Department of Electrical and Computer Engineering

North South University

Senior Design Project

499B Report

COVID-19 Diagnosis and Classification from CXR Images based on Vision Transformer (ViT)

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Fall, 2021

DECLARATION

We, hereby, declare that the work presented in this report is the outcome of our eight months' work performed under the supervision of Ashfia Binte Habib, Department of Electrical and Computer Engineering, North South University, Dhaka, Bangladesh. The work was spread over a span of one of the final year courses, CSE 499, Senior Design Project, in accordance with the course curriculum of the Department for the Bachelor of Science in Computer Science and Engineering program.

Students' name & signature:

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Md. Mahbubur Rahman

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Shihabur Rahman Samrat

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Abdullah Al Ahad

APPROVAL

The senior project report on "**COVID-19 Diagnosis and Classification from CXR Images based on Vision Transformer (ViT)**" has been submitted by Md Mahbubur Rahman (ID # 1731134042), Shihabur Rahman Samrat (ID # 1731574042) and Abdullah Al Ahad (ID # 1731496042); students of the Department of Electrical and Computer Engineering, North South University, Bangladesh. This report partially fulfills the requirement for the degree of Bachelor of Science in Computer Science and Engineering in February, 2022 and has been accepted as satisfactory.

Supervisor's Signature

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Department Chair's Signature

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Abstract

The COVID-19 pandemic is far from over, and the current primary method of diagnosis is Reverse Transcription Polymerase Chain Reaction (RT-PCR). Although RT-PCR is reliable, it is known to have a long turnaround time and high false-negative rates that can severely hinder the accuracy of diagnosis. Alongside RT-PCR, Rapid Antigen Tests (RAT) are also used, but they have much lower accuracy than RT-PCR. Motivated by the flaws of the current diagnosis methods, we present a Vision Transformer-based classifier for the successful diagnosis and classification of COVID-19 using chest X-Ray (CXR) images. A 15000 sample CXR dataset was compiled, which consisted of 5000 CXR per class. Afterwards, a Vision Transfer (ViT) was fine-tuned on the dataset. Resnet-50 and DenseNet121 were used as baseline models. It is observed that the Vision Transformer-based model had the highest classification accuracy of 96.2% with a F1 score of 0.965 and the average precision and recall of 0.9617 and 0.962, respectively. This study demonstrates the adequacy of the ViT for the identification and classification of COVID-19 and Pneumonia.