

# DeepHealth



## Deep-Learning and HPC to Boost Biomedical Applications for Health

The main goal of the DeepHealth project is to put HPC computing power at the service of biomedical applications; and apply Deep Learning (DL) and Computer Vision (CV) techniques on large and complex biomedical datasets to support new and more efficient ways of diagnosis, monitoring and treatment of diseases.

### THE DEEPHEALTH TOOLKIT: A KEY OPEN-SOURCE ASSET FOR EHEALTH AI-BASED SOLUTIONS

At the centre of the proposed innovations is the DeepHealth toolkit, an open-source free software that will provide a unified framework to exploit heterogeneous HPC and big data architectures assembled with DL and CV capabilities to optimise the training of predictive models. The toolkit is composed of two core libraries plus a back end offering a RESTful API to other applications to facilitate the use of the libraries, and a dedicated front end that interacts with the back end for facilitating the use of the libraries to data scientists. The libraries are the European Distributed Deep Learning Library (EDDL) and the European Computer Vision Library (ECVL). Version 1.0 of both libraries has been released during second semester of 2021, and both are ready to be integrated in current and new biomedical platforms or applications.

### THE DEEPHEALTH CONCEPT – APPLICATION SCENARIOS

The DeepHealth concept focuses on scenarios where image processing is needed for diagno-

sis. In the training environment IT experts work with datasets of images for training predictive models. In the production environment the medical personnel ingests an image coming from a scan into a platform or biomedical application that uses predictive models to get clues to support them during diagnosis. The DeepHealth toolkit will allow the IT staff to train models and run the training algorithms over hybrid HPC + big data architectures without a profound knowledge of DL, CV, HPC or big data and increase their productivity reducing the required time to do it.

### 14 PILOTS AND SEVEN PLATFORMS TO VALIDATE THE DEEPHEALTH PROPOSED INNOVATIONS

The DeepHealth innovations are being validated in 14 pilots through the use of seven different biomedical and AI software platforms provided by partners. The libraries are being integrated and validated in seven AI and biomedical software platforms: commercial platforms: (everis Lumen, PHILIPS Open Innovation Platform, THALES PIAF) and research-oriented platforms (CEA's ExpressiFTM, CRS4's Digital Pathology, WINGS MigraineNet).

The use cases cover three main areas: (i) Neurological diseases, (ii) Tumour detection and early cancer prediction and (iii) Digital pathology and automated image annotation. The pilots will allow evaluating the performance of the proposed solutions in terms of the time needed for pre-processing images, the time needed to train models and the time to put models in production. In some cases, it is expected to reduce these times from days or weeks to just hours. This is one of the major expected impacts of the DeepHealth project.

[deephealth-project.eu](http://deephealth-project.eu)

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#### **COORDINATING ORGANISATION**

Everis Spain SL, Spain

#### **OTHER PARTNERS**

- Azienda Ospedaliera Città della Salute e della Scienza di Torino, Italy
- Barcelona Supercomputing Centre (BSC), Spain
- Centre Hospitalier Universitaire Vaudois, Switzerland
- Centro di Ricerca, Sviluppo e Studi Superiori in Sardegna SRL, Italy
- CEA - Commissariat à l'Énergie Atomique et aux énergies alternatives, France
- EPFL - Ecole Polytechnique Fédérale de Lausanne, Switzerland
- Fundacion para el Fomento de la Investigación Sanitaria y Biomedica de la Comunitat Valenciana, Spain
- Karolinska Institutet, Sweden
- Otto-von-Guericke-Universität Magdeburg, Germany
- Philips Medical Systems Nederland BV, Netherlands
- Pro Design Electronic GmbH, Germany

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## **HPC and Big Data enabled Large-scale Test-beds and Applications**

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- SIVCO Romania SA, Romania
- Spitalul Clinic Prof Dr Theodor Burghel, Romania
- STELAR Security Technology Law Research UG, Germany
- Thales SIX GTS France SAS, France
- TREE Technology SA, Spain
- Università degli Studi di Modena e Reggio Emilia, Italy
- Università degli Studi di Torino, Italy
- Universitat Politècnica de València, Spain
- WINGS ICT Solutions Information & Communication Technologies IKE, Greece

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#### **CALL**

ICT-11-2018-2019

#### **PROJECT TIMESPAN**

01/01/2019 - 30/06/2022