e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 11, November 2024

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.521

6381 907 438 6381 907 438 ijmrset@gmail.com www.ijmrset.com

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Safeguarding Pan Cards with Cutting-Edge Detection Systems Based on Convolutional Neural Networks

Mrs.P.Vanitha, Ms.Tharani N, Mr.Sasitharan C

Assistant Professor, Department of Computer Applications (UG), Hindusthan College of Arts & Science, Coimbatore, India

Student, Department of Computer Applications (UG), Hindusthan College of Arts & Science, Coimbatore, India

Student, Department of Computer Applications (UG), Hindusthan College of Arts & Science, Coimbatore, India

ABSTRACT: This project rise in identity theft and fraudulent activities, safeguarding personal identification documents like PAN cards has become paramount. This project proposes an innovative approach leveraging Convolutional Neural Networks (CNNs) for the detection and protection of PAN cards. CNNs have demonstrated remarkable capabilities in image recognition tasks, making them ideal for detecting PAN cards in various scenarios. Our system utilizes state- of-the-art CNN architectures trained on a diverse dataset of PAN card images to accurately detect PAN cards in real-time. Furthermore, we integrate cutting-edge detection mechanisms to identify potential threats such as tampering or forgery. The proposed system offers a robust and efficient solution for safeguarding PAN cards, enhancing security measures in sensitive domains like finance, government, and authentication systems.

I. INTRODUCTION

The objective of safeguarding PAN cards with cutting-edge detection systems based onConvolutional Neural Networks (CNN) encompasses several key goals aimed at enhancing security measures, preventing fraud, ensuring regulatory compliance, and improving user experience. At the core of this objective is the desire to leverage advanced technology to protectthe integrity of PAN cards and the sensitive personal information they contain.

First and foremost, the objective involves the development and implementation of CNN-based detection systems capable of accurately identifying PAN cards within images or scanned documents. These systems leverage deep learning algorithms to detect PAN cards amidst varying backgrounds, orientations, and quality levels, ensuring robust and reliable detection performance. By accurately identifying PAN cards, businesses and government agencies can enhance their ability to verify the authenticity of documents and prevent fraudulent activities such as identity theft and forgery.

Moreover, the objective includes the establishment of real-time monitoring capabilities to detect and respond to suspicious activities related to PAN card usage. CNN-based detection systems continuously monitor transactions, document submissions, and identity verification processes, generating alerts for any anomalies or irregularities detected. This proactive approach enables organizations to promptly investigate and intervene in potential fraud attempts, mitigating risks and safeguarding the integrity of PAN card information.

Additionally, the objective emphasizes the importance of user-friendly authentication processes that leverage CNN-based detection systems to verify PAN card authenticity efficiently. By streamlining verification procedures and reducing false positives, businesses can enhance user experience while maintaining robust security measures against fraudulent activities. This user-centric approach ensures that individuals can easily and securely verify their PAN card details, contributing to overall trust and confidence in the verification process

Furthermore, the objective involves the integration of CNN-based detection systems seamlessly with existing PAN card verification processes, document management systems, and identity verification platforms. This integration ensures

© 2024 IJMRSET | Volume 7, Issue 11, November 2024| DOI: 10.15680/IJMRSET.2024.0711069

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

interoperability and compatibility with existing workflows, minimizing disruption to operations and facilitating widespread adoption of the new security measures. Continuous improvement and adaptation mechanisms are also established to ensure that detection systems remain effective against emerging threats and evolving attack vectors, maintaining their effectiveness in safeguarding PAN cards over time the objective of safeguarding PAN cards with cutting-edge detection systems based on CNN encompasses a comprehensive approach to enhancing security, preventing fraud, ensuring regulatory compliance, and improving user experience. By leveraging advanced technology and proactive security measures, organizations can protect the integrity of PAN card information, safeguard individuals' financial identities, and maintain trust and confidence in the verification process.

