Main Classification Principles

Cloud Masking Training

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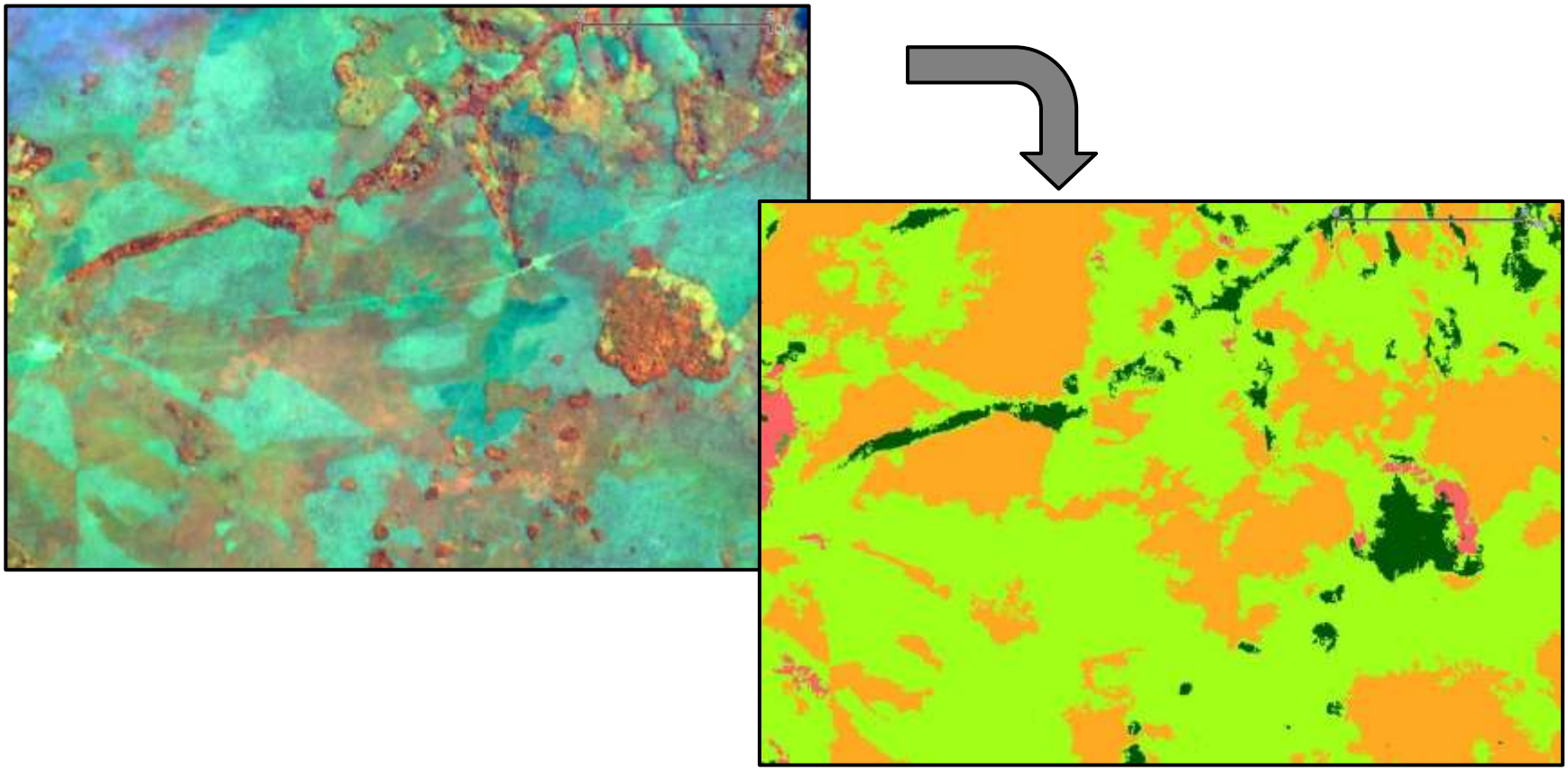
The Goal

