

Research Article

Machine Learning And Coronavirus Disease Prediction

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Abstract

This Study Is Done By Using The Majority Rule At The End Of The Process I.E. Covid19 Detection Is Positive When More Than Half Of The Architectures Points In Favour Of It Otherwise Negative. Overall, Results Obtained Demonstrate A Strong Effect Of Deep Learning Architectures On The Covid19 X-Ray Datasets. We Also Discussed Recently Available Datasets Around The Globe And The Application Of Various DL Architectures. Lenet5, Cnn, Dense-Net121, Densenet169, Densenet201, Resnet50, Vgg16, Vgg19, Mobilenetv2, Nasnetmobile, Nasnetlarge, Inceptionv3, Inceptionresnetv2 And Xception Were Presented With Performance Measures As A Proof Of Concept. Further, We Proposed A Method To Detect The Covid-19 Presence Based On The Results Of The Above Architectures. X-Ray Diagnosing Can Be Used As An Initial Method During Large Population Testing And Can Be Made Easily Available At Any Remote Place With Good Internet Connection. Future Studies Can Include Adding More Data But Not Limited To X-Ray Images. Moreover, Covid-19 Diagnosing With Sonography (Lung Ultrasound) Combined With Radiography Can Be Used To Increase The Detection Power As Ultrasound Frequency Analysis Using Acoustic Models Would Be Good Enough In Identifying Covid-19 Presence.

1 Introduction

In 2004 And 2005 Hcov-N163 And Hcov-Hkui Strains Were Discovered Which Caused Severe Bronchiolitis And Upper Respiratory Tract Infection. In 2012 Mers Was Discovered Which Was Transmitted From Animals To Humans And Caused More Than 850 Deaths. Sars-Cov-2 Discovered At The End Of 2019 Mark As The More Severe Than Any Other Coronavirus Because Of Its Easily Transmissible Property And No Pre-Existing Immunity About The Virus. Moreover, It Harms The Lower Respiratory Tract (Trachea, Primary Bronchi, Lungs) Along With The Upper Respiratory Tract (Nasal Cavity, Pharynx, Larynx). Infection Is Transmitted Mostly By Droplets (Microscopic Bits Of Phlegm, Saliva Or Mucous) Landing On The Mouth, Nose Or Eyes. Symptoms Can Range From Mild To Severe And Mostly In Older People, Have Hypertension Or Diabetes, Or Heart Or Lung Disease. Every Aspect Requires Efficient Management (Abdul Jalil Et Al., 2021; Mohd Noh Et Al., 2021; Mustafa Et Al., 2021; Roszi Et Al., 2021; Tumisah Et Al., 2021). If It Is Managed Well, Various Problems Can Be Avoided (Irma Et Al., 2021; Suzana Et Al., 2021; Rohanida Et Al., 2021; Nazrah Et Al., 2021; Shahrulliza Et Al., 2021).

This Virus Was Initially Originated From Wuhan City In China When The Chinese Official Reported Who About Pneumonia-Like Cases In The Wuhan City In Dec 2019. The First Official Death From This Coronavirus Was

Reported By China In Jan 2020. Further This Virus Spread To The Whole World And Causing A Pandemic In All Continents. More Than 23 Lakhs People Have Been Infected All Around The Globe Causing More Than 1.5 Lakhs Deaths, Resulting In The Total Lockdown In Various Counties.