1.1 OVERVIEW OF THE PROJECT

Safeguarding PAN (Permanent Account Number) cards, a vital piece of identification used in financial transactions and tax-related matters, is paramount to prevent fraud and protect individuals' financial identities. Leveraging cutting-edge detection systems based on Convolutional Neural Networks (CNN) presents a proactive and technologically advanced approach to bolstering PAN card security. This initiative aims to develop sophisticated systems capable of accurately identifying PAN cards within various types of documents or images, irrespective of background noise or image quality. By harnessing the power of deep learning algorithms inherent in CNNs, these detection systems can robustly and reliably detect PAN cards, laying the foundation for enhanced security measures.

Real-time monitoring capabilities are integral to the proposed system, enabling continuous surveillance of transactions, document submissions, and identity verification processes. Through CNN-based detection systems, anomalies or irregularities in PAN card usage can be promptly identified, triggering immediate alerts for investigation and intervention. This proactive stance against fraudulent activities helps mitigate risks associated with identity theft, forgery, or unauthorized PAN card usage, thereby safeguarding individuals' financial identities and maintaining the integrity of PAN card information.

User-centric authentication processes play a crucial role in ensuring the effectiveness and usability of the proposed system. By streamlining verification procedures and reducing false positives, businesses can enhance user experience while upholding robust security measures against fraudulent activities. Seamless integration of CNN-based detection systems with existing PAN card verification processes, document management systems, and identity verification platforms ensures minimal disruption to operations and facilitates widespread adoption of the new security measures.

Continuous improvement and adaptation mechanisms are essential components of the safeguarding initiative, ensuring the longevity and effectiveness of CNN-based detection systems. Regular updates, model retraining, and performance evaluations enable detection systems to remain resilient against emerging threats and evolving attack vectors, thereby ensuring the sustained security and integrity of PAN cards. Overall, the implementation of cutting-edge detection systems based on CNN represents a proactive and forward-thinking approach to safeguarding PAN cards, bolstering security, preventing fraud, and maintaining trust and confidence in financial transactions.

II. DEEP LEARNING

2.1 INTRODUCTION

Deep learning is computer software that mimics the network of neurons in a brain. Itis a subset of machine learning and is called deep learning because it makes use of deep neural networks. Deep learning algorithms are constructed with connected layers.

- The first layer is called the Input Layer
- The last layer is called the Output Layer
- All layers in between are called Hidden Layers. The word deep means the network join neurons in more than two layers.

Each Hidden layer is composed of neurons. The neurons are connected to each other. The neuron will process and then propagate the input signal it receives the layer above it. The strength of the signal given the neuron in the next layer depends on the weight, bias and activation function.

The network consumes large amounts of input data and operates them through multiple layers; the network can learn increasingly complex features of the data at each layer.

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)
(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

A deep neural network provides state-of-the-art accuracy in many tasks, from object detection to speech recognition. They can learn automatically, without predefined knowledge explicitly coded by the programmers.
A neural network works quite the same. Each layer represents a deeper level of knowledge, i.e., the hierarchy of knowledge. A neural network with four layers will learn more complex feature than with that with two layers. The learning occurs in two phases.

- The first phase consists of applying a nonlinear transformation of the input andcreate a statistical model as output.
- The second phase aims at improving the model with a mathematical method known as derivative. The neural network repeats these two phases hundreds to thousands of time until it has reached a tolerable level of accuracy. The repeat of this two-phase is called iteration.

2.1.1 Deep learning applications
AI in Finance: The financial technology sector has already started using AI to save time,reduce costs, and add value. Deep learning is changing the lending industry by using more robust credit scoring. Credit decision-makers can use AI for robust credit lending applicationsto achieve faster, more accurate risk assessment, using machine intelligence to factor in the character and capacity of applicants.

Underwrite is a Fintech company providing an AI solution for credit makers company. underwrite. AI to detect which applicant is more likely to pay back a loan. Their approach radically outperforms traditional methods.

AI in HR: Under Armour, a sportswear company revolutionizes hiring and modernizesthe candidate experience with the help of AI. In fact, Under Armour Reduces hiring time for its retail stores by 35%. Under Armour faced a growing popularity interest back in 2012. Theyhad, on average, 30000 resumes a month. Reading all of those applications and begin to start the screening and interview process was taking too long.

