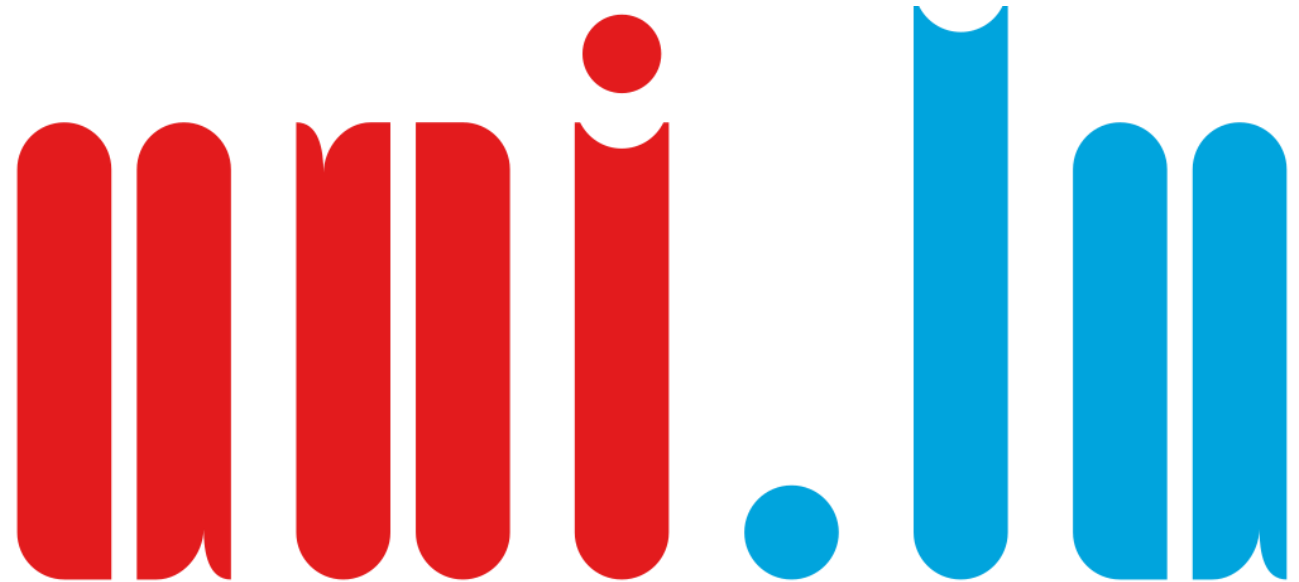# Programming Machine Learning Algorithms for HPC

- Important dates

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# Exam

- 19 of November.
- Question with options.
- Content from the slides up to 12 of November.
- No open book.
- No phone.

# 1$^{st}$ project

- Implement parallel KNN for regression (with the tools we already reviewed).

- We will provide the sequential code.

- You will implement a parallel version of the algorithm.

- The parallel version should give the same results (output) as the sequential version.

- You will do a benchmark (at least 30 runs) and present the result of real time and also CPU time with average and standard deviation.

- Main things to highlight:
  - Approach you used to parallelize and why.
  - The speed-up gain in real time.

# 1st project

- Teams of max 3 people.
- Send us the code (or jupyter notebook, an easy way to run it).
- If its .py files put it in a zip folder.
- Put your name (or the team members name) on the file or the notebook.
- Explain your logic with code comments.
- Use the HPC of the university (Aion).
- Do not change the random seed of the code to replicate the results.
- Send the project results before 12 of November (sending later its possible but will remove 30% of the total score).

# Projects 2 and 3

- Same requirements and rules as the first project:

    2. Ensemble of forecasters – To be delivered by 26 of November.
    3. Convolution training – To be delivered by 03 of December.

# Project 4

- Deliver a technical report of using a framework for parallel ML – Horovod by 10 of December.
  - Teams of max 3 people.
  - 2 pages max.
  - Screenshots of the execution.
  - Report on speed of training.

- Follow the Horovod tutorial: https://ulhpc-tutorials.readthedocs.io/en/latest/deep_learning/horovod/
  - **Use Tensorflow and Pytorch**.
  - Use the cifar10 dataset and create a model to classify images.

# Project 5

- Deliver a technical report of using a HuggingFace.
  - Teams of max 3 people.
  - 2 pages max.
  - Screenshots of the execution.
  - Report on speed of training.

- Follow the HuggingFace tutorial: https://ulhpc-tutorials.readthedocs.io/en/latest/deep_learning/huggingface/

# Important dates

| Deliverable | Date |
|---|---|
| 1$^{st}$ project - KNN | 12 of November |
| Exam | 19 of November |
| 2$^{nd}$ project – Ensemble of forecasters | 26 of November |
| 3$^{rd}$ project – Convolution training | 03 of December |
| 4$^{th}$ project - Horovod | 10 of December |
| 5$^{th}$ project – HuggingFace | 17 of December |

# Final score

- Exam 50 %
- Projects 50 %
  - Each project will be scored individually. Then averaged.


- Note: Homework and participation in class is also taken into account to increase the final score.