CXR7-Radiolobot: Classification of Seven Clinical Findings in Chest X-Ray Using Deep Learning

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Abstract

Motivation "Imaging faces a global demand vs supply crisis" said Eyal Toledano at Nvidia's conference (2017, October) when opening of the healthcare track. 2B people will join the middle class in the next decade. There is inequity in care across geographies (e.g. Indonesia, much less than 1 radiologist per 1M population). Imaging data has exploded 4x in the last decade. Patients suffer from physician mistakes: 30Among the imaging data, a few dozens of percents are X-Ray, according to Elad Benjamin.

Short algo description & results Our approach demonstrate another step in the challenging path to include automation in the medical care process. Using a CNN we achieved a radiology level performance in detecting seven clinical findings in chest X-Ray (CXR). Each image in the validation test was tagged by three radiologists.

Clinical Impact

Among the seven clinical findings, we succeed to detect four top priority findings:

* Pleural effusion

* Consolidation

* Pulmonary edema

* Possible mass

In addition, we detect also:

* Cardiomegaly

* Hilar disease [prominence]

* Atelectasis

Summary We demonstrate an automatic CXR7-Radiolobot for detecting seven clinical findings in CXR. The system may improve the medical care people get by: * Shortening the time to care begin, by detecting patients that have top priority findings. * Improving TP in geographies that have a major deficiency in radiologist manpower. * Reducing the FN * Ensuring a constant level of performance, while reducing the the dependency in quality and level of physicians performance. * Ensuring reproducible and systematic way for finding detection.

Keywords CNN, Deep Learning, Medical Imaging, Algorithms, Computer Aided Diagnosis, Chest X-Ray, CXR

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