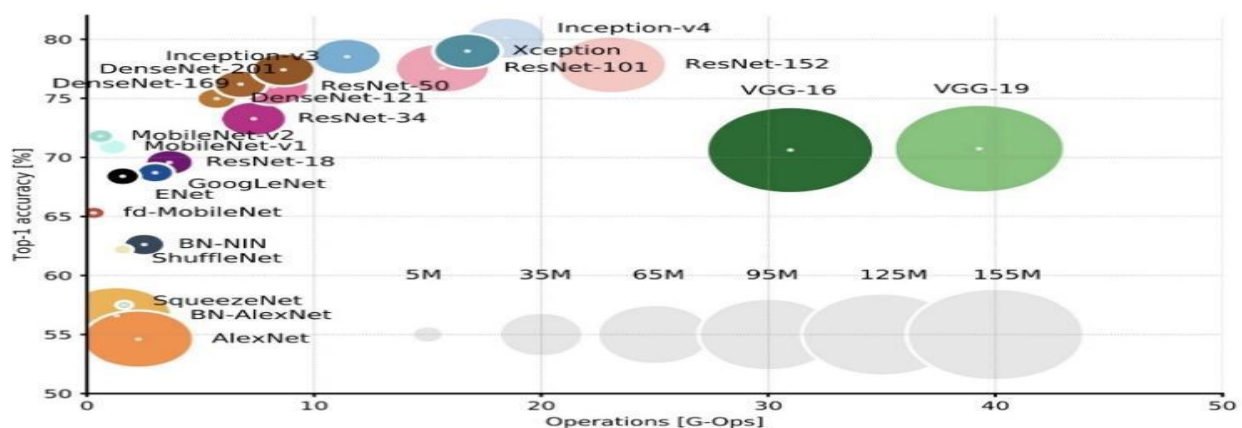
This Coronavirus Doesn't Have Any Vaccine Available For Its Treatment Till Now. Staying Away From The Virus Is The Primary Precaution That Can Be Taken. So The Detection Of The Covid19 Presence Is The Necessity And That Too At A Larger Scale Which Will Help Us In Making Precaution A Primary Way. All Aspects Require Effective Leadership And Management (Mohd Arafat Et Al., 2021; Sumaiyah Et Al., 2021; Hifzan Et Al., 2021; Shahrul Et Al., 2021; Helme Et Al., 2021). Every Organization Values Perfect Management In Ensuring Success (Farah Et Al., 2021; Syahrul Et Al., 2021; Quah Et Al., 2021; Ahmad Syarifuddin Et Al., 2021; Jumiah Et Al., 2021).

In The Era Of This Latest Technology Incredible Computational Power And Effective Applications Begin With Data. Data Serves As The Driving Fuel In The Field Of Artificial Intelligence And Are The Foundation Element At Every Perspective. Moreover, Data In Good Structure And Labelling Form I.E. Descriptive, Diagnostic, Prescriptive And Predictive Is Necessary Which Can Prove As The Establishment Of A Robust System. Various Organizations In The World Are Coming Out With The Covid19 Dataset. These Data Are Of Various Types Like Textual Counts, Genome Sequence, 2d Structure And Various Features Like Patient's Age, Sex, Location, Symptoms, Etc. We Have Chosen An X-Ray Image Dataset For Are Diagnosing Purposes. The Success Of Something Depends On Good And Efficient Management (Mohd Ali Et Al., 2021; Parimala Et Al., 2021; Siti Jamilah Et Al., 2021; Nor Fauziyana Et Al., 2021; Noel Et Al., 2021).

