DEEPHEALTH

The DeepHealth Toolkit: a Unified Framework to Boost Biomedical Applications

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

The DeepHealth Project

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Aim & Goals

- Put HPC computing power at the service of biomedical applications
- Increase the productivity of medical personnel and IT professionals
- Offer a unified framework adapted to exploit underlying heterogeneous HPC and Cloud architectures

Key facts

Duration: 36 months
Starting date: Jan 2019

Budget: 14.642.366 €
EU funding: 12.774.824 €

22 partners from 9 countries:
Research centers, Health organizations, large industries and SMEs

Research Organizations

UNIVERSITAT POLITÈCNICA DE VALÈNCIA
Barcelona Supercomputing Center
list
UNIMORE
Karolinska Institutet
CRS4
UNIVERSITÀ DEGLI STUDI DI TORINO
OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

Health Organizations

Fundación para el Fomento de la Investigación Sanitaria y Biomédica de la Comunitat Valenciana
CHUV
SPITALUL CLINIC PROF. DR. THEODOR BURGHELE BUCUREȘTI
Stockholms läns landsting

Large Industries

everis
PHILIPS
THALES
SIMAVI

SMEs

WINGS ICT SOLUTIONS
TREE TECHNOLOGY
prodesign electronic gmbh
Stelar security

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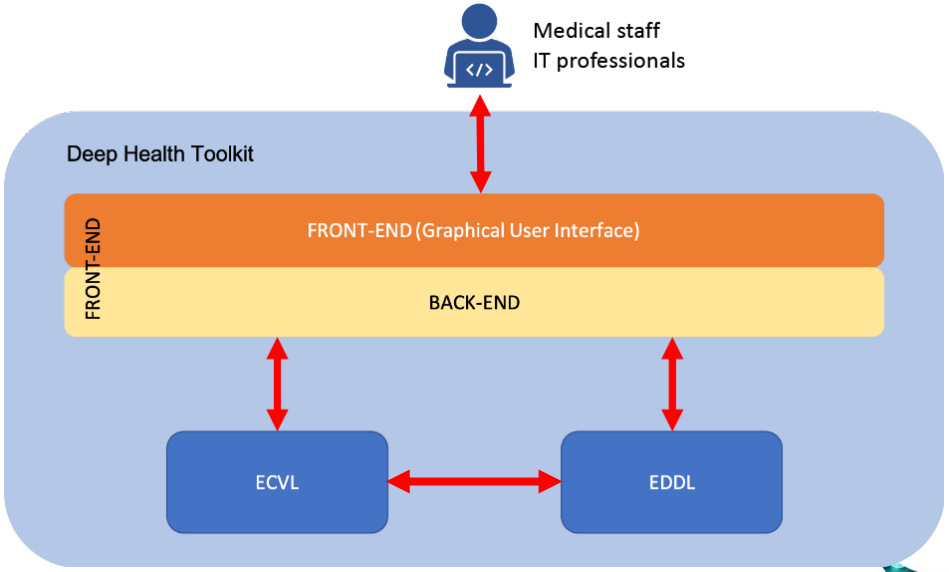
The DeepHealth Toolkit

- The *DeepHealth Toolkit* is composed of two libraries designed for computer vision and deep learning tasks:
  - ECVL - European Computer Vision Library
  - EDDL - European Distributed Deep Learning Library

- Plus, a front-end designed for non-expert users, which consists of:
  - A RESTful web service
  - A web-based GUI

- The entire toolkit is open-source and available at github.com/deephealthproject



