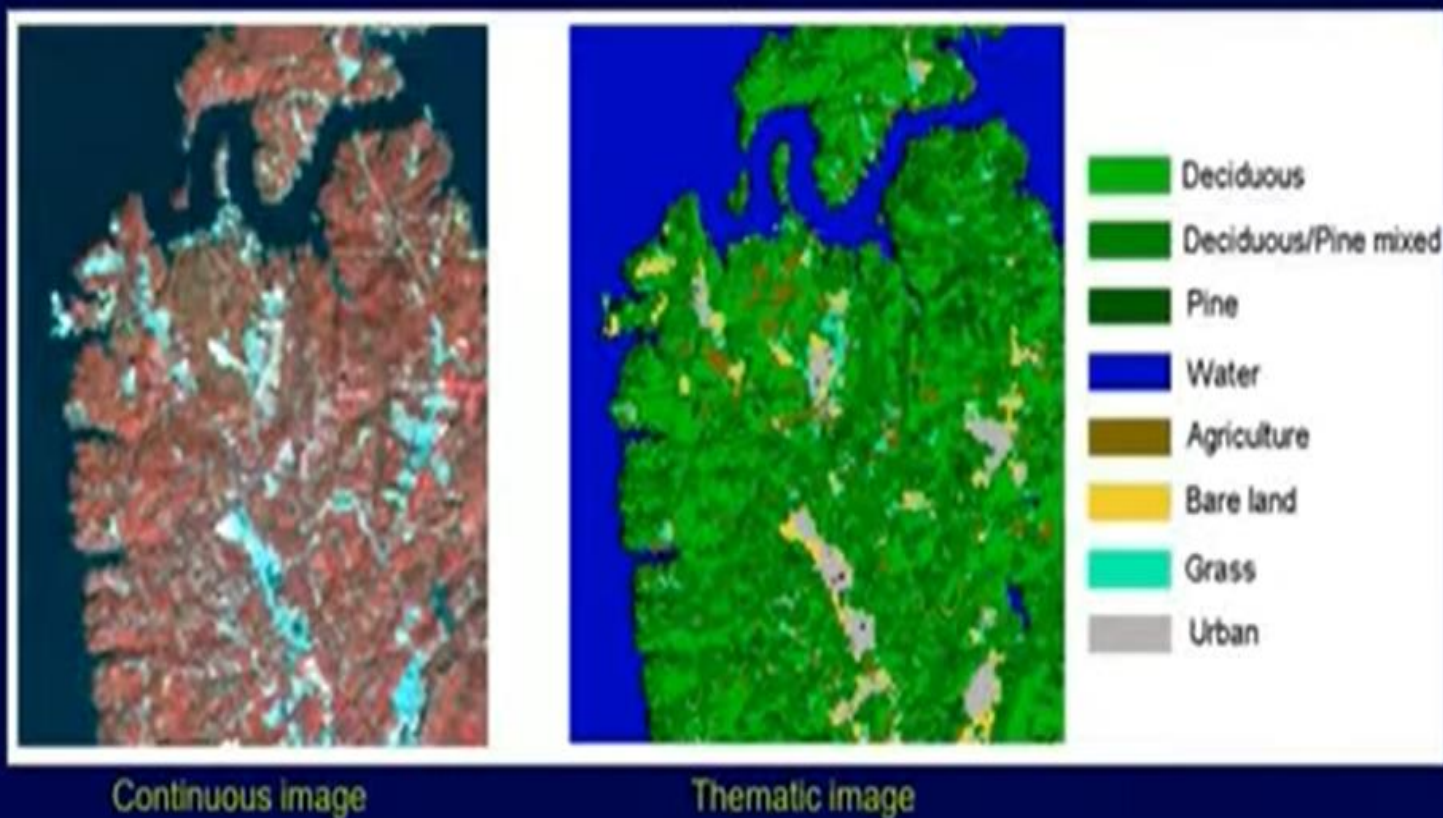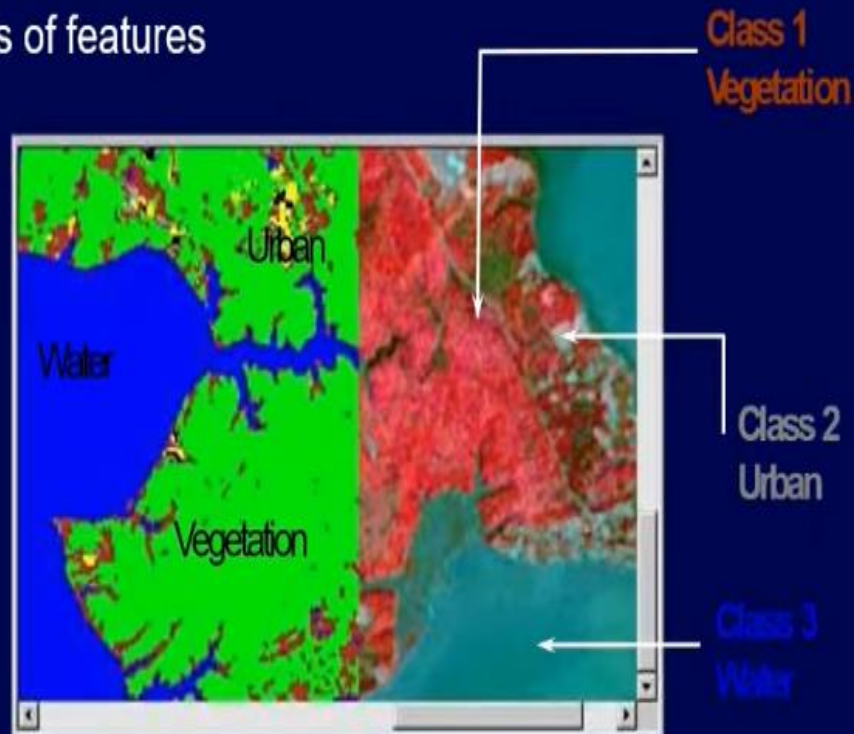

Continuous image

Thematic image

Legend:
- Deciduous
- Deciduous/Pine mixed
- Pine
- Water
- Agriculture
- Bare land
- Grass
- Urban

Image Classification

Derives thematic information from spectral information

Reduces data volume

Permits analysis of features

Information Class and Spectral Class

Information class: It is a class specified by an image analyst. It refers to the information to be extracted.

Spectral class: It a class which includes similar gray-level vectors in the multispectral space. Spectral classes are groups of pixels that are uniform (or near-similar) with respect to their brightness values.

Supervised and Unsupervised

Supervised (Information Class)

Have a set of desired classes in mind → then create the appropriate signatures from the data.

Appropriate-

- when one wants to identify relatively few classes
- when one has selected training sites that can be verified with ground truth data
- when one can identify distinct, homogeneous regions that represent each class.

Unsupervised (Spectral Class)

Classes to be determined by spectral distinctions that are inherent in the data → define the classes later.

Appropriate-

when one wants to define many classes easily, and then identify classes.

Training for Classification

Computer system must be trained to recognize patterns in image data.

Process of defining the criteria by which these patterns are recognized.

Supervised Training is controlled by the analyst.