- From Remote sensing to ***Classification ≃ Map***
- ***Classification*** = ***Simplify*** Remote sensing information to ***only some Study classes*** *(usually from 2 to 10/20 classes)*



Main Classification Type

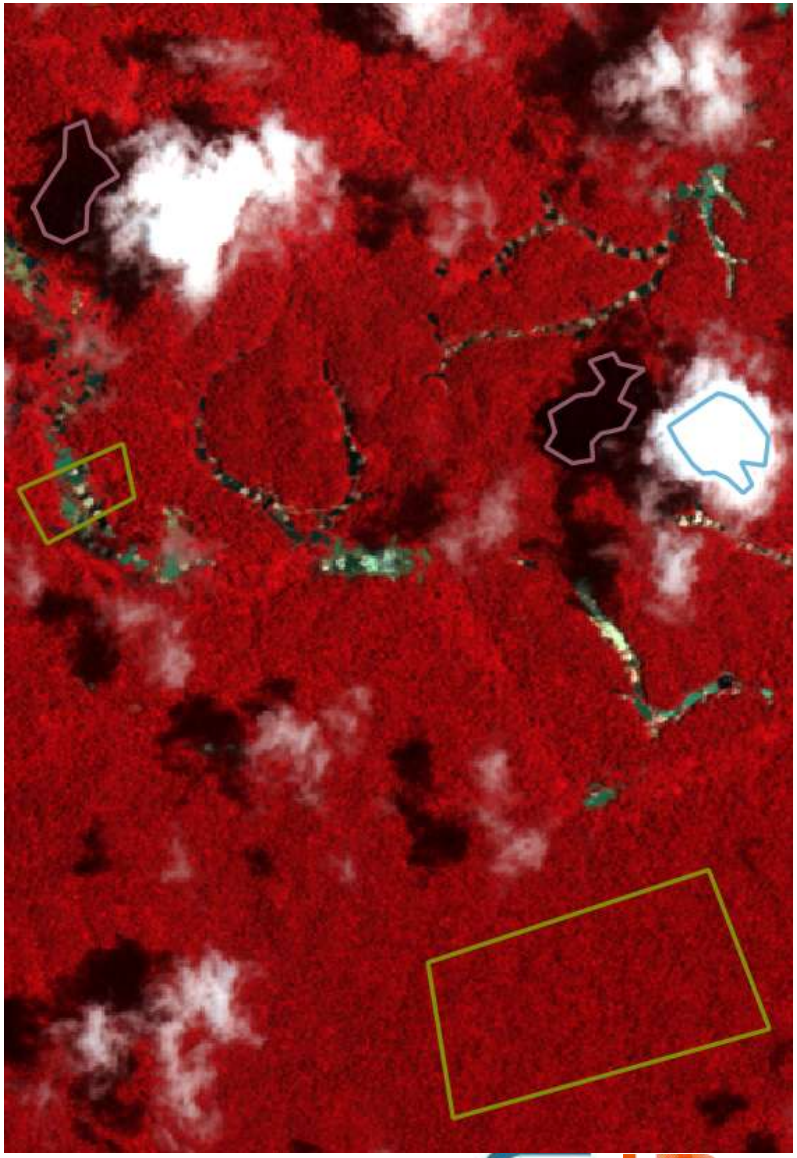
- **Unsupervised** = ***automatic classification*** based on a researched number of classes
  - ***Some existing algorithms*** : Iso data, Kmeans…
  - ***Advantages*** : Simple
  - ***Cons:*** Only radiometric classes and results depend on the area extent

- **Supervised** = Operator create ***ROI*** (Region Of Interest = polygone build on visual interpretation of input data based).
  Algorithm ***learn to recognize*** classes and ***generalize*** to ***all the data area***
  - ***Some existing algorithms*** : SVM, Maximum Likehood, Random Forest
  - ***Advantages*** : Better results
    Able to use Thematic classe and not only radiometric
  - ***Cons :*** ROI need to be carefully drawn in order to represent all the pixels diversity.