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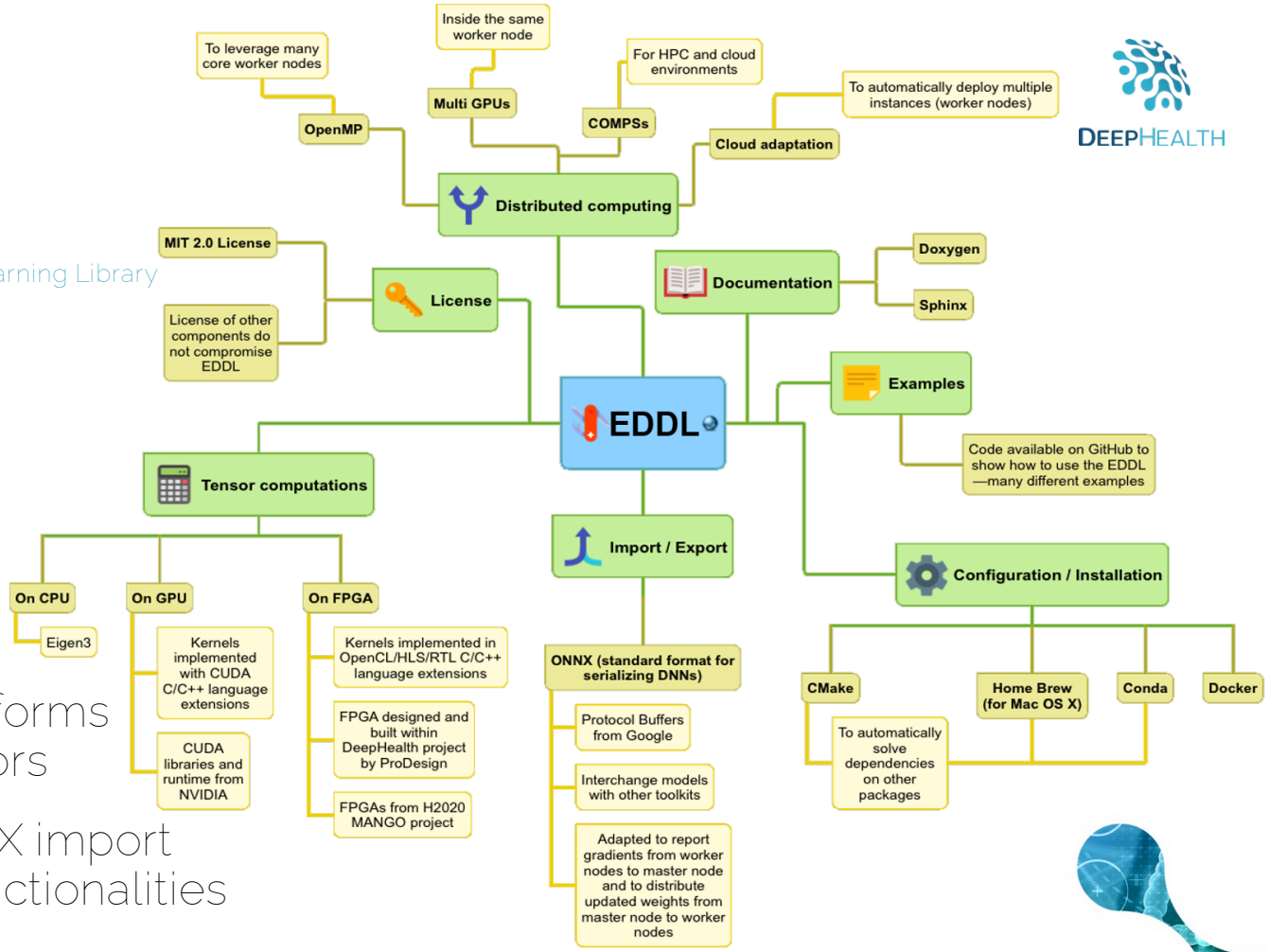
EDDL

European Distributed Deep Learning Library

- Written in C++
- Keras-like API
- Built-in data augmentation
- Supports different hardware platforms and accelerators
- Provides ONNX import and export functionalities



