



# Image processing for Earth Observation

Short  
Projects

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# Project types

## 1 – open topic

- You choose a relevant problem requiring image processing (ex: landcover change, temporal monitoring, land planning),
- You find the necessary data, create or find the labels
- You design a processing chain that makes sense with the ML methods seen in the class (or others, to be discussed)
- We expect that you are critical about what you are doing, discuss what works and what not, discuss in terms of scientific (domain) output

# Project types

## 2 – deep learning

- We choose a relevant problem (examples on Moodle)
- We provide the necessary data
- You design a processing pipeline in Pytorch.
- We expect that you test several approaches and are critical about what you are doing. Discuss in terms of accuracy, training time, etc.

# What we expect

- Groups 4 students
- Deadline: **January 12<sup>th</sup>**, midnight\*.
- Submission on Moodle.
  
- The project will consist of
  - a .pdf document (**15 pages max – we won't read further**) with
    - Topic and challenges, short literature review;
    - Proposed processing routine (typically a flowchart);
    - Results (a few maps, assessment of metrics);
    - Discussion → being critical about what has been done.
  
  - your code in python, fully executable, creating the maps for a part of your data.

\* NB: our advise is to hand in before December 31st, so that you have two full weeks to study for your exams.  
But we leave it up to you.

# Schedule

	1 <sup>st</sup> hour	2 <sup>nd</sup> hour	3 <sup>rd</sup> hour	Deliverable
13 October	Classification courses		Introduction about the projects	
19 October	Reading club		Brain storm ideas with the TAs	Idea!
10 November	Course on semantic segmentation			Topic chosen, groups ready
17 November	Reading club 2		Discuss with groups	Filled google form for topics and groups
24 November	Project			First processing chain
01 December	Mid term Q&A	Project		
08 December	Mid term		Project	First results
15 December	Project			
22 December	Project			Improved results, start writing report

# Evaluation criteria

Criterion	Explanation	Pts. on open topic	Pts. on deep learning topic
Data (open topic only)	<ul style="list-style-type: none"> <li>- Choice of relevant data (resolution, bands, ...)</li> <li>- Data preparation (including dataset splits)</li> </ul>	3	0
Method	<ul style="list-style-type: none"> <li>- Relevant choice of methods</li> <li>- Several parameter sets / methods are compared</li> </ul>	3	5
Reproducibility, code	<ul style="list-style-type: none"> <li>- Code can be run easily</li> <li>- Code is readable</li> <li>- Computational efficiency is reasonable</li> <li>- A readme file with instructions is provided</li> </ul>	1	2
Evaluation of results	<ul style="list-style-type: none"> <li>- Several relevant metrics are computed over train / val splits</li> <li>- Computational complexity (e.g. training time, inference time) is assessed</li> </ul>	3	3
Report	<ul style="list-style-type: none"> <li>- Report is clearly written</li> <li>- Graphics are readable and complete (e.g. axis titles)</li> <li>- Results are analysed</li> <li>- Discussion in terms of scientific (domain) output</li> <li>- Limitations are clearly discussed</li> </ul>	2	2
	<b>TOTAL</b>	<b>12</b>	<b>12</b>

# Some advice

- Timing is short, so work well, don't go for over complicated topics.
- Discuss with the assistants to ensure you have a doable idea, so that you can start straight away
- Take a deep learning project only if you are very at ease in Python programming
- Create a slack channel for your group, so you can reach the assistants easily