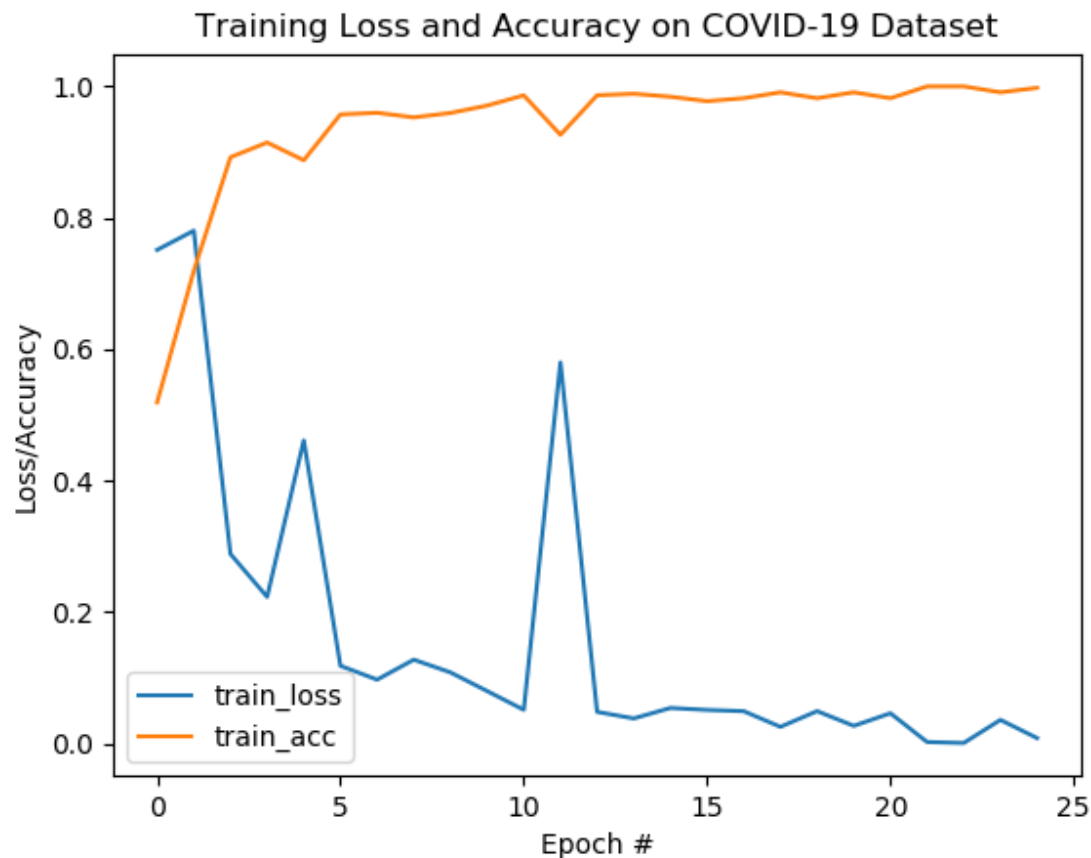
When It Comes To Using The Ai In The Healthcare Field Data Should Be More Precise And Accurate As Various Consequences Can Happen Due To Fluctuation For Even In Single Value To The Prediction. Earlier Work Through Various Websites And Blogs On Covid19 Detection Has Used Very Fewer Amount Of Data [1-3]. We Presented A Deep Learning-Based Segmentation To Identify Different Roi Areas In The X-Ray Images And Generating A Sequence Structure Or Pattern To Detect In The Testing Stage With New Data. Various Cnns Architecture Has Been Tested And The Result Has Been Shown In This Paper. The Best Way Is To Do Efficient Management (Ahmad Shafarin Et Al., 2021; Junaidah Et Al., 2021; Farah Adibah Et Al., 2021; Ahmad Shakani Et Al., 2021; Muhamad Amin Et Al., 2021).

2 Methodology

Deep Neural Network Has Achieved Tremendous Progress In The Past Decades Which Can Be Seen Figuratively. We Have Used 14 Of These Architectures For Our Covid19 Analysis And Diagnosing. These Architectures Include Various Forms Of Lenet, Vgg, Densenet, Resnet, Inception, Mobilenet, And Xception. As Per The Current Study Chest X-Ray Can Be Used In Diagnosing The Disease. Now, Let's Move Forward In Expanding All The Architectures One By One. Cnn Is A Type Of Neural Network That Uses The Convolutional Layer, Activation Layer, Pooling Layer In Its Hidden Layers, Fully Dense Layer And Output Layer Is Used To Predict.



A 5 Layer Cnn Architecture Accompanied By A Fully Connected Layer With An Output Layer Is Used By Us. Cnn Takes An Image As Input, Assign Weights And Baise To Differentiate Between Images. Result Of Cnn Is Seen. Lenet5 Is A Two-Layer Convolutional Architecture Style Neural Network Followed With A Fully Connected Layer And Softmax Activation. This Is The Simplest Model Used By Us In The Covid19 Prediction.