Supervised Classification

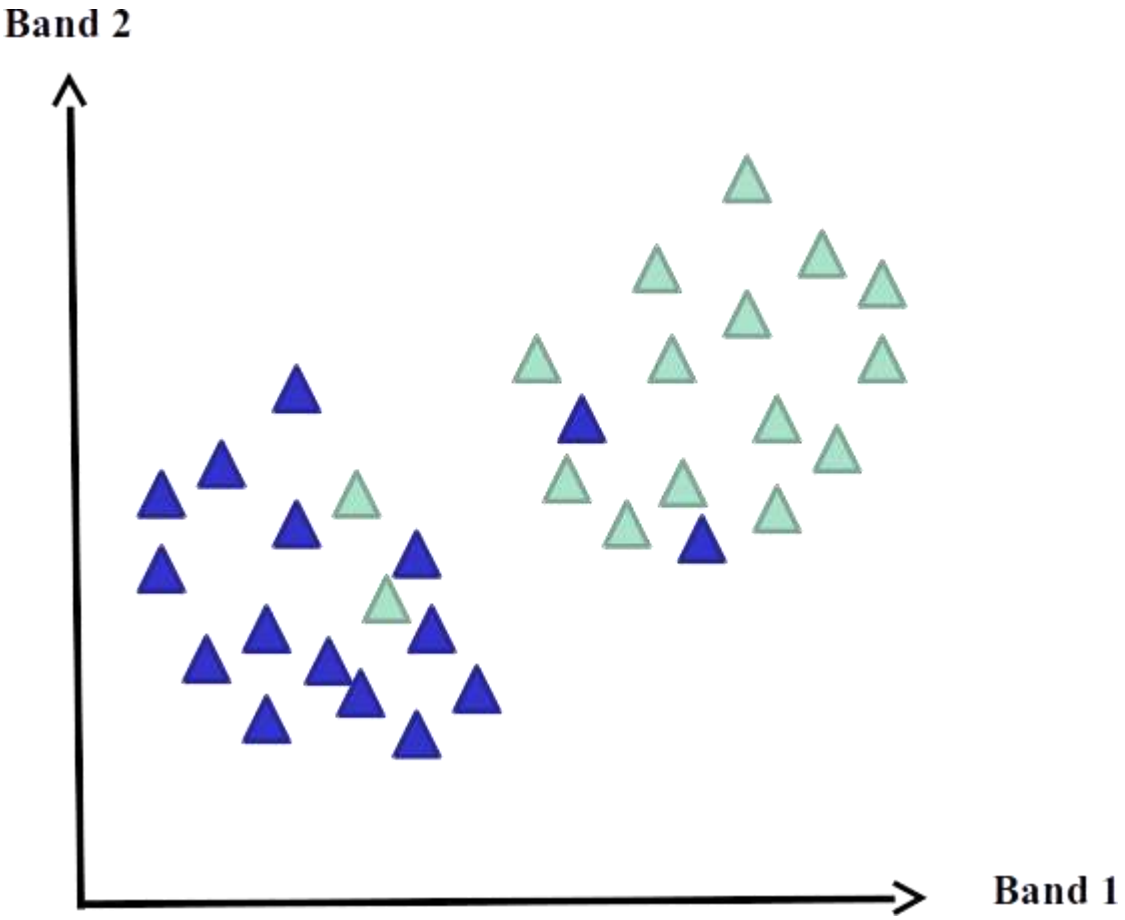
Input Radiometric information based on

- ROI
- Input Raster (RADAR Intensities, Ratio, NDVI, Optical data….)



