KU LEUVEN

LUMI and PyTorch

A journey from Tier-2 to Tier-0

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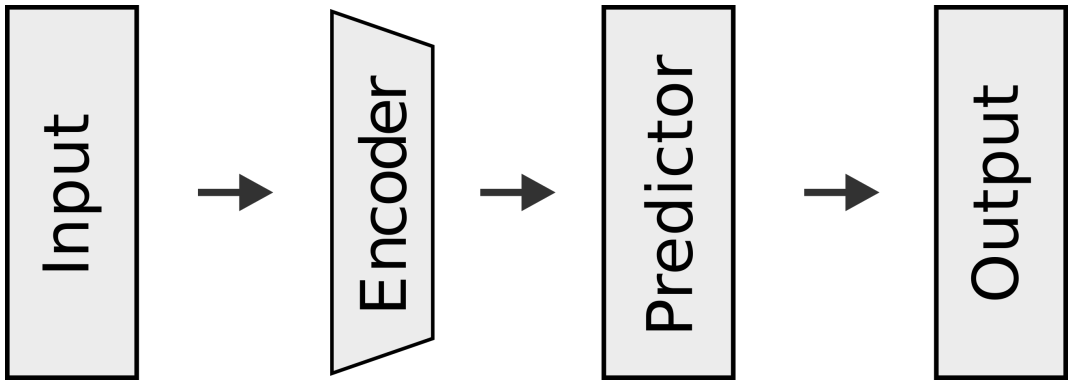
Background: transfer learning

- Encoder: **pretrained** on large amounts of data $\Longrightarrow$ good starting point for solving any task
- Predictor: **task-specific** layers



My PhD:

- Large-scale representation learning: training high-quality, general vision encoders
- Requires a lot of resources (GPUs)

Tier-2

- KU Leuven/UHasselt level
- 48 GPUs (V100, A100, H100, excluding P100)
- Useful for shorter experiments with a small number of GPUs
- Successfully used for single-GPU experiments and up to 12 hours of training
- For long jobs requiring several nodes: waiting time too long

Tier-1

- Flemish level
- 160 A100 GPUs (4 GPUs per node)
- Must write a proposal. My allocation: 36k GPU hours
- My small-scale jobs: 8 GPUs (2 nodes) for 2 days
- However: cannot run many such jobs in parallel (only 40 nodes)
- Waiting times: sometimes instant, sometimes several days

Tier-0 / LUMI

- My large-scale jobs: 64 GPUs for 15 days $\implies$ 23040 GPU hours per job (64% of the Tier-1 grant)
- Ideal for large-scale experiments (25k GPU hours starting grant vs. 40k maximum for Tier-1)
- My grant: 350k GPU hours
- Huge number of nodes: less waiting time (at the moment)
- Not ideal for smaller jobs (< 1 full node)

PyTorch and AMD GPUs

- AMD MI250X GPUs only
- Historically difficult to use with deep learning frameworks
- Today, my code works out of the box:
  - Install conda through the LUMI container wrapper (note: experimental)
  - Install the proper version of PyTorch (simple installation guide on the website)
  - Run the same code you would run on NVIDIA GPUs (even the sbatch script almost identical)

Conclusions

- Most important takeaway: determine your needs realistically (Tier-2 vs. Tier-1 vs. LUMI)
- If you need LUMI, do not hesitate to apply: seems daunting at first but is quite simple
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