



**IJIRCCCE**

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

**Volume 10, Issue 5, May 2022**

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 8.165**



9940 572 462



6381 907 438



ijircce@gmail.com



www.ijircce.com

# Covid-19 Face Mask Detection Using Convolution Neural Network

Snehal Kute, Kavita Kargal, Dr. Y. S. Angal, Prof. T. V. Kafare

UG Students, Department of Electronics and Telecommunication Engineering, JSPM's Bhivrabai Sawant Institute of Technology and Research, Wagholi, Pune, India

Professor, Department of Electronics and Telecommunication Engineering, JSPM's Bhivrabai Sawant Institute of Technology and Research, Wagholi, Pune, India

**ABSTRACT :** In the current ongoing situation of the pandemic, it has become necessary for people to wear a mask in order to protect themselves from exposure of the wide spread Novel-Corona Virus, however many people do not wear it. The aim of this project is to depict a system created which detects whether a person has worn a mask or not. For achieving this aim, a dataset consisting of 50 images of people wearing a mask and without a mask is created. Using the same dataset, 101 layers deep, convolution neural network is trained. Indeed, the algorithm step regarding mask detection accomplished an accuracy rate of 96.02%. Lastly, the model is deployed to the image with borders.

**KEYWORDS:** Convolution Neural Network, Pycharm, Python, Tensorflow, Keras

## I. INTRODUCTION

The new coronavirus pandemic, also known as Covid-19, has plunged the globe into disaster, infecting over 172 million people and claiming nearly 3.7 million lives, according to the WHO's worldwide assessment released on June 2, 2021. Covid-19 is a coronavirus family that has previously been associated with the outbreaks of Severe Acute Respiratory Syndrome (SARS-CoV) in 2003 and Middle East Respiratory Syndrome (MERS-CoV) in 2012. SARS-CoV-2, also known as Covid-19, is a new coronavirus strain that was discovered in the Chinese city of Wuhan. The virus is highly infectious and spreads via direct contact with humans and infected surfaces. In March 2020, the WHO designated Covid-19 as a pandemic. America, followed by Europe, had the largest confirmed cases and fatalities during the Covid-19 pandemic. Due to the fact that this is a newly discovered virus, researchers are currently developing efficient vaccinations to eliminate Covid-19. **NEED & MOTIVATION OF PROJECT .**

COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to avail of their services. Therefore, face mask detection has become a crucial task to help global society. The proposed method detects the face from the image correctly and then identifies if it has a mask on it or not. As a surveillance task performer, it can also detect a face along with a mask in motion. The method attains accuracy up to 95.77% and 94.58% respectively on two different datasets. We explore optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.

## II. PROBLEM DEFINITION

Covid-19: mild to severe respiratory illness that is caused by a coronavirus (Severe acute Respiratory syndrome coronavirus Mask Detection :Face mask detection refers to detect whether a person is wearing a mask Or not. Artificial neural networks: usually simply called neural networks, are computing systems Inspired by the biological neural networks that constitute animal brains.

## III. METHODOLOGY

The proposed model consisted of two key components, the first one is a deep transfer learning ResNet 101 as a feature extractor and the second one ResNet 50. ResNet is one of the most powerful deep neural networks which has proven

the best results when used as a feature extractor. Subsequently, after feature extraction, a decision tree algorithm is used for classification.

SYSTEM BLOCK DIAGRAM:

