Artificial Intelligence based Computational Detection of Coronavirus using X-Ray Images of chest of Patients & its predictions using MATLAB ANN Training App

Authors: Dr.M.W .Khanooni&
DrAbhayKasetwar
Co-Authors:Dr. TruptiNagrare& Mr. Govind Joshi
Department of M.tech(Electronics)
S.B.Jain Institute of Technology, Management and Research, Nagpur Autonomous institute affiliated to RTM Nagpur University.

Abstract :-

Corona virus is leading cause of deaths worldwide due to pandemic. Because of expanding cases and new trends of viruses, covid19 test unit accessible in emergency clinics at remote places or where city scan(CT) is unavailable. Therefore it is significant to implement an automated system to diagnose and making decision for doctors.

The database of experiments provides better results in this project work(95.18%)and economic & accuracy is high. New cases Antigen, Rapid, RTPCR test works on 0 or 1 but this model simulates different probabilities with accuracy using soft computing neural network.

***Keywords*–AI techniques, Covid19 detection, Chest X-Ray, MATLAB, Neuro Solution Software, ANN Training App**
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Introduction :

Corona virus is deadly because of delay in detection and inappropriate conventional testing methods which is time consuming since CT scans is not available at remote places and samples collections processes leads to disaster due to delay and RTPCR rapid antigen test deals with either 0 or 1 and not the number of probabilities in between. Our project aim towards automated detection of corona virus using x-rays images readily available every ever and its detailed computational analysis using artificial intelligence with MATLAB ANN training tool and Neuro solution software.

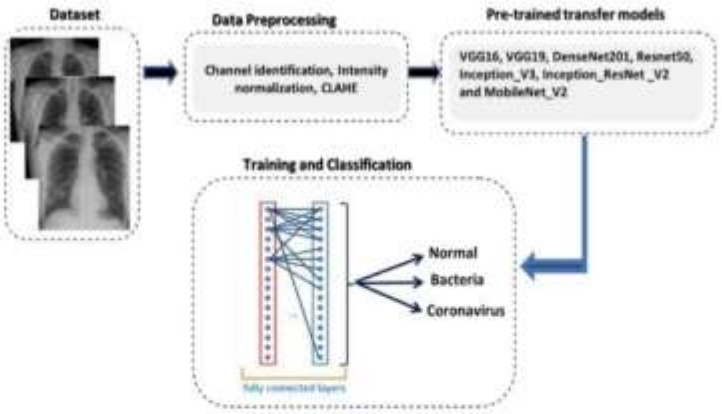
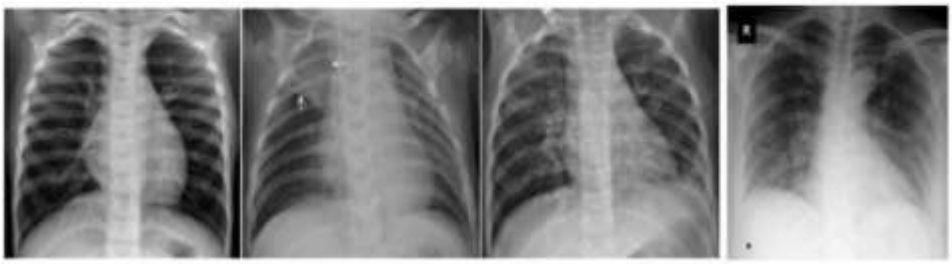
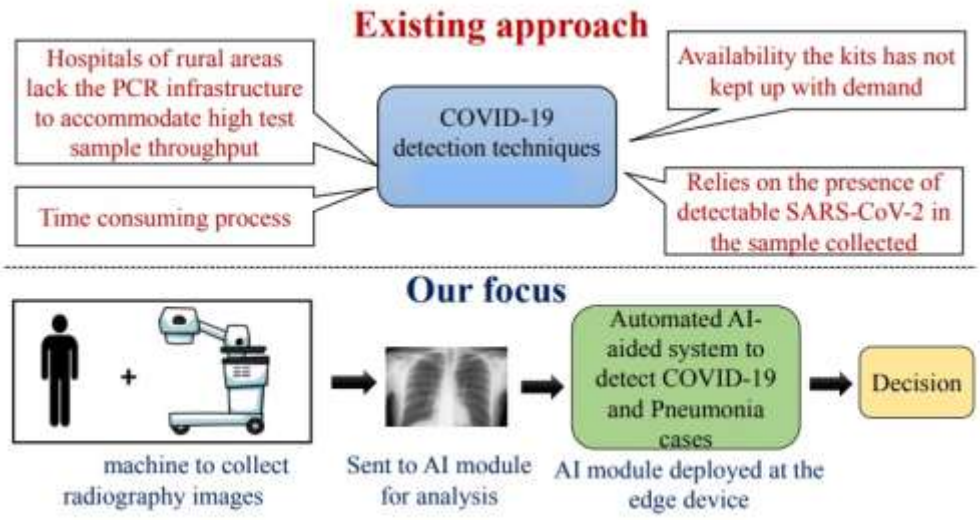


Figure 1. Block diagram of the proposed methodology.



