DEEPHEALTH

EDDL

Lab 0: ECVL + EDDL environment

Winter School 24/01/2022

The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 825111.

Contents

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What is EDDL?

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What is EDDL?

European Distributed Deep Learning Library

- Open-source library that provides two high-level features:
  - Distributed Deep Learning
  - Tensor computation
- API for C++ and Python

Key benefits

- Hardware transparency support for CPU, GPU and FPGA
- Support for Clusters, Clouds and containerized platforms
- Framework interoperability

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Deep-learning features

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Deep-learning features

Layers supported

All the main deep-learning operations are supported (See here):

- **Core layers:** Dense, Dropout, Select, Concat, Broadcasting,…
- **Activations:** ReLU, Softmax, Sigmoid,…
- **Convolutions & Poolings:** conv, pool, upsampling, transposed,… (1d, 2d, 3d)
- **Recurrent:** RNN, LSTM, GRU
- **Normalization:** BatchNorm, LayerNorm, GroupNorm,…
- **Tensor operators:** Max, Min, Sum, Mean, Equal,…
- **Data transformation & Augmentation*:** Crop, Rotate, Flip, Pad, Cutout,…

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Tensor features

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Tensor features

Operations supported

All the main tensor operations are supported (See here):

- **Array creation:** ones, zeros, arange, linespace, randn, clone,…
- **Array manipulation:** reshape, permute, un/squeeze, concat, stack, tile, broadcast…
- **Image manipulation:** Crop, Scale, Rotate, Pad, Flip,… (+ randoms)
- **Indexing routines:** nonzero, where, select, permute, expand,…
- **Input/Output:** load, save, load_partial,…
- **Linear Algebra:** Interpolate, Norm, Trace,
- **Logical functions:** all, any, isclose, isinf, logical_and, logical_or,…
- **Mathematical functions:** abs, cos, clamp, log, add, mult, max, min,…

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Supported architectures

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Supported architectures

Working models

- **Image classification:** AlexNet, ResNet, GoogLeNet, DenseNet,…
- **Object Detection:** YOLO, RetinaNet,…
- **Object Segmentation:** U-Nets, DUC,…
- **Encoder-Decoder:** Machine translation, Image Captioning, Sentiment,…
- **Generative Adversarial Networks**

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Installation

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Installation

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- **Operating system:** Windows, MacOS and Linux
- **Hardware acceleration:** CPU, GPU (cuda native/cuDNN), FPGA and COMPSs
- **Installation:**
  - **Source:** cmake
  - **Image:** Docker
  - **Package management:** conda*, brew and pip

**It will be seen in detail in the next lab session*

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Documentation

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Documentation

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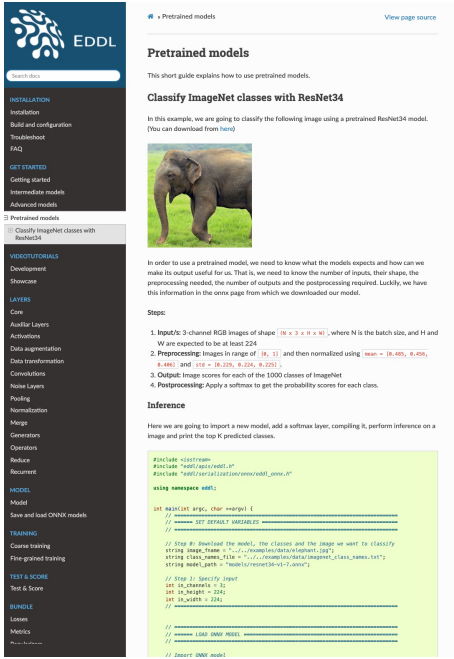