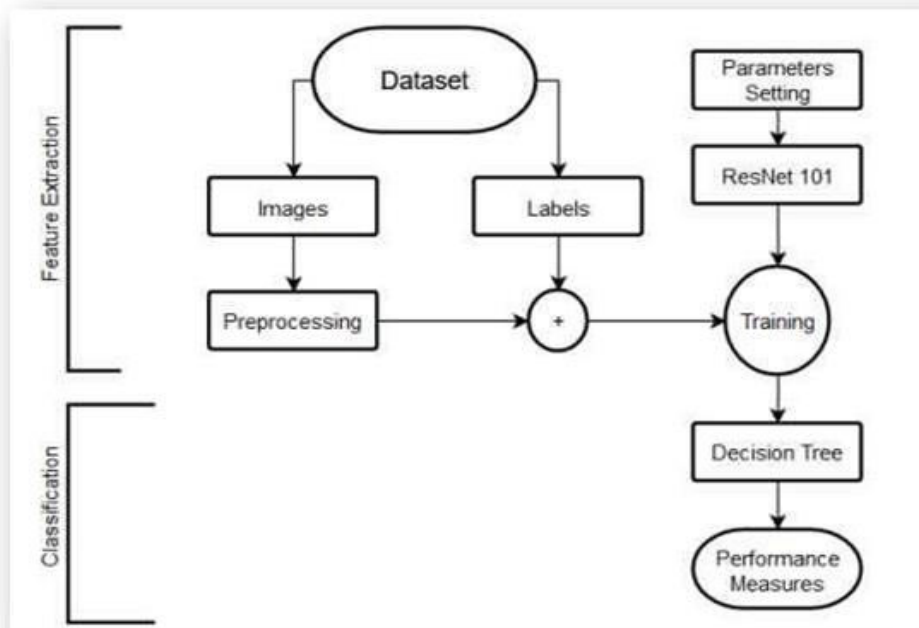


Fig 1. Flow of algorithm

ResNet 50 :

ResNet50 is a variant of ResNet model which has 48 Convolution layers along with 1 MaxPool and 1 Average Pool layer. It has  $3.8 \times 10^9$  Floating points operations. It is a widely used ResNet model and we have explored ResNet50 architecture in depth.

We start with some background information, comparison with other models and then, dive directly into ResNet50 architecture. In 2012 at the LSVRC2012 classification contest Alex Net won the first price, After that ResNet was the most interesting thing that happened to the computer vision and the deep learning world.

Because of the framework that ResNets presented it was made possible to train ultra-deep neural networks and by that i mean that i network can contain hundreds or thousands of layers and still achieve great performance. The ResNets were initially applied to the image recognition task but as it is mentioned in the paper that the framework can also be used for non-computer vision tasks also to achieve better accuracy.