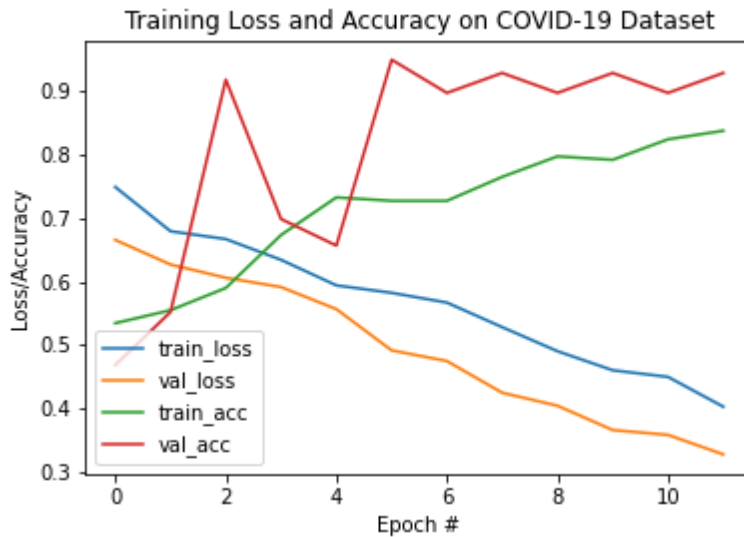


Vgg Is A Convolutional Neural Network Model Proposed By Karen Simonyan& Andrew Zisserman Of The University Of Oxford As A Conference Paper At Iclr 2015. Vgg16 Advances The Accuracy Of Alexnet By Replacing Large-Sized Kernels With Grid Sized Kernels. It Was Trained On The Imagenet Dataset For Weeks And Concluded On The Accuracy Of 92.7% Of The Top 5 Test.

Vgg Has Two Variants As Vgg16 And Vgg19. Vgg16 Architecture Contains 13 Convolutional Layers, 3 Dense Layers, And Pooling Layers. Vgg19 Architecture Contains 16 Convolutional Layers, 3 Dense Layers, And Pooling Layers. Result Of Both Are Shown Below. Resnet Is A Deep Residual Network That Becomes The Winner Of IISVRC 2015 In Image Classification, Detection, And Localization. Resnet50 Contains 5 Stages All Together With Convolution And Identity Blocks.

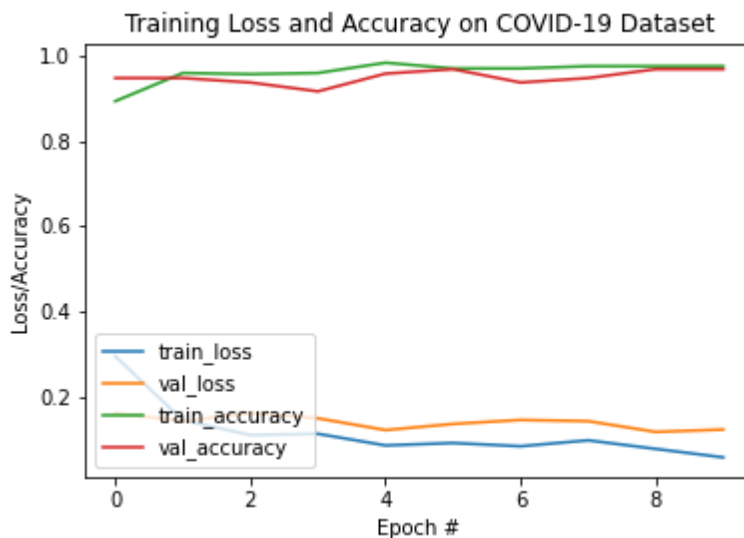
3 Results And Discussion

Densenets Are The Deep Convolutional Network That Works In A Feed-Forward Fashion. Densenets Has Many Advantages Over Other Networks As- They Alleviate The Vanishing Gradient Problems, Feature Reuse, And Propagation And Reduces The Parameter Numbers.



