Colon cancer diagnosis

DeepHealth

Colon cancer is one of the most frequent causes of death. Screening programs can enable prompt diagnosis and treatment of this aggressive disease, but they also lead to higher caseloads and costs for the already strained European healthcare services. DeepHealth can help streamline pathological diagnosis of colon biopsies.

Challenge

Most of the times, the prompt care of a potential tumor depends on the pathological evaluation of a small sample of tissue (biopsy) by a pathologist, a specialized physician dedicated to the diagnosis of a wide range of conditions by microscopic examination of human tissues. By looking at these tiny specimens, many significantly different treatments can be proposed to a patient: from simple follow-up to surgery. Screening programs can help to detect tumors early, before they become invasive, thus improving their prognosis. But they also lead to an increase in samples to be examined. Since resources are limited, this can slow up diagnosis and exhaust the pathological laboratories.

Deep Learning represents the state-of-the-art for image analysis and classification. However, there are still major challenges to be overcome, like collecting, annotating, and processing huge resolution histopathological slides and promoting an interdisciplinary approach to build up synergies between AI and pathological experts.

Solution

Within the DeepHealth project, we are undertaking this challenge with a transversal approach: HPC infrastructure, curated image database, and a tried-and-tested, ready-to-deploy solution to predict new samples. We support AI and pathological experts with state-of-the-art OpenDeepHealth HPC cloud infrastructure and a secure tenant for efficient AI computing based on the developed EDDL and ECVL libraries. We deliver *UniToPatho* open annotated dataset of 9,536 histopathological patches. We devise and train UniToPatho deep neural networks for colorectal polyps classification and adenomas grading with an innovative multi-resolution approach.

Benefits

Development and validation of deep learning-based tools designed to support the pathological diagnostic workflow ease the caseload of pathologists and of their labs. These resources can then be focused on more challenging tasks that are untameable by deep learning… yet!

Medical specialty:
Pathology

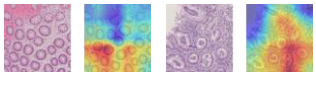
Use Case:
Colon adenomas

Site:
Turin (Italy)

Entity:
UNIVERSITÀ DEGLI STUDI DI TORINO

DeepHealth Project

DeepHealth is a H2020 collaborative project which develops new HPC and Deep Learning techniques applied to large and complex biomedical datasets to support new and more efficient ways of diagnosis of diseases. The technologies developed (EDDLL, ECVL, etc.) have been validated by clinicians on 14 Use Cases like this, providing 14 Success Stories ready to scale to other healthcare institutions.



Colon histopathological slides

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https://deephealth-project.eu/

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