(a). Normal (b). Bacterial Pneumonia (c). Viral Pneumonia (d). Covid19



III.PROPOSED METHODOLOGY

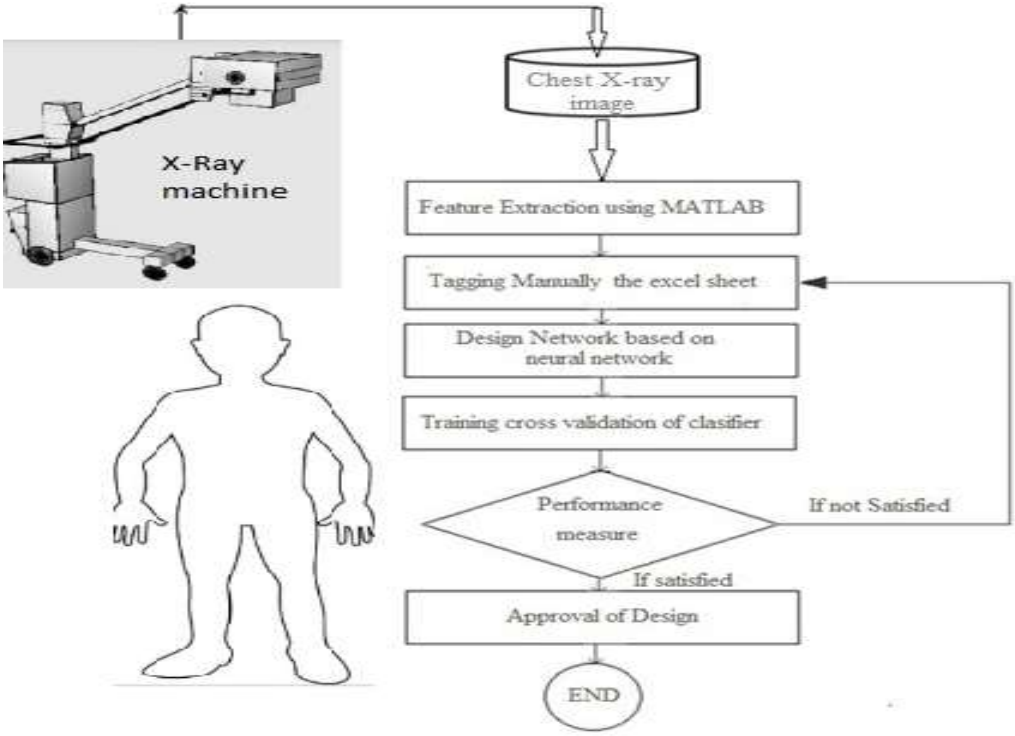
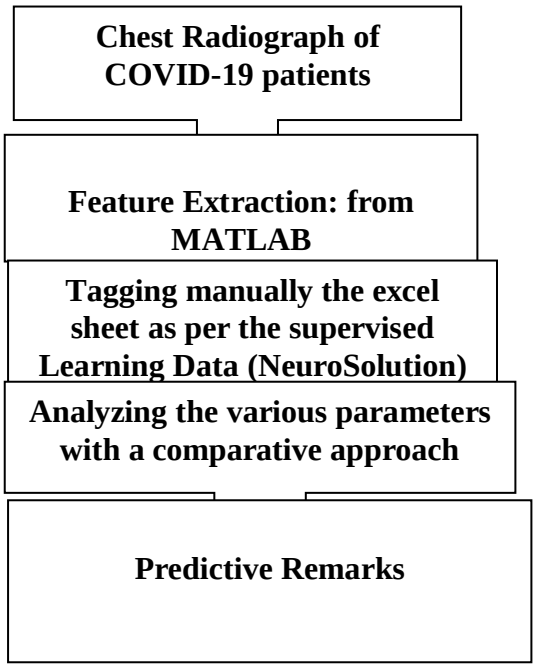