In Densenets Additional Input From Preceding Layers Is Passed To The Next Layers As Feature-Maps. This Technique Is Called Concatenation (Collective Knowledge Sharing From Each Layer). The Numbers Of Channels Are Less Than Other Network And The Network Is Thinner. Thus Making Densenets As Greater Computational Efficiency And Memory Efficiency. There Are Many Variants Of Densenets As Densenet121, Densenet169, And Densenet201 Which Are Used By Us On Covid19 Detection.

Neural Architecture Search Network (Nasnet) Is A Search Algorithm That Searches For Best Architecture On A Small Dataset And Transfers The Block To A Larger Dataset. In Nasnet, Rnn Controller Is Used As Building Blocks To Create An End To End Architecture. Schedules Drop Path Is Used By Nasnet Which Helps In The Generalization Of The Model. Normal Cells And Reduction Cells Are Used In Nasnet. Nasnet Takes 224 * 224 Input Image Size. Two Variants Of Nasnet Are There Which Are Used By Us For Further Experimental Classification. These Are Nasnetmobile And Nasnetlarge.



Inception Deep Convolutional Architecture Was Introduced By Googlenet Which Was Much More Complex Than Other Networks. Further Advancements Were Made In The Inception Model Network Such As Batch Normalization

And Additional Factorization Ideas. This Factorization Aimed To Reduce The No. Of Parameters That Are Going To Be Used. For Eg: - A 5*5 Layer Can Be Replaced By Two 3*3 Layers Which Result In A 28% Decrease In The Parameters From 25 To 18. Further Factorization Was Applied To Asymmetric Convolutions Which Reduces More Parameters. Inception V3 Uses 42 Layer Deep Convolutions Which Advance With: -Rmsprop Optimizer, Factorized 7*7 Convolutions, Batchnorm In The Auxiliary Classifier And Label Smoothing Concepts. Due To The Good Accuracy Rate Of The Resnet Model A Hybrid Inceptionresnet Model Was Also Introduced That Is Similar To Inceptionv4 Functionality. We Have Used Inceptionv3 And Inceptionresnetv2 For Our Dataset As A Classification Algorithm. This Demonstrates That The Importance Of Something Being Managed Well (Santibuan Et Al., 2021; Nor Diana Et Al., 2021; Zarina Et Al., 2021; Khairul Et Al., 2021; Rohani Et Al., 2021; Badaruddin Et Al., 2021, Abdul Rasid Et Al., 2021).

Xception Is The Extreme Version Of The Inception Model Which Uses Modified Depth Wise Separable Convolutional. Modified Depth Wise Convolution Here Refers To The Pointwise Convolution At The Initial Stage And Depth-Wise At The Next Stage. The Output Of The Pointwise Convolution Serves As The Input For The Depth Wise Convolutions In Them. This Modification Was Motivated By The Inceptionv3 Model Which Uses Non-Linearity After The First Operation. But The Xception Network Doesn't Use Any Intermediate Relu Non-Linearity.

Areas Of Operation Of Microrobots Are Limited. Some Of The Specific Areas In Which The Devices Gain Application Include Microsurgery And Application In Blood Vessels. However, The Shift Towards Wireless Technologies Implies That Magnetic Moving Materials Expected To Supply Energy Ought To Have Alternating Magnetic Fields. In Addition, The Evolution Of Microrobots Is Linked To Their Ability To Move Inside Curvature, Vertical, And Horizontal Pipes. Hence, Increasing Research Or Scholarly Investigations Have Targeted The Process Of 3d Printing Of Mems And Microrobots Using Stereolithography. The Investigations Have Also Emphasized Locomotion Characteristics And Motion Mechanisms Associated With These Devices. In This Study, Findings Suggest That When 3d Versions Of Microrobots Are Produced Via Stereolithography, They Have High Response Rates. The Implication For The Future Is That Stereolithography Is Likely To Gain Increasing Application In Medical And Industrial Applications; An Example Being The Case Of Microsurgery.