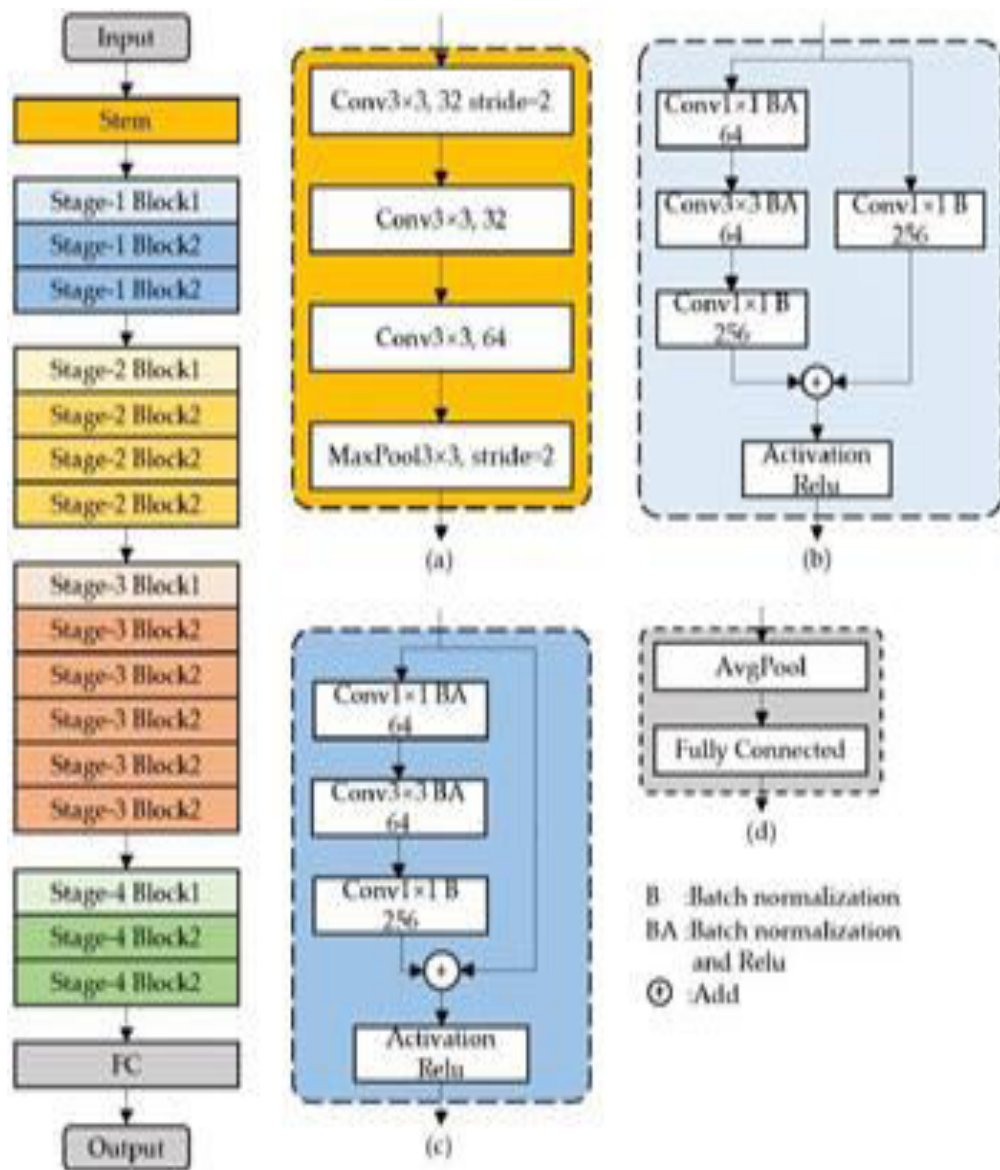


Fig 2. The architecture of ResNet-50-vd.

In the last layer, Decision tree classifier was implemented to fulfill the classification goal. The model was trained without over fitting and performance improvement was observed. The decision tree is a model used to compute an entropy function and an information gain. Amount of uncertainty in data is achieved via calculating the entropy while information gain is achieved using calculation of the difference in the entropy.



Fig 3. Sample Output flow

## HARDWARE DESCRIPTION

### 1. WEB-CAM –

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video.

Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires much bandwidth, such streams usually use compressed formats. The maximum resolution of a webcam is also lower than most handheld video cameras, as higher resolutions would be reduced during transmission. The lower resolution enables webcams to be relatively inexpensive compared to most video cameras, but the effect is adequate for video chat sessions.



Fig 4. Webcam

### 2. MONITOR –

A monitor is an electronic visual computer display that includes a screen, circuitry and the case in which that circuitry is enclosed. Older computer monitors made use of cathode ray tubes (CRT), which made them large, heavy and inefficient. Nowadays, flat-screen LCD monitors are used in devices like laptops, PDAs and desktop computers because they are lighter and more energy efficient. A monitor is also known as a screen or a visual display unit (VDU)



Fig 5. Monitor

### 3. RAM –

Random-access memory (RAM) is a type of storage for computer systems that makes it possible to access data very quickly in random order. Its a temporary memory which has a role of a facilitator in between the components like hard disk drive and CPU. Data from hard drive is loaded into RAM so as to get processed by CPU. A 4GB RAM means it can store 4GB of data temporarily or if you count in number of characters then a 4GB RAM can hold 4294967296 characters.

### 4. HDD –

hard disk, also called hard disk drive or hard drive, magnetic storage medium for a computer. Hard disks are flat circular plates made of aluminum or glass and coated with a magnetic material. Hard disks for personal computers can store terabytes (trillions of bytes) of information. Data are stored on their surfaces in concentric tracks.