Fig 2: Flow Chart

RESEARCH METHODOLOGY

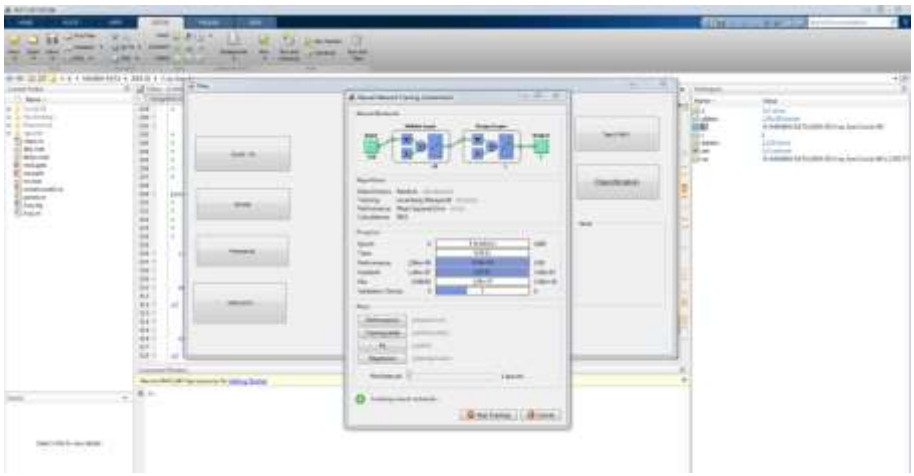


INPUT OF COVID-19 X-RAY DATASET

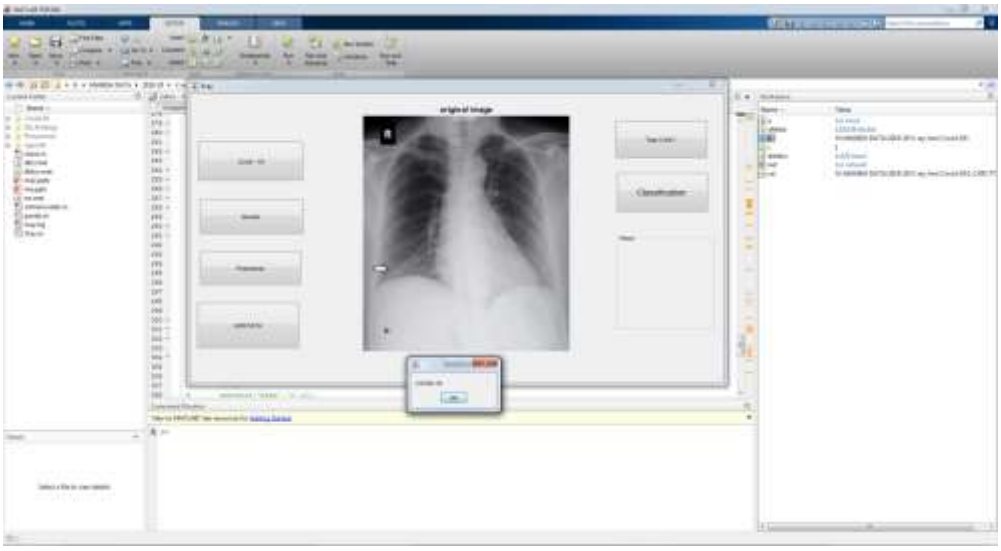
INPUT OF PHENOMENA X-RAY DATASET

INPUT OF NORMAL X-RAY DATASET

ANN TRAINING



Classification Of X-RAY Image



Conclusion:-

Result found out provides in this project work (95.18%) efficient, economic&correct. New cases Antigen, Rapid, RTPCR test works on 0 or 1 but this model simulates different probabilities with accuracy using soft computing Neural Network (CNN).

	COVID-19	Pneumonia (virus bacterial)	Normal
Train	84	233	176
Test	226	631	478
Train + test	310	864	654

Sensitivity, specificity, and accuracy for three categories

	Sensitivity	Specificity	Accuracy
Run1	98.21	98.94	95.21
Run2	99.10	98.72	95.43
Run3	99.10	99.15	95.43
Run4	96.85	99.36	95.13
Run5	99.10	98.72	95.51
Average	*98.47*	*98.98*	*95.34*

Sensitivity, specificity, and accuracy for two categories

	Sensitivity	Specificity	Accuracy
Run1	98.67	98.54	98.58
Run2	98.23	98.54	98.44
Run3	98.67	97.70	98.01
Run4	98.66	98.95	98.86
Run5	98.67	98.74	98.72
Average	*98.58*	*98.49*	*98.52*

Comparison between the proposed model and the previous studies

Study	Type of images	Number of cases	Method used	Accuracy 2-classes (%)	Accuracy 3-classes (%)
Ioannis et al. (2020)	Chest X-ray	224 COVID-19 (+) 700 pneumonia 504 healthy	VGG-19	-	93.48
Tulin et al. (2020)	Chest X-ray	125 COVID-19 (+) 500 pneumonia 500 No findings	DarkCovidNet	98.08	87.02
Wang and Wong (2020)	Chest X-ray	53 COVID-19 (+) 5526 COVID-19 (−) 8066 healthy	COVID-Net	-	92.4
Sethy and Behra (2020)	Chest X-ray	127 COVID-19(+) 127 normal 127 pneumonia	ResNet50+ SVM	-	95.33
Zheng et al. (2020)	Chest CT	313 COVID-19 (+) 229 COVID-19 (−)	UNet+3D Deep Network	90.8	-
Wang et al. (2020b)	Chest CT	195 COVID-19(+) 258 COVID-19(−)	M-Inception	82.9	-
Xu et al. (2020)	Chest CT	219 COVID-19(+) 224 viral pneumonia 175 healthy	ResNet + Location Attention	-	86.7
Ying et al. (2020)	Chest CT	777 COVID-19 (+) 708 healthy	DRE-Net	86	-
Proposed study CCBlock	Chest X-ray	310 COVID-19 (+) 654 healthy 864 pneumonia (virus and bacteria)	VGG-16 + CCBlock	98.86	95.51

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