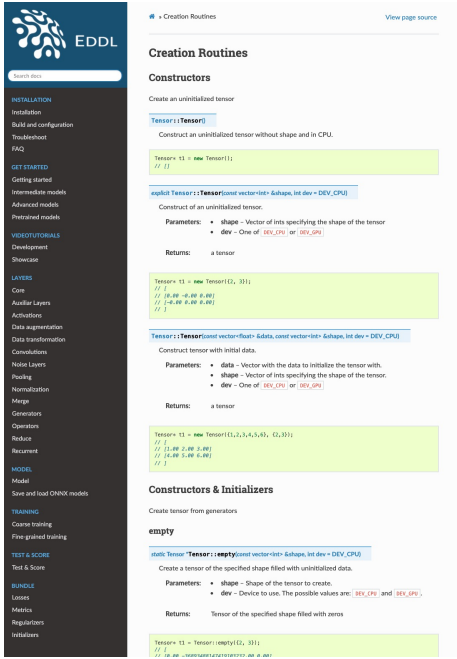

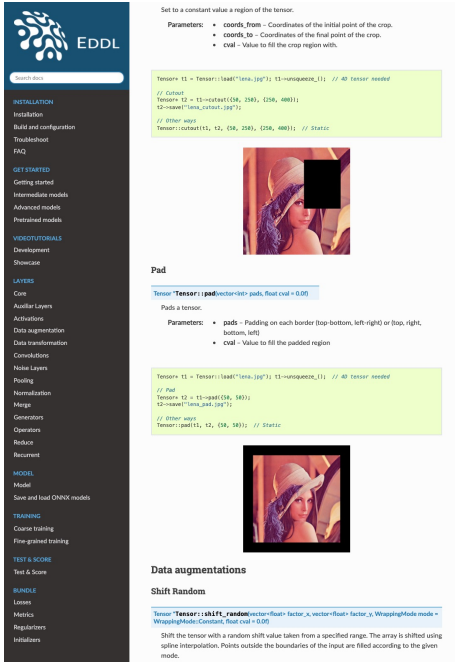

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Resources

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Resources

Additional links with useful information

EDDL documentation

https://deephealthproject.github.io/eddl/index.html

GitHub

https://github.com/deephealthproject/eddl

Progress

https://github.com/deephealthproject/eddl/blob/master/docs/markdown/eddl_progress.md

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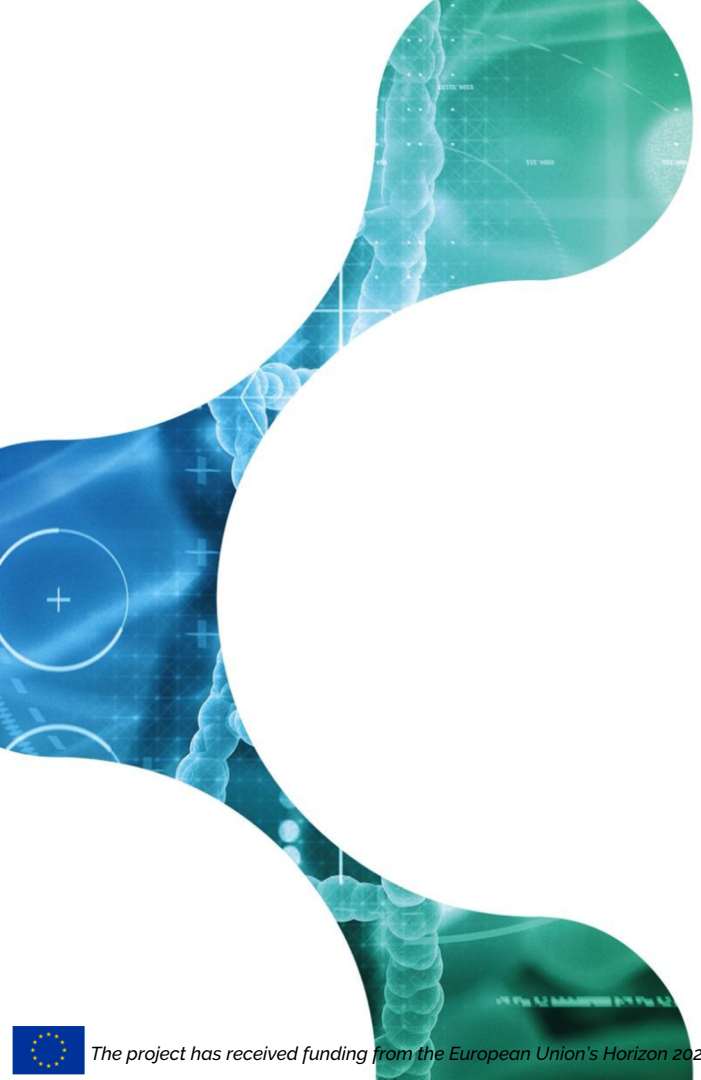

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Thank you!

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