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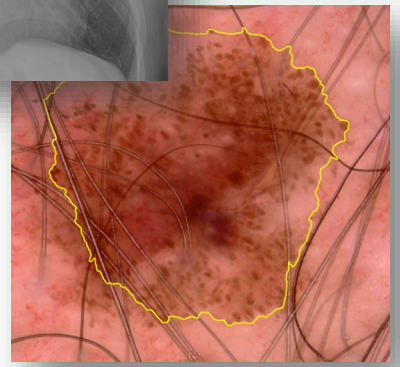
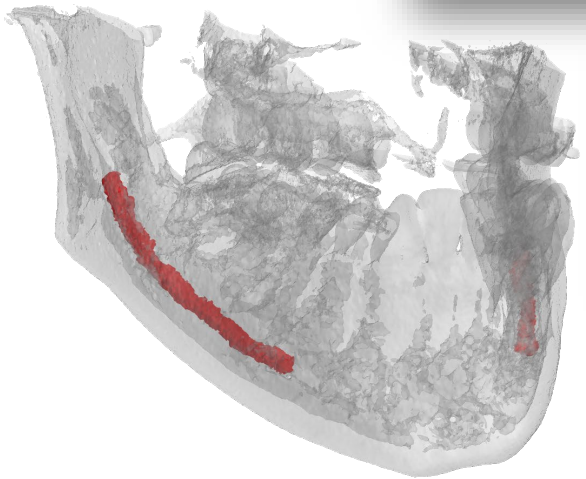
ECVL

European Computer Vision Library

- Mainly designed to integrate existing state-of-the-art Computer Vision and Image Processing libraries
- Support for multiple medical imaging formats (NIfTI, DICOM, TIFF, whole-slide)
- Core functionalities implemented for both 2D images and 3D volumes:
  - Reading and writing
  - Processing
  - Visualizing
- Domain-Specific Language for data augmentation





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Python APIs

- PyEDDL and PyECVL have been designed for binding Python code to existing C++ code
- Python APIs avoid introducing significant inefficiencies in execution speed or memory usage by keeping any computationally intensive code in C++

- Seamless conversion between EDDL Tensor or ECVL Image objects and NumPy arrays

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Benchmarking

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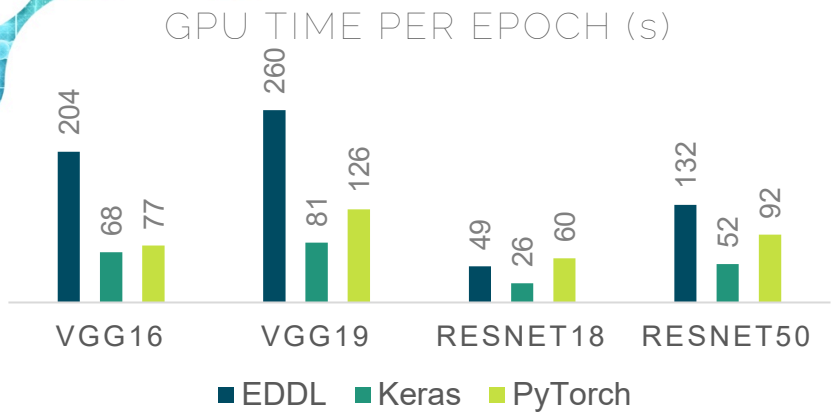