## SOFTWARE DESCRIPTION

### 1. PyCharm

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python programming language. It is developed by the Czech company JetBrains (formerly known as IntelliJ). It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as data science with Anaconda.

PyCharm is cross-platform, with Windows, macOS and Linux versions. The Community Edition is released under the Apache License, and there is also Professional Edition with extra features – released under a proprietary license and also an educational version.

#### Features

- Coding assistance and analysis, with code completion, syntax and error highlighting, linter integration, and quick fixes
- Project and code navigation: specialized project views, file structure views and quick jumping between files, classes, methods and usages
- Python refactoring: includes rename, extract method, introduce variable, introduce constant, pull up, push down and others
- Support for web frameworks: Django, web2py and Flask [professional edition only][8]
- Integrated Python debugger
- Integrated unit testing, with line-by-line code coverage
- Google App Engine Python development [professional edition only]
- Version control integration: unified user interface for Mercurial, Git, Subversion, Perforce and CVS with change lists and merge
- Support for scientific tools like matplotlib, numpy and scipy [professional edition only][9]
- It competes mainly with a number of other Python-oriented IDEs, including Eclipse's PyDev, and the more broadly focused Komodo IDE.

FLOW-CHART

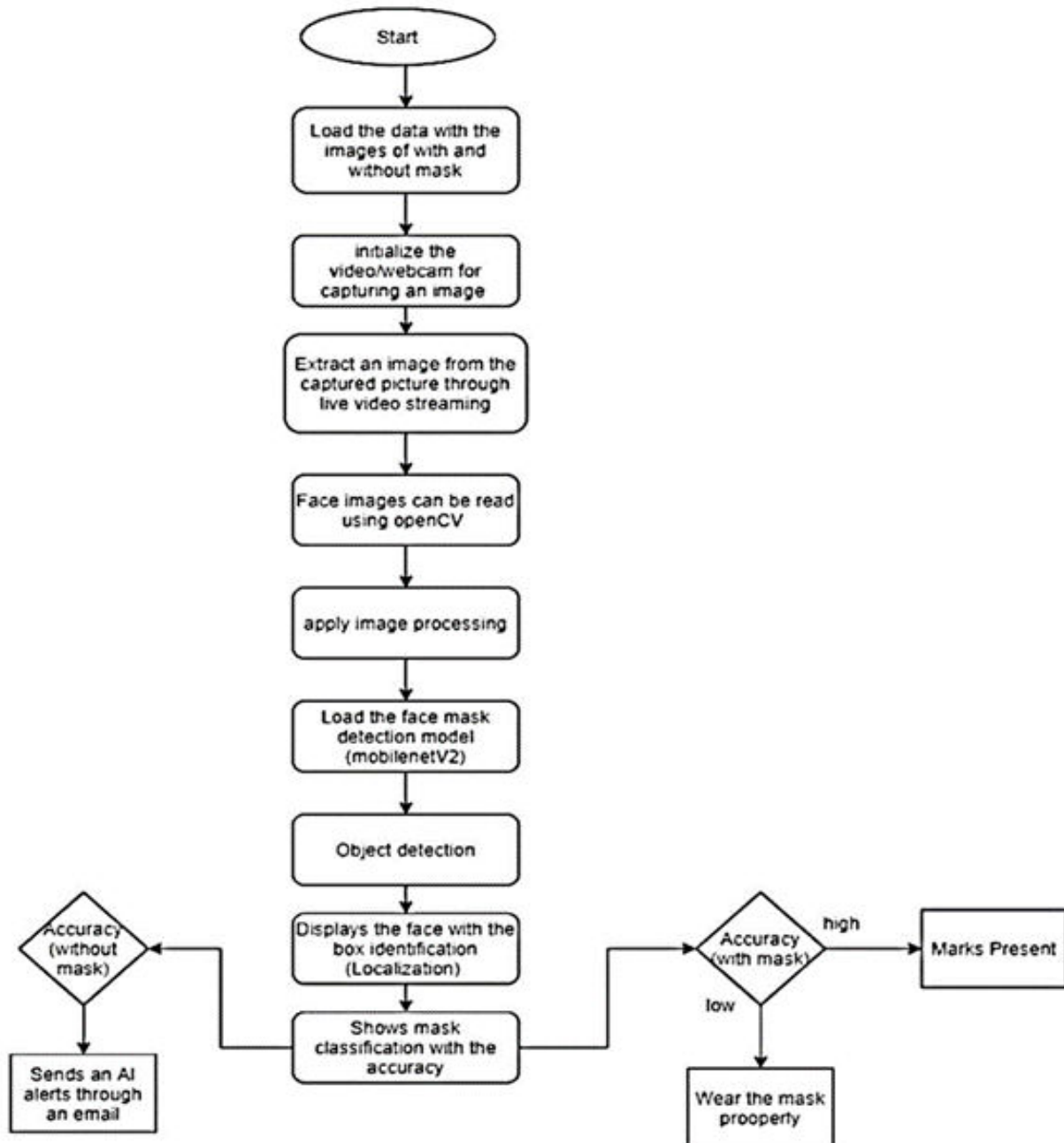


Fig6. Flowchart of Face Mask Detection

IV. CONCLUSION

In this work, we have introduced a novel model for medical masked face detection, focusing on medical mask object to prevent COVID-19 spreads from human to human. For image detection, we have employed the 101 based ResNet-50 model to produce highperformance outcomes. The proposed model improves detection performance by introducing mean IoU to estimate the best number of anchor boxes. To train and validate our detector in a supervised state, we design a new dataset based on two public masked face datasets. Furthermore, performance metrics such as AP and log-