Supervised Classification

Example of Maximum Likelihood algorithm



Supervised Classification

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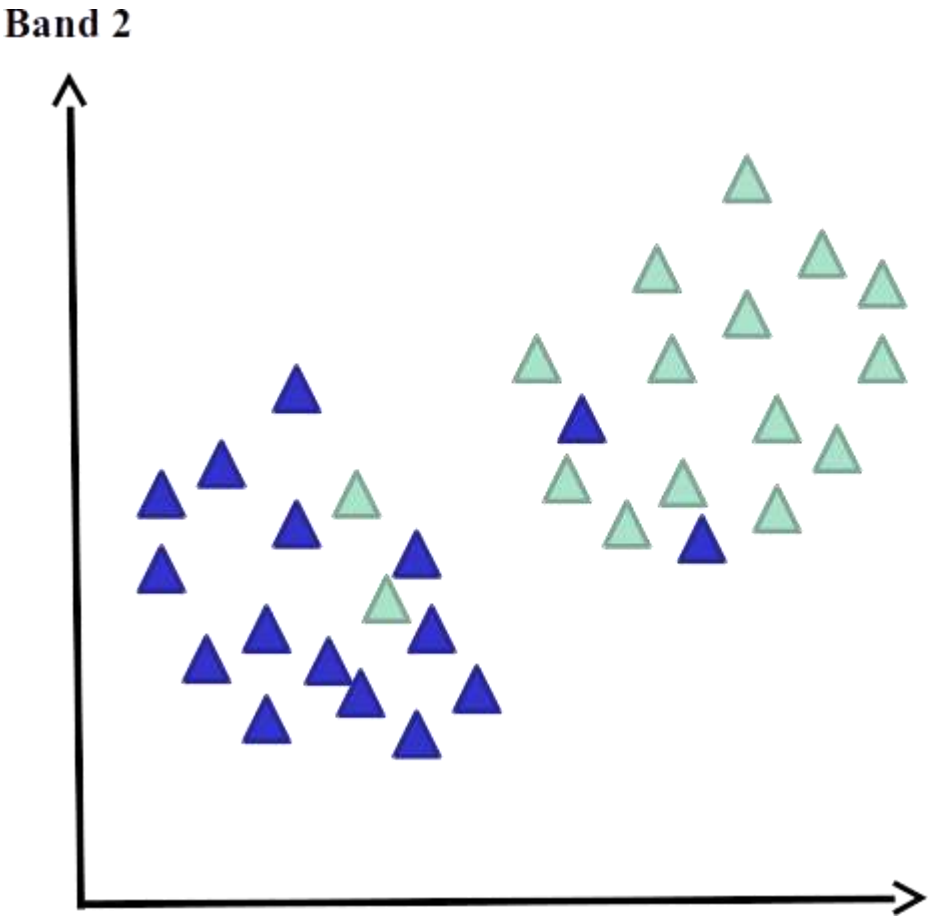


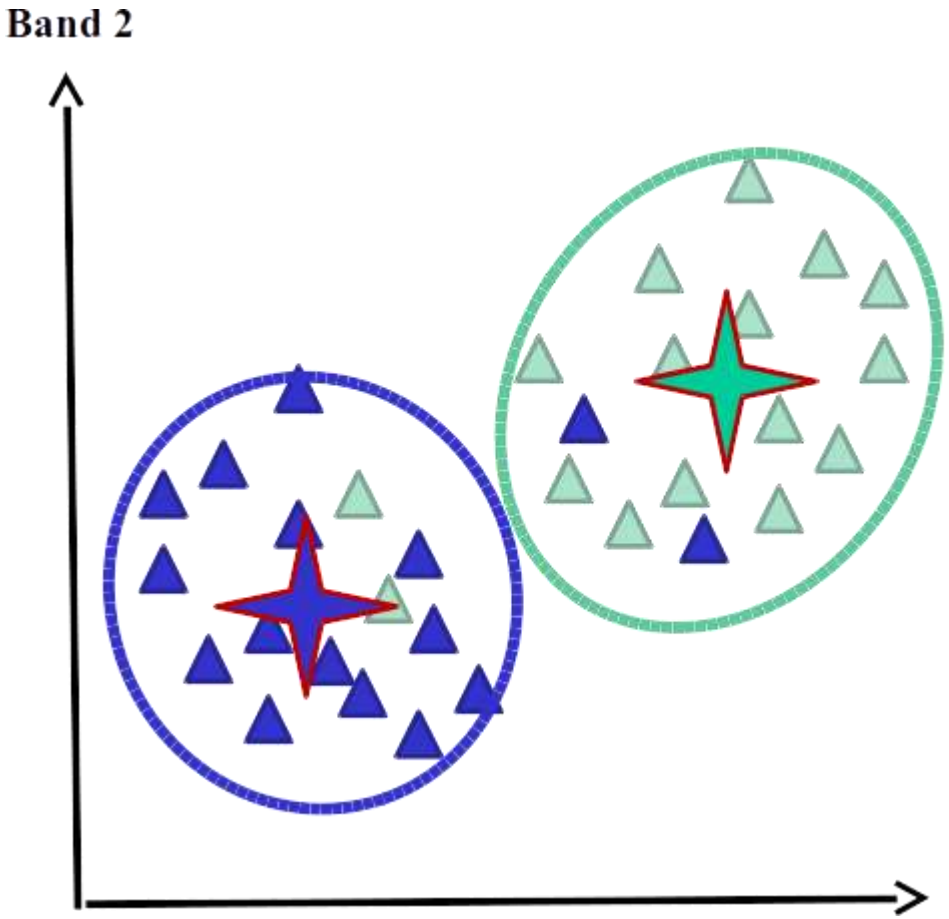
Learning with training pixels (ROI)

