# Deep Medical Image Annotation DeepHealth

The workload of radiologists has been continuously increasing for the past ten years due to the introduction of three-dimensional, cross-sectional imaging in a wider set of diagnostic protocols. AI might ease such a huge workload providing not only clues in the visual inspection of the image data, but also suggestions and support in writing the final textual report in natural language.
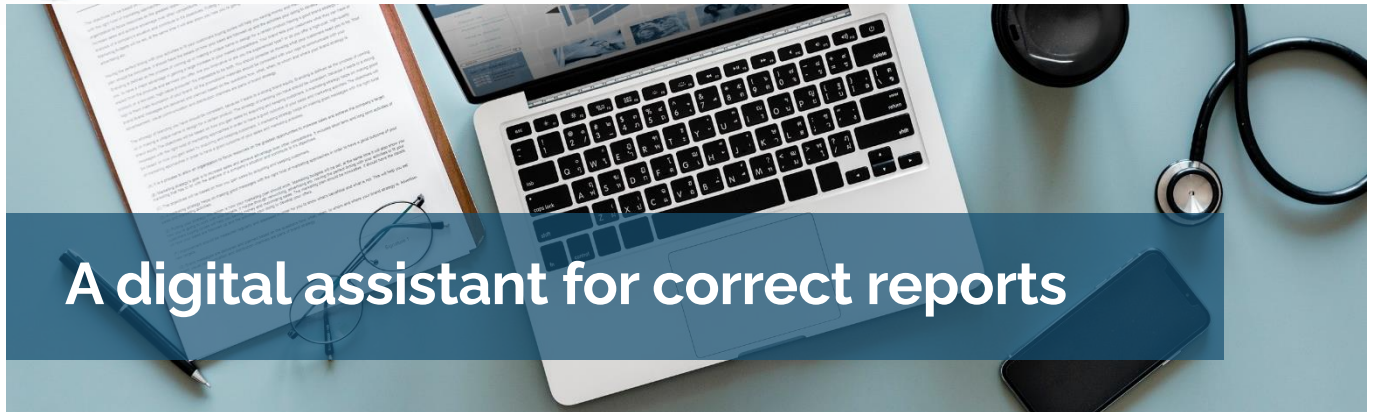
A digital assistant for correct reports

Challenge

The widespread use of 3-D examinations in the investigation of many diseases has lead to an increased workload for radiologists. Recent statistics show that a radiologist is asked to interpret up to one image every 3-4 seconds. It is obvious that such a pace is not sustainable: indeed, the current daily rate of diagnostic errors, due to missed findings or inconsistencies in the final report, is estimated to be in the range 3%-5%.

Due to habituation, fatigue and other factors, such as frequent interruptions, and in order to reduce the time spent for a single report, radiologists use dictation software, that introduce wrong words in the text, or "copy and paste" sentences from old reports without the needed modifications. An ambiguous or inconsistent report often leads to unnecessary follow-up examinations, that, in turn, increase the diagnostic burden.

Solution

Deep Learning can help reduce not only the number of missed findings in the images, but also the errors and the inconsistencies in the final textual report. A neural network can suggest sentences and paragraphs based on the automatic findings or can even produce a full report in natural language, thus limiting the use of the error-prone methods currently adopted by the radiologists.

Exploiting the functionalities of the DeepHealth libraries for AI computing, EDDLL and ECVL, we are undertaking the challenge of providing a module for the automatic generation of medical reports. The module is experimented with chest X-Ray images annotated with classes (disease) and complete textual reports. A first neural network analyses the images and provides the input to a second one that generates one or more sentences describing the content of the radiography.

Benefits

This module will speed up the total time spent writing a complete report, reducing the impact of unreliable software and procedures. By alleviating the burden of routine work, the adoption of this digital assistant will help radiologists focus on providing the best care to their patients.

Medical specialty:
Radiology

Use Case:
Chest X-Rays

Site:
Pisa and Turin (Italy)

Entity:

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.

https://deephealth-project.eu/

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