average miss rates score had been studied for SGDM and Adam optimizer experiments. We have shown that the proposed model scheme of 101 with ResNet50 is an effective model to detect a medical masked face. As a future study, we plan to detect a kind of masked face in image and video based on deep learning models.

#### REFERENCES

1. Bhuiyan, M. R., Khushbu, S. A., & Islam, M. S. A Deep Learning Based Assistive System to Classify COVID-19 Face Mask for Human Safety with YOLOv3. 2020 11th International Conference on Computing, Communication and Networking Technologies, ICCCNT 2020, July.
2. <https://doi.org/10.1109/ICCCNT49239.2020.9225384> (2020).
3. Das, A. Covid-19 Face Mask Detection Using. 1–5. (2019).
4. Fafous, N., Vemparala, M. R., Frickenstein, A., Frickenstein, L., Badawy, M., & Stechele, W. BinaryCoP: Binary Neural Network-based COVID-19 FaceMask Wear and Positioning Predictor on Edge Devices. 2021 IEEE International (2021).
5. Parallel and Distributed Processing Symposium Workshops, IPDPSW 2021 - In Conjunction with IEEE IPDPS 2021, 108–115.
6. <https://doi.org/10.1109/IPDPSW52791.2021.00024>
7. Gupta, S., Sreenivasu, S. V. N., Chouhan, K., Shrivastava, A., Sahu, B., & Manohar Potdar, R. Novel Face Mask Detection Technique using Machine Learning to control COVID'19 pandemic. Materials Today: Proceedings, xxxx. <https://doi.org/10.1016/j.matpr.2021.07.368> (2021).
8. Jignesh Chowdary, G., Punn, N. S., Sonbhadra, S. K., & Agarwal, S. Face Mask Detection Using Transfer Learning of InceptionV3. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 12581 LNCS, 81–90. [https://doi.org/10.1007/978-3-030-66665-1\\_6](https://doi.org/10.1007/978-3-030-66665-1_6) (2020).





INNO  SPACE  
SJIF Scientific Journal Impact Factor

Impact Factor: 8.165

 **doi**<sup>®</sup>  
**cross** **ref**

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 9940 572 462  6381 907 438  [ijircce@gmail.com](mailto:ijircce@gmail.com)



[www.ijircce.com](http://www.ijircce.com)

Scan to save the contact details