Goal

- Compute ***class center*** (mean) from ROI
- Classify new pixel based on ***center class proximity***

Supervised Classification

Example of Maximum Likelihood algorithm



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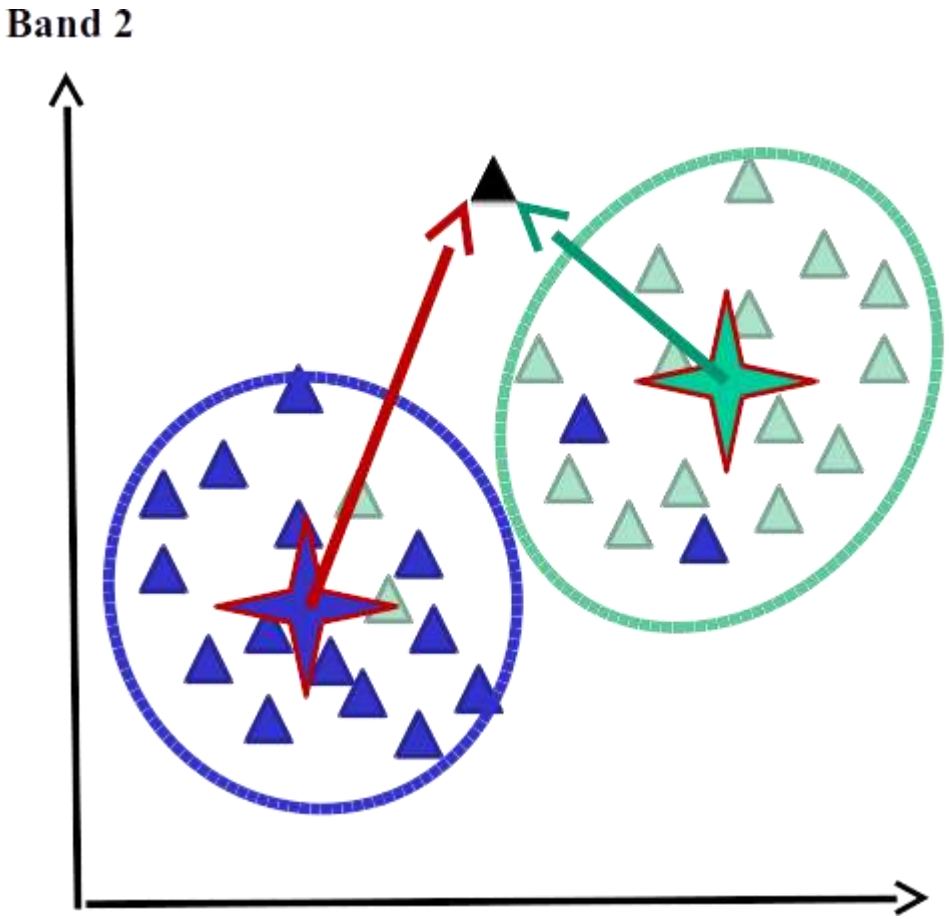

