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Paediatric Frontal Chest Radiograph Screening with Fine-Tuned Convolutional Neural Networks

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Abstract:

Within developing countries, there is a realistic need for technologies that can assist medical practitioners in meeting the increasing demand for patient screening and monitoring. To this end, computer aided diagnosis (CAD) based approaches to chest radiograph screening can be utilised in areas where there is a high burden of diseases such as tuberculosis and pneumonia. In this work, we investigate the efficacy of a purely data-driven approach to chest radiograph classification through the use of fine-tuned convolutional neural networks (CNN). We use two popular CNN models that are pre-trained on a large natural image dataset and two distinct datasets containing paediatric and adult radiographs respectively. Evaluation is performed using a 5-fold crossvalidation analysis at an image level. The promising results, with top AUC metrics of 0.87 and 0.84 for the respective datasets, along with several characteristics of our data-driven approach motivate for the use of fine-tuned CNN models within this application of CAD.