Select pixels that represent patterns → instruct the computer system to identify pixels with similar characteristics.
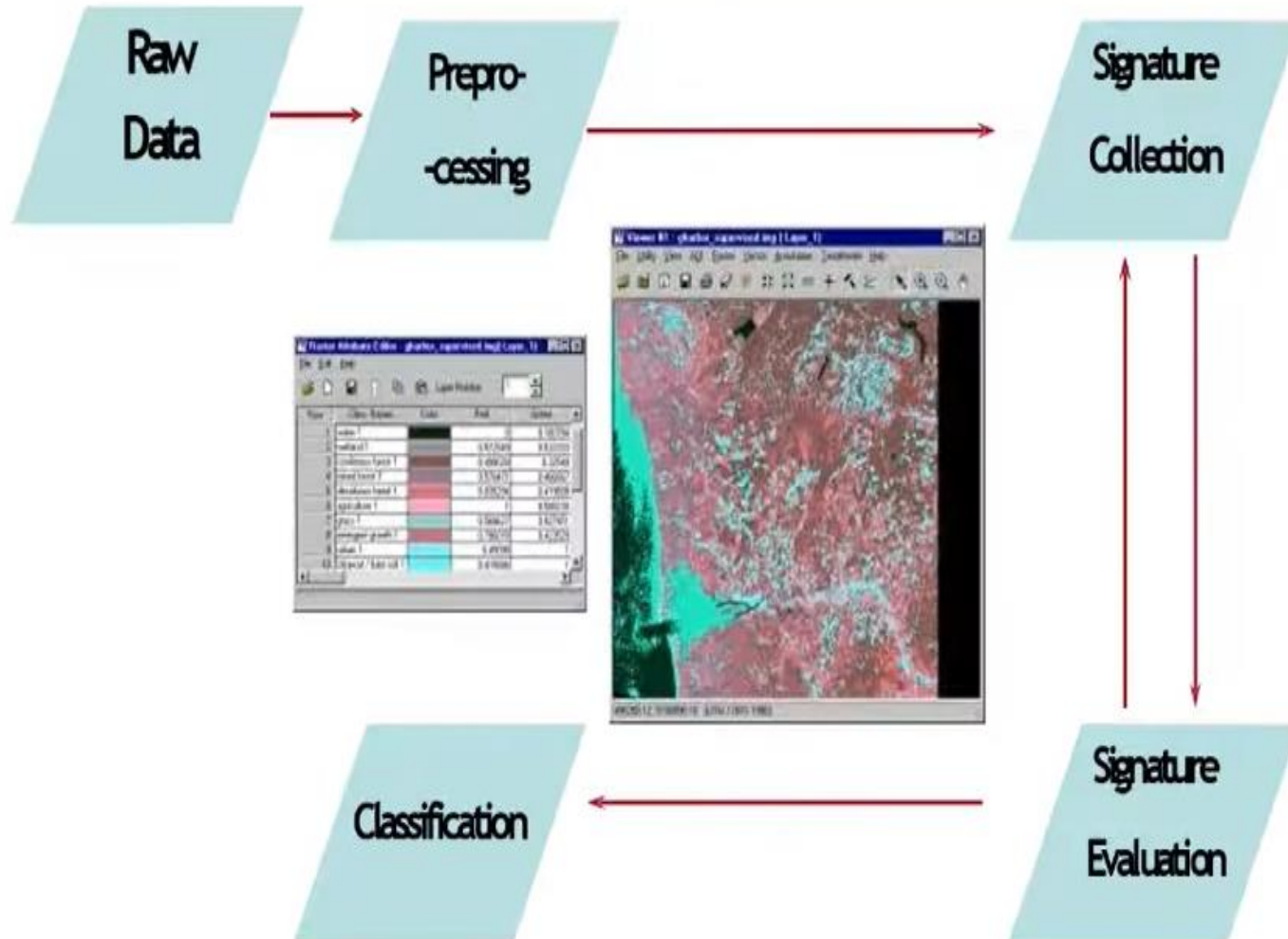
More accurate but requires high skill.

Unsupervised Training is computer-automated.

Specify number of classes → the computer uncovers statistical classes.

Less accurate and less skill required.