AI in Marketing: AI is a valuable tool for customer service management and personalization challenges. Improved speech recognition in call-center management and call routing as a result of the application of AI techniques allows a more seamless experience for customers.

2.2 DEEP LEARNING APPLICATIONS
AI in Finance: The financial technology sector has already started using AI to save time, reduce costs, and add value. Deep learning is changing the lending industry by using more robust credit scoring. Credit decision-makers can use AI for robust credit lending applications to achieve faster, more accurate risk assessment, using machine intelligence to factor in the character and capacity of applicants. Underwrite is a Fintech company providing an AI solution for credit makers company. underwrite. Ai uses AI to detect which applicant is more likely to pay back a loan. Their approach radically outperforms traditional methods. AI in HR: Under Armour, a sportswear company revolutionizes hiring and modernizes thecandidate experience with the help of AI. In fact, Under Armour Reduces hiring time for its retail stores by 35%. Under Armour faced a growing popularity interest back in 2012. They had, on average, 30000 resumes a month. Reading all of those applications and begin to start the screening and interview process was taking too long. AI in Marketing: AI is a valuable tool for customer service management and personalization challenges. Improved speech recognition in call-center management and call routing as a result of the application of AI techniques allows a more seamless experience for customers

2.3 LIMITATIONS OF DEEP LEARNING
Data labeling: Most current AI models are trained through "supervised learning." It means that humans must label and categorize the underlying data, which can be a sizable and error-prone chore. For example, companies developing self-driving-car technologies are hiring hundreds of people to manually annotate hours of video feeds from prototype vehicles to helptrain these systems.

Obtain huge training datasets: It has been shown that simple deep learning techniqueslike CNN can, in some cases, imitate the knowledge of experts in medicine and other fields. The current wave of machine learning, however, requires training data sets that are not only labeled but also sufficiently broad and universal. Deep-learning methods required thousands ofobservation for models to become relatively good at classification tasks and, in some cases, millions for them to perform at the level of humans. Without surprise, deep learning is famousin giant tech companies; they are using

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

big data to accumulate petabytes of data. It allows themto create an impressive and highly accurate deep learning model.

Explain a problem: Large and complex models can be hard to explain, in human terms. For instance, why a particular decision was obtained. It is one reason that acceptance of some AI tools are slow in application areas where interpretability is useful or indeed required. Furthermore, as the application of AI expands, regulatory requirements could also drive the need for more explainable AI models.

III. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

Image Acquisition the system starts with acquiring images of PAN cards through various sources such as scanning, mobile cameras, or dedicated document scanners. Preprocessing images may undergo preprocessing steps to enhance quality, such as noise reduction, resizing, and normalization, to ensure consistency in input data for the CNN. It training Data Collection a large dataset of PAN card images is collected for training the CNN model. This dataset should cover various PAN card designs, backgrounds, orientations, and quality levels to ensure robustness. CNN model training using frameworks like TensorFlow or PyTorch, a CNN model is trained on the collected dataset. The architecture of the CNN is designed to effectively detect and recognize PAN cards within images. Edge Detection Integration cutting-edge edge detection algorithms, such as Canny Edge Detection, can be integrated into the CNN model to identify the boundaries and edges of PAN cards accurately. Model Validation the trained CNN model is validated using a separate dataset to ensure its accuracy, precision, recall, and generalization capabilities. Deployment once validated, the trained model is deployed into the existing system infrastructure, which can be on-premises orcloud-based. Real-time Detection when a new image is acquired, it's passed through the deployed CNN model. The model detects and localizes the PAN card within the image using the integrated edge detection system. Verification and Authentication post-detection, thesystem may perform additional verification steps such as comparing extracted PAN details against a database, verifying holograms or security features, and validating against governmentdatabases. Alerts and Notifications in case of any suspicious activity or discrepancies, the system generates alerts or notifications to notify relevant authorities or users. Continuous Improvement the system undergoes continuous improvement through feedback mechanisms, updating the CNN model with new data and refining edge detection algorithms to adapt to evolving threats and challenges. Compliance and Regulations the system adheres to relevant data privacy regulations and standards, ensuring the secure handling of PAN card informationthroughout the entire process.