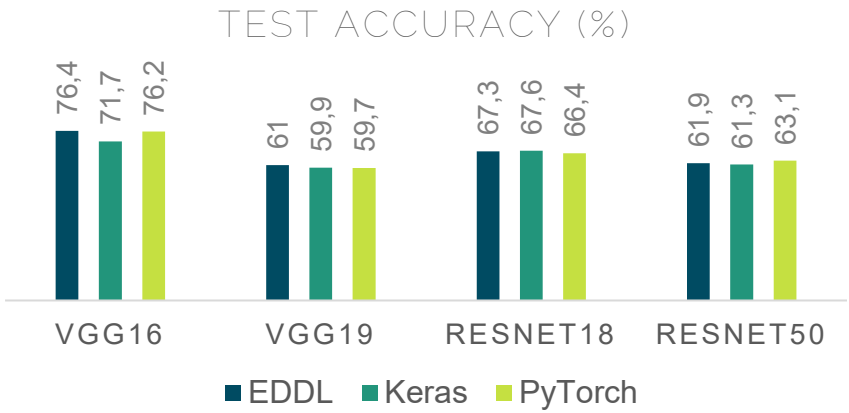

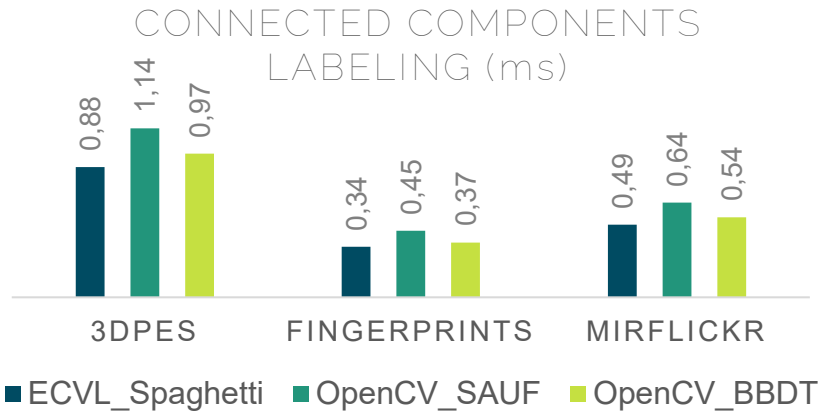

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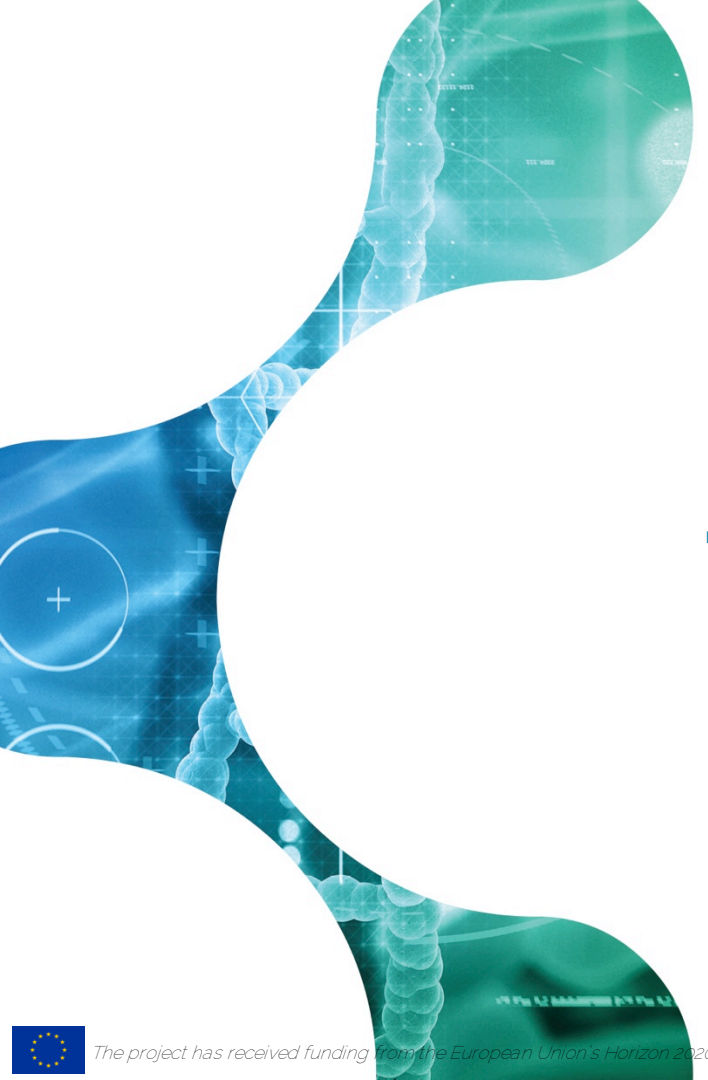

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Thank you!

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