NUST COLLEGE OF
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X-RAY ANALYSIS AND READER

DE-39 (DC&SE)

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ABSTRACT

X-ray analysis and reader from CXR (Chest X-Ray) images has immense prospective to intensify the manual diagnosis and manual writing of medical reports for patients. This project would ultimately provide a facilitating platform to the medical industry. This project would act as a second opinion and helping hand for doctors, so to reduce chances of misdiagnosis. For patients, this app would mean the reduction of wastage of time, stress, loss, and money, and for hospitals, the reduction of crowds, which is ideal for times such as the COVID19 pandemic. This project is a cloud-based application deployed on azure and developed on Flask. This web-app takes a CXR image from user and implements different models: Effecientnet B4, Yolo V4, and Attention Mechanism for Classification, Disease Detection, and Image Captioning, respectively. This web app detects the presence and probabilities of 11 major thoracic diseases in the image (Atelectasis, Cardiomegaly, Effusion, Infiltration, Mass, Nodule, Pneumothorax, Consolidation, Edema, Emphysema and Pleural Thickening), with the probability of no disease found. Moreover, this app generates a heatmap based on previous classification and segments out (with a bounding box) wherever lung opacity is seen in the x-ray. Furthermore, a general analysis report can be generated through the app based on the chest x-ray image uploaded. Three different Datasets were used each for a different task, to diversify our models and add to their accuracy.

Key Words: *Bilingual Evaluation Under Study (BLEU), Chest X-RAY (CXR), Hypertext Markup Language (HTML), Application(app).*

CONTRIBUTION

- Flask, HTML and Bootstrap has been used for the web application.
- Use of deep learning for report generation of thoracic diseases from chest x-ray images.
- A model of Yolo v4 has been used for the segmentation and classification of CXR images.
- Model of Effecientnet B4 has been used for the detection of thoracic diseases.
- Implementation of Grad CAM in order to generate heat maps.
- Attention mechanism has been used for the captioning of CXR images.