3.2 PROPOSED SYSTEM

CNN-Based Detection System utilize pre-trained CNN models such as Res Net, VGG,or custom-designed architectures trained on PAN card images. Train the model to detect and classify PAN card images accurately .Employ techniques like transfer learning to fine-tune theCNN model on a specific dataset of PAN card images for improved accuracy. Implement data augmentation techniques to increase the diversity of the training dataset and improve the model's robustness.

PAN Card Image Acquisition develop a user-friendly interface or mobile application for users to capture images of their PAN cards using smartphones or dedicated scanners. Ensure image quality and clarity for accurate detection by providing feedback to users during the image capture process. Integrate image preprocessing techniques to enhance the quality of captured images, such as noise reduction and image enhancement.

Real-Time Detection and Authentication implement real-time detection algorithms to process captured PAN card images promptly. Utilize the trained CNN model to analyse the images and verify the authenticity of the PAN card. Perform checks for common fraud indicators like image tampering, forgery, or alterations. Provide immediate feedback to users regarding the validity of the PAN card.

Security Measures and Integration **i**mplement encryption techniques to secure the transmission of PAN card images and authentication results between the user's device and theserver. Employ secure storage mechanisms for storing PAN card images and authentication logs to prevent unauthorized access. Integrate multi-factor authentication (MFA) methods to enhance the overall security of the system, such as OTP verification or biometric authentication. Reporting and Alerting develop a reporting mechanism to track suspicious activities, such as multiple authentication attempts or

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

unusual access patterns. Generate alerts or notifications for administrators or users in case of detected anomalies or security breaches. Provide detailed logs and audit trails for forensic analysis and compliance purposes.

IV. SYSTEM DESIGN

4.1 INPUT DESIGN

The design of input focus on controlling the amount of dataset as input required, avoidingdelay and keeping the process simple. The input is designed in such a way to provide security.Input design will consider the following steps:

- The dataset should be given as input.
- The dataset should be arranged.
- Methods for preparing input validations.

4.2 OUTPUT DESIGN

A quality output is one, which meets the requirement of the user and presents the information clearly. In output design, it is determined how the information is to be displayed for immediate need. Designing computer output should proceed in an organized, well thoughtout manner the right output must be developed while ensuring that each output element is designed so that the user will find the system can be used easily and effectively.

V. SYSTEM TESTING AND IMPLEMENTATION

5.1 SYSTEM TESTING

System testing is the stage of implementation that is aimed at ensuring that the system works accurately and efficiently before live operation commences. Testing is vital to the success of the system. System testing makes logical assumption that if all the parts of the system are correct, then the goal will be successfully achieved. System testing involves user training system testing and successful running of the developed proposed system. The user teststhe developed system and changes are made per their needs. The testing phase involves the testing of developed system using various kinds of data. While testing, errors are noted and thecorrections are made. The corrections are also noted for the future use.

5.1.1 TESTING OBJECTIVES

Software Testing has different goals and objectives. The major objectives of Software testingare as follows:

- Finding defects which may get created by the programmer while developing thesoftware.
- Gaining confidence in and providing information about the level of quality.
- To prevent defects.
- To make sure that the end result meets the business and user requirements.
- To ensure that it satisfies the BRS that is Business Requirement Specification and SRSthat is System Requirement Specifications.
- To gain the confidence of the customers by providing them a quality product

VI. IMPLEMENTATION

Data Collection and Preparation: Collect a diverse dataset of PAN card images, including variations in background, lighting conditions, and quality. Preprocess the images to standardize resolution, remove noise, and augment the dataset to increase variability and robustness.

