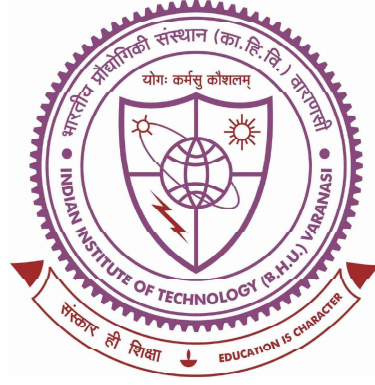


Transfer learning based multiclass classification of Covid-19 using chest
X-Rays and weakly supervised model for cardiac MRI segmentation



*The thesis submitted in partial fulfillment
for the award of degree
DOCTOR OF PHILOSOPHY*

by

ALOK TIWARI

SCHOOL OF BIOMEDICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY
(BANARAS HINDU UNIVERSITY)
VARANASI-221005

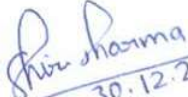
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Dr. Shiru Sharma
Supervisor
Associate Professor
School of Biomedical Engineering
Indian Institute of Technology
(Banaras Hindu University)
Varanasi-221005

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I, *Alok Tiwari*, certify that the work embodied in this thesis is my own bonafide work and carried out by me under the supervision of *Dr. Shiru Sharma* from *July 2016* to *December 2022* at the *School of Biomedical Engineering, Indian Institute of Technology (Banaras Hindu University), Varanasi*. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma. I declare that I have faithfully acknowledged and given credits to the research workers wherever their works have been cited in my work in this thesis. I further declare that I have not willfully copied any other's work, paragraphs, text, data, results, etc., reported in journals, books, magazines, reports dissertations, theses, etc., or available at websites and have not included them in this thesis and have not cited as my own work.

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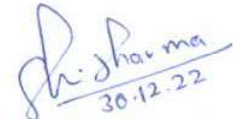
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Supervisor

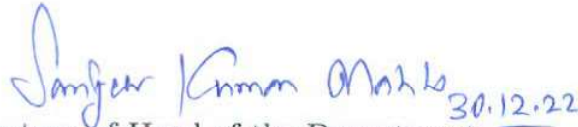
Associate Professor

School of Biomedical Engineering

Indian Institute of Technology

(Banaras Hindu University)

Varanasi-221005


30.12.22

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SCHOOL OF BIOMEDICAL ENGG.
नास्तीय प्रौद्योगिकी संस्थान (का.हि.वि.)
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Varanasi-221005

Alok Tiwari
20/12/22

Dedicated
to
My Parents

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Symbols

<i>CT</i>	Computed tomography
<i>CXR</i>	Chest X-ray
<i>MRI</i>	Magnetic resonance imaging
<i>CMRI</i>	Cardiac magnetic resonance imaging
<i>PB</i>	Pneumonia bacterial
<i>PV</i>	Pneumonia viral
<i>Covid – 19</i>	Coronavirus disease
<i>RW</i>	Random walker
<i>SRG</i>	Seed region growing
<i>C – MRI</i>	Cardiac MRI
<i>ACC</i>	Accuracy
<i>PR</i>	Precision
<i>SN</i>	Sensitivity
<i>SP</i>	Specificity
<i>TPR</i>	True positive rate
<i>TNR</i>	True negative rate
<i>FPR</i>	False positive rate
<i>PPV</i>	Positive prediction value
<i>TP</i>	True positive
<i>FP</i>	False positive
<i>TN</i>	True negative
<i>FN</i>	False negative
<i>CM</i>	Confusion matrix
<i>WHO</i>	World health organization

<i>RELU</i>	Rectified linear activation unit
<i>SELU</i>	Scaled exponential linear unit
<i>GD</i>	Gradient descent
<i>CNN</i>	Convolutional neural network
<i>RCNN</i>	Regions with convolutional neural networks
<i>DCNN</i>	Deep convolutional neural network
<i>MCC</i>	Matthews correlation coefficient
<i>SVM</i>	Support vector machines
<i>pCT</i>	Positive computed tomography
<i>nCT</i>	Negative computed tomography
<i>NiCT</i>	Non-informative computed tomography
<i>GM</i>	Geometric mean
<i>FM</i>	Fowlkes-Mallows index
<i>J</i>	Youden's index
<i>CVD</i>	Cardiovascular diseases
<i>GAN</i>	Generative adversarial networks
<i>MV – RAN</i>	Multiview recurrent aggregation network
<i>MVTT</i>	Multiview two-task
<i>PZ</i>	Peripheral zone
<i>TZ</i>	Transition zone
<i>ROI</i>	Region of interest
<i>ACDC</i>	Automatic cardiac diagnosis challenge dataset
<i>SCD</i>	Sunnybrook cardiac dataset
<i>SAX</i>	Short-axis view
<i>DCM</i>	Dilated cardiomyopathy
<i>HCM</i>	Hyper cardiomyopathy
<i>MINF</i>	Myocardial infarction
<i>RV</i>	Right ventricle
<i>LV</i>	Left ventricle
<i>MYO</i>	Myocardium
<i>ADAM</i>	Adaptive moment estimation
<i>LR</i>	Learning rate
<i>RTPCR</i>	Realtime reverse transcriptase-polymerase chain Reaction