In The Current World, 3d Printing Refers To The Use Of 3d Model Data To Make Objects; With The Process Achieved By Joining Materials [1]. The Joining Of Materials Involves Layer Upon Layer And Is Seen To Deviate From Traditional Machining And Other Subtractive Manufacturing Technologies [2]. The Implication Is That Through 3d Printing, Parts Of Very Complex And Sophisticated Geometries Can Be Delivered Without Engaging In Post-Processing. Also, 3d Printing Is Seen To Apply To A Diversity Of Materials With Near-Zero Material Waste And Is Built From Custom-Made Materials [3]. Additional Scholarly Observations Hold That 3d Printing Is Ecologically And Environmentally Favorable And This Positive Outcome Accounts For Its Increasing Use In Manufacturing Divisions That Include Aerospace, Health, Motorized, And Robotics [4]. Over The Next Few Years, This Trend Of Substantial Growth And Adoption Of 3d Printing Is Predicted To Continue [5].

Increasing Attention Also Continues To Be Directed At Soft Robots. This Trend Is Attributed To The Advantages With Which Oft Robots Are Associated [1], Including Safety For Human Operators And The Aspect Of Flexibility [2]. However, Most Of The Previous Studies Indicate That The Fabrication Of Soft Robots Remains A Challenge [1-3, 5]. These Mixed Outcomes Account For The Recent Emergence Of 3d Printing As A Central Technology Responsible For Fabricating Soft Robots. In Scholarly Investigations That Have Focused On 3d Printing As A Fabrication Option Targeting Soft Robots, Most Of The Affirmations Suggest That The 3d Printing As A Fabrication Option Has Received Increasing Implementation Due To The Ability To Print Multiple Materials Simultaneously, As Well As The Merit Of High Quality [4]. It Is Also Notable That For Soft Robotics, The Most Suitable Applications Have Been Functional Soft Materials. The Latter Materials Have Been Preferred Because Of Varied Multi-Functionalities And High Motion Complexities [2]. In This Paper, The Main Aim Is To Provide A Critical Review Of The Production Of 3d Printed Magnetic Mems/Microrobots By Using Stereolithography.

4 Conclusion

We Proposed A Method To Calculate The Final Output Using The Prediction Of All These Methods. This Is Done By Using The Majority Rule At The End Of The Process I.E. Covid19 Detection Is Positive When More Than Half Of The Architectures Points In Favour Of It Otherwise Negative. Overall, Results Obtained Demonstrate A Strong Effect Of Deep Learning Architectures On The Covid19 X-Ray Datasets. We Also Discussed Recently Available Datasets Around The Globe And The Application Of Various Dl Architectures. Lenet5, Cnn, Dense-Net121, Densenet169, Densenet201, Resnet50, Vgg16, Vgg19, Mobilenetv2, Nasnetmobile, Nasnetlarge, Inceptionv3, Inceptionresnetv2 And Xception Were Presented With Performance Measures As A Proof Of Concept. Further, We Proposed A Method To Detect The Covid-19 Presence Based On The Results Of The Above Architectures. X-Ray Diagnosing Can Be Used As An Initial Method During Large Population Testing And Can Be Made Easily Available At Any Remote Place With Good Internet Connection. Future Studies Can Include Adding More Data But Not Limited To X-Ray Images. Moreover, Covid-19 Diagnosing With Sonography (Lung Ultrasound) Combined With Radiography Can Be Used To Increase The Detection Power As Ultrasound Frequency Analysis Using Acoustic Models Would Be Good Enough In Identifying Covid-19 Presence.

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