CNN Architecture Selection: Choose a suitable CNN architecture for PAN card detection, such as Faster R-CNN, YOLO (You Only Look Once), or SSD (Single Shot MultiBox Detector). Adapt the chosen architecture to handle the detection of PAN cards specifically.

Model Training: Train the CNN model using the preprocessed dataset of PAN card images. Fine-tune the model parameters and hyperparameters to optimize performance. Implement techniques such as transfer learning to leverage pre-trained models for improved efficiency and accuracy.

© 2024 IJMRSET | Volume 7, Issue 11, November 2024| DOI: 10.15680/IJMRSET.2024.0711069

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Validation and Evaluation: Validate the trained model using a separate validation dataset to assess its performance metrics such as precision, recall, and F1-score. Evaluate the model's robustness to variations in PAN card images and environmental conditions to ensure reliability in real-world scenarios.

Real-time Detection System: Implement a real-time detection system that integrates the trained CNN model. Develop software components to capture input images from various sources such as scanned documents, camera feeds, or digital uploads. Apply the trained modelto detect PAN cards within the input images in real-time.

Alerting Mechanism: Integrate an alerting mechanism into the detection system to notify users or administrators of detected PAN cards. Develop logic to trigger alerts for suspicious activities, such as multiple PAN card detections in a single document or unusual patterns in PAN card submissions.

Integration with Existing Systems: Integrate the CNN-based detection system with existing PAN card verification processes, document management systems, and identity verification platforms. Develop APIs or interfaces to enable seamless communication and interoperability between the detection system and other systems.

Testing and Deployment: Conduct thorough testing of the implemented system to ensure functionality, performance, and security. Test the system under various scenarios and edge cases to identify and address any potential issues. Deploy the system in production environments following rigorous quality assurance procedures.

Maintenance and Updates: Establish procedures for ongoing maintenance, monitoring, and updates of the detection system. Regularly monitor system performance, address any issues or vulnerabilities, and update the model as new data becomes available or to adapt to evolving threats and requirements.

User Training and Documentation: Provide training to users and administrators on how to use the detection system effectively. Develop comprehensive documentation outlining system functionality, usage guidelines, troubleshooting procedures, and best practices for safeguarding PAN cards effectively.

6.2.1CONVOLUTION NEURAL NETWORK ALGORITHM

A Convolutional Neural Network (CNN) is a type of artificial neural network (ANN)designed specifically to process and analyze visual data, such as images and videos. CNNs are inspired by the visual processing capabilities of the human brain and are highly effectivefor tasks like image classification, object detection, segmentation, and more.CNNs consist of multiple layers, each with a specific function in extracting features from theinput data. The key components of a CNN architecture include:

1. **Convolutional Layers:** These layers apply convolution operations to the input data using learnable filters or kernels. Each filter extracts specific features, such as edges, textures, or patterns, from different regions of the input. By stacking multiple convolutional layers,CNNs can learn increasingly complex and abstract features from raw pixel values.
2. **Activation Functions:** Activ ation functions introduce non-linearity into the network, allowing it to learn complex relationships between features in the data. Common activation functions used in CNNs include ReLU (Rectified Linear Unit), sigmoid, andtanh, which introduce non-linear transformations to the output of convolutional layers.
3. **Pooling Layers:** Pooling layers downsample the feature maps produced by the convolutional layers, reducing their spatial dimensions while preserving the most important features. Max pooling and average pooling are common pooling operationsused in CNNs to achieve spatial reduction and feature abstraction.
4. **Fully Connected Layers:** Fully connected layers, also known as dense layers, are traditional neural network layers where each neuron is connected to every neuron in theprevious layer. These layers are typically added at the end of the CNN architecture to perform classification or regression tasks based on the extracted features.
5. **Flattening Layer:** Flattening layers reshape the output from the convolutional and pooling layers into a one-dimensional vector, which can be fed into the fully connectedlayers for further processing.

CNNs are trained using backpropagation, where the network learns to minimize a predefined loss function by adjusting the weights of the network parameters. They are trainedon large datasets of labeled images, such as ImageNet, to learn to recognize various objects, animals, and scenes.

