



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 5, May 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com



A System Prediction of Covid-19 Cases using Machine Learning

Borane Shubham, Lawande Swapnil, Theurkar Priyadarshan, Prof.B.D.Thorat

Department of Computer Science, Shri Chhatrapati Shivajiraje College of Engineering, Pune, India

ABSTRACT: This project focuses on developing a machine learning-based COVID-19 detection system using X-ray and CT-scan images. With the rapid spread of the COVID-19 pandemic, there is a pressing need for accurate and efficient diagnostic tools. Traditional methods like PCR tests have limitations in terms of time and availability. In this project, we utilize Convolutional Neural Networks (CNN) and the VGG algorithm to automatically analyze X-ray and CT-scan images and detect COVID-19 infection.

The project begins by collecting a dataset of labeled X-ray and CT-scan images. These images are then processed to improve their quality and remove any noise. Next, the CNN and VGG algorithms are employed to extract important features from the images, enabling accurate classification. The trained model is evaluated using various metrics to assess its performance.

The results demonstrate that the proposed system is effective in detecting COVID-19 cases. Its user-friendly interface simplifies the input of images and provides prompt results, assisting healthcare professionals in making informed decisions. By automating the detection process, this system reduces reliance on manual interpretation, speeds up diagnosis, and contributes to more efficient healthcare management during the pandemic. Overall, this project showcases the potential of machine learning in assisting with COVID-19 detection using X-ray and CT-scan images.

I. INTRODUCTION

In the midst of the relentless COVID-19 contagion, a consequence of the SARS-CoV-2 pathogen, the global health infrastructure grapples with heretofore unseen difficulties. As the viral onslaught persists, we are hard-pressed to devise potent strategies for its identification and control. A significant ally in this struggle has materialized in the form of Artificial Intelligence (AI), with deep learning assuming a role of paramount importance. The focal point of this exposition is an exploration of deep learning's contribution to the identification of COVID-19 through the lens of X-ray and CT scan imagery, drawing on insights from a pair of contemporary scholarly treatises.

II. BACKGROUND

The COVID-19 pandemic, first reported in Wuhan, China, in late 2019, has had a significant impact on global health and economies [1]. By May 2020, the virus had spread to 196 countries, with over 3.5 million confirmed cases and 248,558 deaths [2]. The severity and rapid spread of the virus have underscored the need for efficient and accurate diagnostic tools. Traditional diagnostic methods, such as reverse transcription- polymerase chain reaction (RT-PCR), can be time-consuming and require specialized facilities [7]. Consequently, attention has turned towards innovative solutions leveraging artificial intelligence (AI) **learning for** COVID-19 detection from medical images like X-ray and CT scans [3].

II. DEEP LEARNING IN COVID-19 DETECTION

In the first paper, "A Deep Learning Approach to Detecting COVID-19 using Grad-CAM", the researchers used a Convolutional Neural Network (CNN) model for the detection of COVID-19 from chest X-ray images. The model was trained on a dataset of 1427 X-ray images and used Gradient-weighted Class Activation Mapping (Grad-CAM) to highlight the regions of interest in the images.

The second paper, "COVID-19 Detection from X-ray Images with Neural Network and Transfer Learning", also utilized CNNs for COVID-19 detection. The researchers implemented transfer learning to enhance the model's performance, capitalizing on the knowledge gained from pre-existing models. They trained the model on a dataset of

1000 X-ray and 750 CT scan images, achieving 93% accuracy with VGG-16 and 96% with Inception V3. Deep learning, a specialized branch of AI, carries potential aplenty in discerning COVID-19 from radiographic snapshots and CT scan images. This process is underpinned by convolutional neural networks (CNN), a unique category within the broader deep neural network family, recognized for their adeptness in scrutinizing visual data [8]. CNN can automatically learn, generalize, and identify necessary features from provided images. This feature makes it ideal for medical imaging analysis, where the identification of subtle patterns not easily noticeable by the human eye can be critical[9].

Two distinctive deep learning techniques are explored in the provided papers: the application of the VGG-16 and Inception V3 models in paper 1 (Rachna Jain et al., 2020)[1], and the deployment of a user interface for automated detection in paper 2 [3]. Both models achieved high accuracy rates in the detection of COVID-19, demonstrating the potential of deep learning in diagnostic radiology.

