COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

Harshal Amit Sanghvi

for the degree of Doctor of Philosophy (Ph.D.)

"An Artificial Intelligence Driven Framework for Medical Imaging"

May 24th, 2023, 11:00 a.m.
Engineering East, Room 503C
777 Glades Road
Boca Raton, FL

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ABSTRACT OF DISSERTATION
Dissertation Title: An Artificial Intelligence Driven Framework for Medical Imaging

Abstract:

The major objective of this dissertation is to create a framework which is used for medical diagnosis. In this diagnosis, we are bringing classification and diagnosing of diseases through an Artificial Intelligence based framework which includes COVID, Pneumonia, and Melanoma cancer through medical images. The algorithm runs on multiple datasets and a model is developed which detects the medical images through changing hyper-parameters. The aim of this work is to apply the new transfer learning framework designed with Dense Net algorithm for the diagnosis of the diseases and compare the results with the other deep learning models. The novelty in the proposed work is modifying the CNN Algorithms, changing hyper parameters (source weights, Batch Size, Epochs, Architecture (number of neurons in hidden layer), learning rate and optimizer) to quantify the results. The novelty also includes the training of the model by quantifying weights and to get more accuracy. During the data selection process, the data was cleaned, removing all the outliers. Data augmentation was used for the novel architecture to overcome overfitting and hence not producing false absurd results the computational performance was also observed and recorded. The proposed model results were also compared with the existing deep learning models and the algorithm was also tested on multiple datasets.

In the proposed deep learning model, DenseNet a convolutional neural network was used which was trained on the ImageNet dataset. Each layer was getting more accurate information from the previous layer. Since each layer receives feature maps from all preceding layers, the network was thinner and more compact. The growth rate k was the additional number of channels for each layer to have higher computational efficiency and memory efficiency. In the present work, composite learning factor strategy and data augmentation are included in the developed model. The graphical user interface (GUI) which is developed will assist in computational experience and shall adhere to the HIPAA Compliance. The GUI also provides different image observations which were generated through different visualization techniques.

The proposed model gave us more accurate results which was not overfitting, had better computational performance and will assist clinicians with more visual data representation. The parameters are tuned, and the model complexity is calculated.

The present work was validated by the medical fraternity.

BIOGRAPHICAL SKETCH
Born in Ahmedabad, Gujarat, India
B.S., St. Xavier's College, Gujarat University, India, 2017
P.G.D.F.M., B.K. School of Business Management, Gujarat University, India

M.S., School of Sciences, Gujarat University, India, 2020
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CONCERNING PERIOD OF PREPARATION
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Time in Preparation: 2021-2023

Qualifying Examination Passed: Fall 2021

Published Papers:

Sanghvi, H. A., Patel, R. H., Agarwal, A., Gupta, S., Sawhney, V., & Pandya, A. S. (2023). A deep learning approach for classification of COVID and pneumonia using DenseNet-201. International Journal of Imaging Systems and Technology, 33(1), 18-38. *(Published)*

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B. Alhalabi, **H. A. Sanghvi**, R. H. Patel, A. S. Pandya and E. C. Torres, "A Cloud Based Novel Framework for Addressing Repetitive Behavior in Autistic Individuals," 2022 IEEE World Conference on Applied Intelligence and Computing (AIC), 2022, pp. 788-795, doi: 10.1109/AIC55036.2022.9848981. *(Published)*

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Patel, R., **Sanghvi, H.A.,** & Pandya, A. S. "Autonomous robotic system for ultraviolet disinfection". In Cyber-Physical Systems pp. 231-240, Academic Press, Eds. Ramesh Chandra Poornia, Sandeep Kumar, Basant Agarwal, Mohammad S. Khan, Janmenjoy Nayak and Goncalo Marques (2022) *(Published)*

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Pandya, S. B., **Sanghvi, H. A.,** Patel, R. H., & Pandya, A. S. (2022, May). GPU and FPGA Based Deployment of Blockchain for Cryptocurrency–A Systematic Review. In 2022 International Conference on Computational Intelligence and Sustainable Engineering Solutions (CISES) (pp. 18-25). IEEE. *(Published)*