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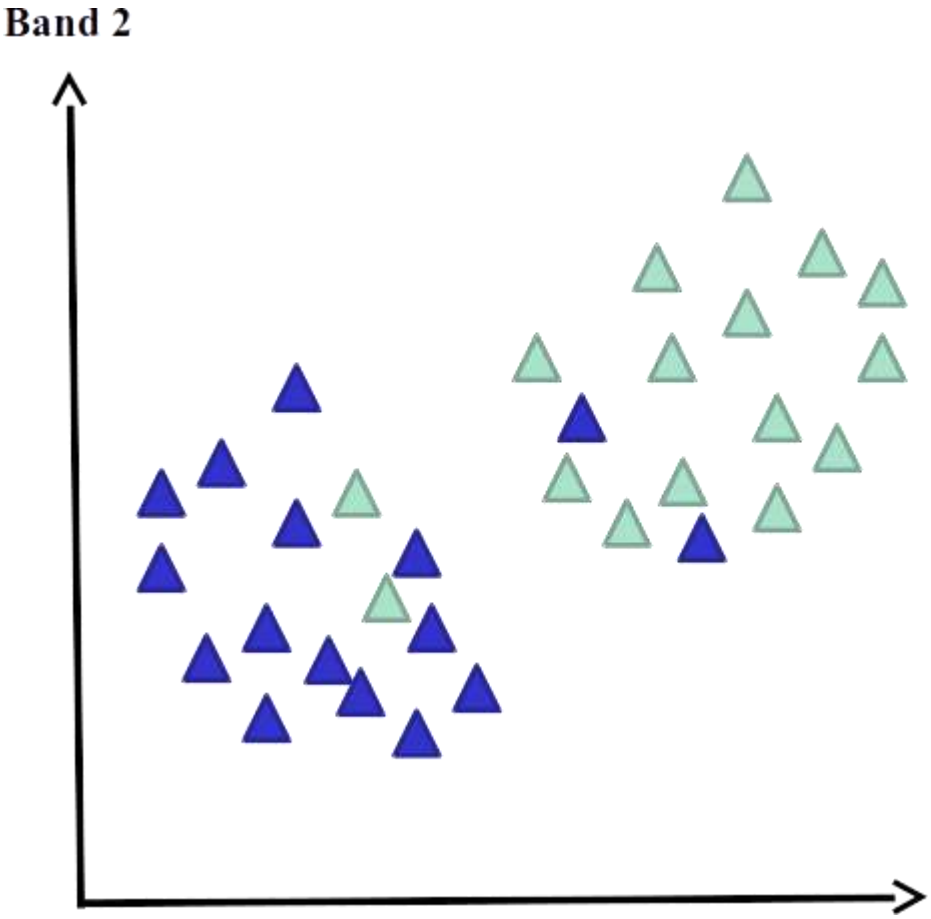
Supervised Classification

Example of SVM (Support Vector Machine)