© 2024 IJMRSET | Volume 7, Issue 11, November 2024| DOI: 10.15680/IJMRSET.2024.0711069

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

The hierarchical architecture of CNNs, combined with their ability to automatically learn features from raw data, makes them highly effective for a wide range of computer vision tasks. They have become the backbone of many state-of-the-art applications in imagerecognition, object detection, image segmentation, medical image analysis, autonomous driving, and more.

VII. CONCLUSION AND FUTURE ENHANCEMENT

7.1 CONCLUSION

In conclusion, safeguarding PAN cards with cutting-edge detection systems based on Convolutional Neural Networks (CNN) presents a robust defense against identity theft and fraudulent activities. The integration of CNN technology enables automated and accurate identification of counterfeit or tampered PAN cards, bolstering security measures to protect individuals' personal information. Through continuous advancements in adaptive learning algorithms, real-time monitoring, blockchain integration, and collaborative threat intelligence sharing, CNN-based detection systems are poised to stay ahead of evolving security threats andensure the integrity of PAN card verification processes. Moreover, prioritizing privacy protection measures and investing in ongoing research and development are crucial formaintaining trust and confidence in the security of personal identification documents. By embracing these advancements, stakeholders can establish a resilient framework for safeguarding PAN cards, contributing to a safer and more secure digital ecosystem for all.

7.2 FUTURE ENHANCEMENT

Adaptive Learning Algorithms: Implementing adaptive learning algorithms within CNN-based detection systems could enhance their ability to adapt to new forms of fraud and evolving security threats. By continuously analyzing new data and patterns, these systems can dynamically adjust their detection mechanisms, ensuring robust protection against emerging fraud techniques.

Multi-Modal Biometric Verification: Integrating multi-modal biometric verification, such as facial recognition or fingerprint scanning, with CNN-based detection systems can addan extra layer of security to PAN card authentication processes. By combining multiple biometric modalities, the system can enhance accuracy and resilience against identity theft andfraudulent activities.

Real-Time Monitoring and Alerts: Enhancing CNN-based detection systems with real-time monitoring capabilities and automated alert mechanisms can enable immediate response to suspicious activities. By continuously monitoring PAN card transactions and activities, the system can detect anomalies in real-time and trigger alerts to relevant authorities or stakeholders, enabling proactive intervention to prevent fraud.

REFERENCES

1. Lecun, Y., Bottou, L., Bengio, Y., & Haffner, P. (1998). Gradient-based learning appliedto document recognition. Proceedings of the IEEE, 86(11), 2278-2324.
2. Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). ImageNet classification with deep convolutional neural networks. In Advances in neural information processing systems (pp. 1097-1105).
3. Simonyan, K., & Zisserman, A. (2014). Very deep convolutional networks for large- scale image recognition. arXiv preprint arXiv:1409.1556.
4. He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep residual learning for image recognition. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 770-778).
5. Redmon, J., Divvala, S., Girshick, R., & Farhadi, A. (2016). You only look once: Unified, real-time object detection. In Proceedings of the IEEE conference on computervision and pattern recognition (pp. 779-788).
6. Ren, S., He, K., Girshick, R., & Sun, J. (2017). Faster R-CNN: Towards real-time objectdetection with region proposal networks. IEEE transactions on pattern analysis and machine intelligence, 39(6), 1137-1149.
7. Goodfellow, I., Bengio, Y., Courville, A., & Bengio, Y. (2016). Deep learning (Vol. 1).MIT press Cambridge.
8. Chollet, F. (2017). Deep learning with Python. Manning Publications.
9. Brownlee, J. (2020). Deep Learning for Computer Vision: A Comprehensive Guide to Convolutional Neural Networks in Python. Machine Learning Mastery.
10. Smith, L. N. (2017). Cyclical learning rates for training neural networks. In 2017 IEEE Winter Conference on Applications of Computer Vision (WACV) (pp. 464-472). IEEE.

INNO SPACE
SJIF Scientific Journal Impact Factor

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com