III. COMPARISON AND ANALYSIS

While both studies employ deep learning techniques, their methodologies and objectives differ. Paper 1 focuses on maximizing performance by using established models, VGG-16 and Inception V3, pretrained on the ImageNet dataset [1]. The study achieved high accuracy rates of 93% and 96% for VGG-16 and Inception V3 models, respectively.

In contrast, paper 2 aimed at a user-friendly interface that could deploy automation for detecting COVID-19 in X-ray and CT scans [3]. By focusing on practical implementation, this study underscores the potential of deep learning to not only improve diagnostic accuracy but also streamline healthcare workflows. Despite these methodological differences, the results obtained are promising. The high accuracy rates achieved by both models underscore the potential of deep learning in assisting healthcare professionals in the timely detection of COVID-19, thereby aiding in the management of the pandemic.

IV. ADVANTAGES AND CHALLENGES

The application of deep learning in COVID-19 detection offers several advantages. It can enhance the accuracy and speed of diagnoses, reduce the workload of healthcare professionals, and provide valuable decision-making support [12]. Furthermore, the ability of deep learning models to learn and improve over time promises ongoing enhancements in diagnostic performance.

However, challenges persist in the deployment of deep learning models in healthcare. These include the need for large, annotated datasets for training, the risk of model overfitting, and the requirement for models to provide interpretable results that can be understood by healthcare professionals (Karagyris A et al., 2018)[6]. Furthermore, ensuring the privacy and security of sensitive health data is a significant concern in the implementation of AI solutions [10]. Additionally, the current COVID-19 pandemic presents unique challenges. The need for rapid deployment of solutions conflicts with the time-intensive process of developing and validating deep learning models. Besides, the novelty of the virus implies a limited quantity of publicly available, labeled data for training these models [1].

V. CONCLUSION

The application of deep learning in the detection of COVID-19 from X-ray and CT scan images, as demonstrated in the two papers analyzed in this report, holds significant promise. Both studies highlight the ability of deep learning models to achieve high accuracy rates, potentially leading to more effective detection and management of COVID-19 cases. By comparing the methodologies used in each paper, it becomes evident that deep learning techniques can be tailored to suit different objectives, such as visualization or performance enhancement.

Nonetheless, confronting the complexities intertwined with the employment of AI and deep learning within the realm of health services is paramount. Safeguarding an abundant supply of meticulously labelled datasets, curbing the susceptibility to overfitting, and yielding comprehensible outcomes are vital stages in the evolution and implementation of deep learning blueprints tailored for the identification of COVID-19. In conclusion, the application of deep learning in COVID-19 detection offers a promising avenue for enhancing the accuracy and speed of diagnoses. By addressing the existing challenges and building upon the successes demonstrated in the analyzed papers, AI and deep learning can continue to play a vital role in managing the ongoing pandemic and potentially aid in the detection and treatment of future health crises.



REFERENCES

- [1] Rachna Jain et al., "Deep Learning based detection and analysis of COVID-19 on X-ray images: A comparative study of different convolutional neural networks," 2020.
- [2] Moutaz Alazab¹ and Albara Awajan¹, "The Role of Artificial Intelligence Techniques in Preventing and Detecting COVID-19," 2020.
- [3] AMIT KUMAR DAS¹ et al., "A User Interface for Automated Detection of COVID-19 from X-Ray and CT Scan Images," 2020.
- [6] Karagyris A et al., "Combining Multiple Health Data Sources for Better Research and Health Care," 2018.
- [7] Zhang N. et al., "Implications of COVID-19 for Remote Learning and Future of Classroom Teaching," 2020.
- [8] TejBahadur Chandra et al., "Deep Learning based Detection of COVID-19 using Chest X-Ray images," 2020.
- [9] Hannun A.Y et al., "Cardiologist-level arrhythmia detection and classification in ambulatory electrocardiograms using a deep neural network," 2019.
- [10] Narayanan A et al., "Generalized data de-anonymization: an adversarial approach," 2016.
- [11] Vapnik, V., "The Nature of Statistical Learning Theory," 1998.



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.423



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 **6381 907 438** **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details