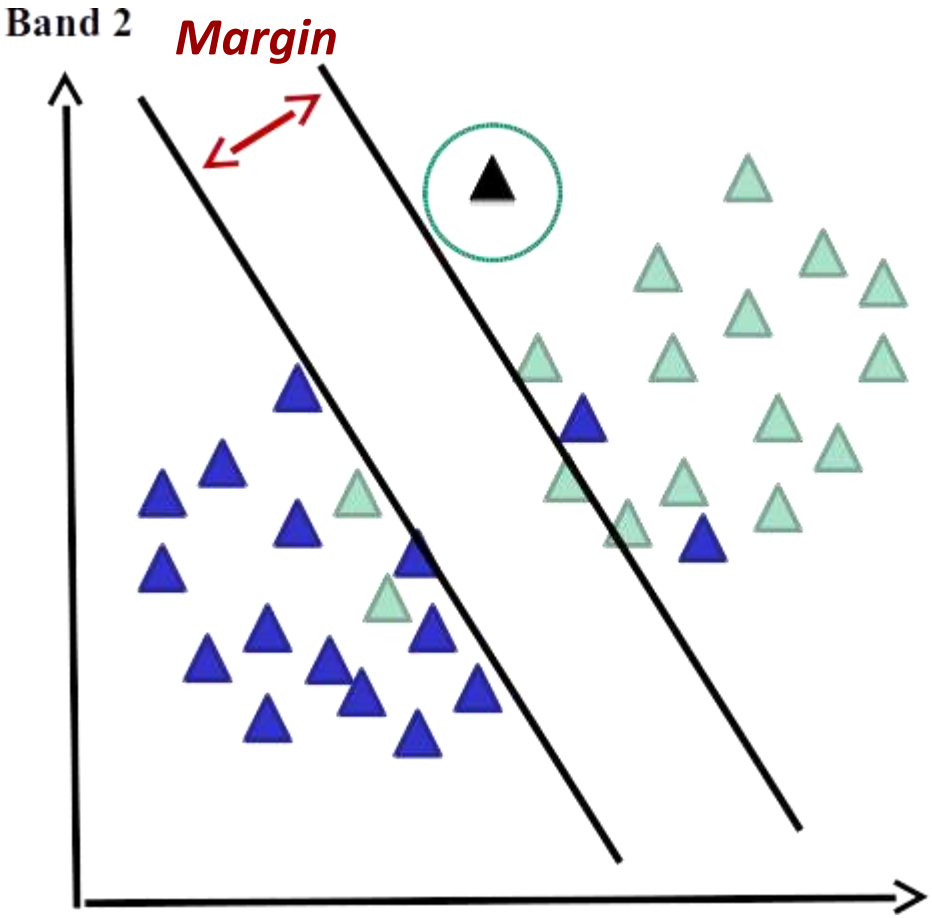
Learning with training pixels (ROI)

Goal

- Find the ***separating line*** (or hyperplane) that ***separate*** the best the classes, based on ROI
- Classify new pixel based on the ***side of the line***

Supervised Classification

Example of SVM (Support Vector Machine)



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Supervised Classification

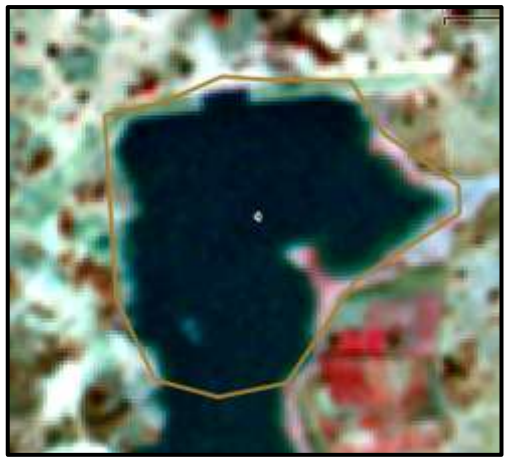
In summary why SVM ?

- Need ***less Training point*** (but always representative!)
- You can use ***any Indices whatever statistics***

  (Optical, Radar, Texture…)
- You can use ***many indices*** : 1-10-100 and more !!!
- ***Easy to use !***

Discussion How to define ROI ?

1. **Chose the study classes**
   a. *What I want to find ?*
   b. *What are the scale of my study classes ?*
   c. *What can probably discriminate our Remote sensing data ?*
2. **Build ROI**
   a. *Have to be Representative (in data and in Landscape)*
   b. *Homogeneous as possible (not to much!)*



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2. **Build ROI**
   a. *Have to be Representative (in data and in Landscape)*
   b. *Homogeneous as possible (not to much!)*
   c. *Take it Easy*
      i. *Radiometric point of view VS only Thematic*
      ii. *Begin with less and simple class*
      iii. *After add more classes*
   d. *Itterative process: Try and Adjust ROI*

How to Improve your Classification ?

1. **Number of Training point(pixels) > 200pts/classe**
   Add more polygones if not
2. **Control ROI representativity**
   All the pixel diversity need to be reprented in a class
3. **Learning accuracy and Final classification need to have same behavior**
   Higher learning accuracy ≃ ROI note representatives→ add missing area
4. **If bad class accuracy**
   Add polygons in the main error areas
5. **If always bad accuracy**
   Merges confused classes