Al based Diagnostic/Screening Software, VUNO Med[®] Chest X-rayTM

Feb 4, 2020

VUNO

VUUS

Contents

01. VUNO Med®- Chest X-ray[™]

02. Offering

03. Sample Output

01 VUNO Med®-Chest X-ray™

- Trained with strongly labelled quality data from Asan Medical Center and SNUH (100% CT confirmed data)
- Automatically detects and reports major abnormal findings in chest PA X-ray images
- Validated by multiple centers and multiple devices
- Detects in 1.x seconds (GPU above RTX 2070)



01 VUNO Med®-Chest X-ray™

- Detects 5 findings (Nodule/Mass, Consolidation, Interstitial Opacity, Pleural Effusion, Pneumothorax)
- Capable of detecting 3 (Nodule/Mass, Consolidation, Interstitial Opacity) out of 4 patterns (Nodule/Mass, Consolidation, Interstitial Opacity, Atelectasis) that can be caused by increased opacity
 - Clinically important Atelectasis is often misdiagnosed as mass
 - With a combination of above findings, major lung diseases (Malignancy, TB, Pneumonia, ILD) can be identified.
- The current regulatory cleared version enables detection of TB and Pneumonia using a combination of 5 findings above. (Oral Presentation, RSNA 2019)



01 VUNO Med®-Chest X-ray™

- Clinical test for regulatory approval
 - Proven validation through a reader study
 - Both groups showed the improved results through AI CAD





Reading Time Reduction:
A. Without CAD: 18.85 ±17.28 s
B. With CAD: 9.44 ±6.05 s

01 VUNO Med®-Chest X-ray[™] (European Radiology)

Accuracy & Validation Data

European Radiology https://doi.org/10.1007/s00330-019-06532-x

CHEST



Deep learning-based detection system for multiclass lesions on chest radiographs: comparison with observer readings

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Abstract

Objective To investigate the feasibility of a deep learning-based detection (DLD) system for multiclass lesions on chest radiograph, in comparison with observers.

Methods A total of 15,809 chest radiographs were collected from two tertiary hospitals (7204 normal and 8605 abnormal with nodule/mass, interstitial opacity, pleural effusion, or pneumothorax). Except for the test set (100 normal and 100 abnormal (nodule/mass, 70; interstitial opacity, 10; pleural effusion, 10; pneumothorax, 10)), radiographs were used to develop a DLD system for detecting multiclass lesions. The diagnostic performance of the developed model and that of nine observers with varying experiences were evaluated and compared using area under the receiver operating characteristic curve (AUROC), on a per-image basis, and jackknife alternative free-response receiver operating characteristic figure of merit (FOM) on a per-lesion basis. The false-nositive fraction was also calculated.



- Key points. The DLD system was feasible for detection with pattern classification of multiclass lesions on chest radiographs.
- The DLD system had high performance of image-wise classification as normal or abnormal chest radiographs (AUROC, 0.985) and showed especially high specificity (99.0%).
- In lesion-wise detection of multiclass lesions, the DLD system outperformed all 9 observers (FOM, 0.962 vs. 0.886; P<0.001).
- Results. Compared with the group-averaged observations, the DLD system demonstrated significantly higher performances on image-wise normal/abnormal classification and lesionwise detection with pattern classification (AUROC, 0.985 vs. 0.958; P=0.001; FOM, 0.962 vs. 0.886; P<0.001). In lesion-wise detection, the DLD system outperformed all nine observers.

* Deep learning-based detection system for multiclass lesions on chest radiographs: comparison with observer readings (European Radiology, First Online: 20 November 2019)

VUUS

Contents

01. VUNO Med®- Chest X-rayTM

02. Coronavirus

03. Sample Output

02 Coronavirus

- NEJM: pneumonia and pleural effusion were found in patients with coronavirus *
- Lancet: Interstitial Opacity (GGO) and Consolidation were found in patients with coronavirus *
- All those findings can be detected by VUNO Med®-Chest X-ray™ **

[NEJM, 2019/01/24 발표]



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02 Offering

- Detects relevant findings: Pneumonia, Pleural Effusion, Consolidation, Interstitial Opacity
- Serves as an effective tool to identify patients with Coronavirus
- Can be deployed widely across all screening centers



Confirmed findings which were in patients with Coronavirus

VUUS

Contents

01. VUNO Med®- Chest X-ray

02. Offering

03. Sample Output

Consolidation Sample Output #1



Nodule/Mass Sample Output #2



Nodule/Mass Sample Output #3



Pleural Effusion Sample Output #4

& Consolidation





Pneumothorax Sample Output #5



Multiple Findings Sample Output #6



View The Invisible Know the Unknown

Al is here to conquer the world. Healthcare is no exception, as Al technology is being used to solve many problems and improve healthcare. Deep learning algorithms that are trained on large sets of data are performing just as well as their human counterparts if not exceeding them. The key strength in Al is not just in its accuracy, however. Al is integrating into physician workflow and improving outcomes, offering a completely new user experience that previously did not exist, and is already making a meaningful impact today. Al is inundating a new era, and VUNO is making these products affordable and readily available to the public. We will always consider what physicians really need and we will create solutions through Al technology.