Supervised Classification

Signature

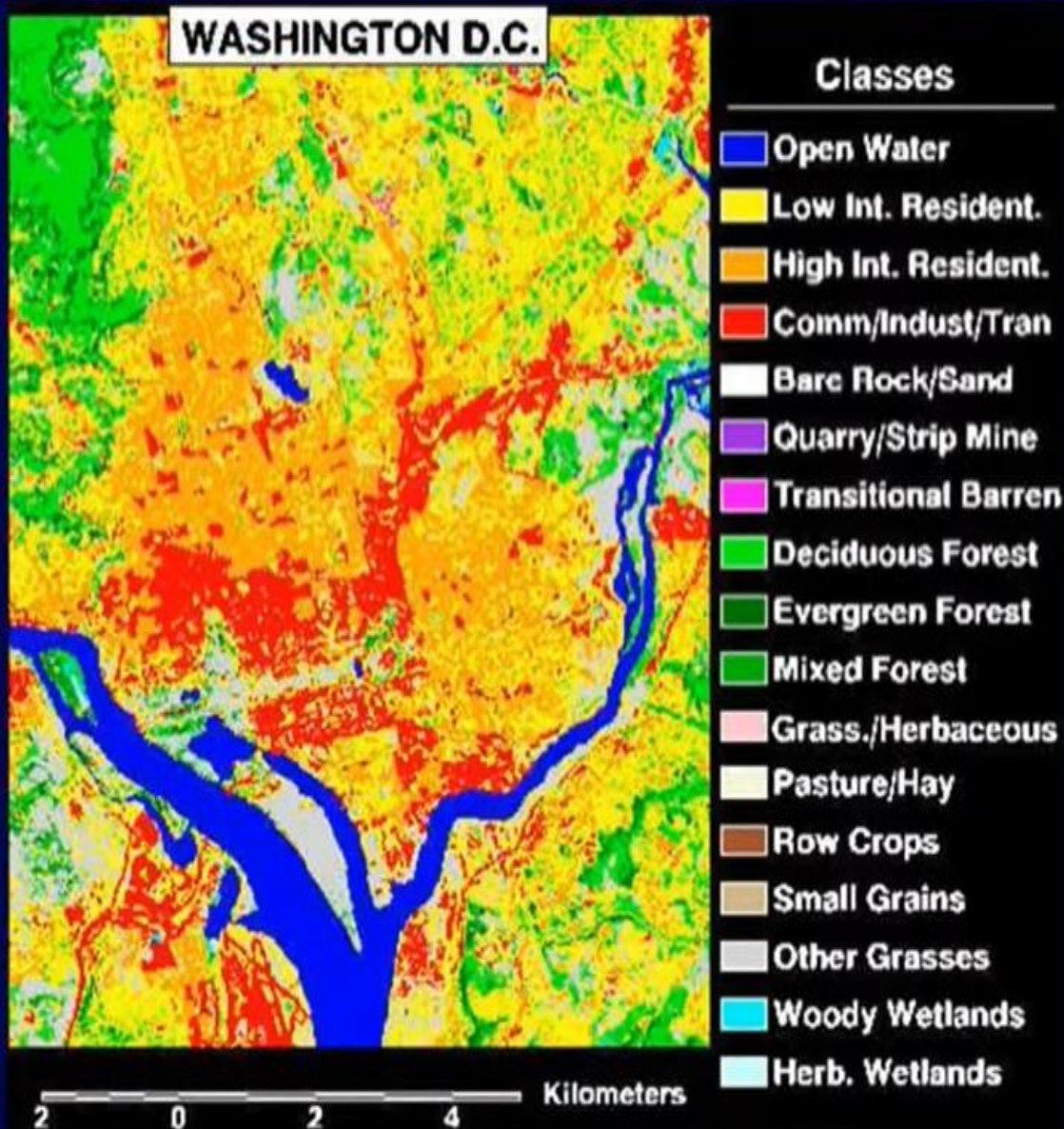A set of pixels selected to represent each primary land-cover.

- **Knowledge**
  - **Field Data**
  - **Personal Experience**
  - **Photos**
  - **Previous Studies**

Lake

Agriculture

River

Forest

Signature/Training Set

Supervised Classification

WASHINGTON D.C.

Classes

- Open Water
- Low Int. Resident.
- High Int. Resident.
- Comm/Indust/Tran
- Bare Rock/Sand
- Quarry/Strip Mine
- Transitional Barren
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Grass./Herbaceous
- Pasture/Hay
- Row Crops
- Small Grains
- Other Grasses
- Woody Wetlands
- Herb. Wetlands

Kilometers
2   0   2   4

https://earthexplorer.usgs.gov/