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First Copy Logo Detection System

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Abstract: In this paper we present a study of logo detection in images from a media agency. We compare two most widely used methods - HOG and SIFT on a challenging dataset of images arising from a printed press and news portals. Despite common opinion that SIFT method is superior, our results show that HOG method performs significantly better on our dataset. We augment the HOG method with image resizing and rotation to improve its performance even more. We found out that by using such approach it is possible to obtain good results with increased recall and reasonably decreased precision.

1. INTRODUCTION

Logo detection in unconstrained scene images is crucial for a variety of real-world vision applications, such as brand trend prediction for commercial research and vehicle logo recognition for intelligent transportation [24, 32, 33]. It isinherently a challenging task due to the presence of varying sized logo instances in arbitrary scenes with uncontrolled illumination, multi-resolution, occlusion and background clutter (Fig. 1 (c)). Existing logo detection methods typically consider a small number of logo classes with the need for large sized training data annotated with object bounding boxes [2, 14, 15, 19, 20, 24, 31, 32, 33]. Whilst this controlled setting allows for a straightforward adoption of the state-of- the-art general c 2018. The copyright of this document resides with its authors. It may be distributed unchanged freely in print or electronic forms. arXiv:1807.01964v3 [cs.CV] 27 Sep2018 2 H. SU, X. ZHU, S. GONG: OPEN LOGO

DETECTION CHALLENGE object detection models [6, 28, 30], it is unscalable to dynamic real-world logo detection applications where more new logo classes become of interest during model deployment, with the availability of only their clean design images (Fig. 1(a)). To satisfy such incremental demands, prior methods are significantly limited by the extremely high cost needed for labelling a large set of per- class training logo images [34]. Whilst this requirement is significant for practical deployments, it is ignored in88888 existing logo detection benchmarks which consider only the unscalable fully supervised learning evaluations. This work considers the realistic and challenging open-ended logo detection challenge. To that end, we introduce a new Open Logo Detection problem, where we have

limited fine-grained object bounding box annotation in real scene images for only a small proportion of logo classes (supervised) with the remaining classes (the majority) totally unlabelled (unsupervised). As logo is a visual symbol, we have the clean logo designs for all target classes (Fig. 1(a)). The objective is to establish a logo detection model for all logo classes by exploiting the small labelled training set and logo design images in a scalable manner. One approach to open logo detection is by jointly learning logo detection and classification as YOLO9000 [28] so that the model can learn to detect logo objects from the labelled training images while learn to classify all logo design images. This method relies.

Background

Logo detection is a subtask of object detection, therefore there are many approaches and studies on this topic. This section briefly describes these studies. There are some problems that every logo detection method should deal with. There are often different versions of the same logo. This includes logos with or without text, differently colored logos or logos that were changed over time. Logos can be placed on different surfaces made of different materials, including textile, paper, computer screens, glass, and metals. These materials look differently and some of them create an additional obstacle by being reflective. Logos are often placed on a curved or another non-planar surface, for example on water bottles or cans, hats, balls or just on a curved piece of textile. Such features as a position of the logo and illumination also play a significant role in how easy or hard it is to detect a logo. Every year, brands lose a significant portion of their sales to unauthorized knock off brands and counterfeits. Moreover, since such counterfeit products are usually of an inferior quality, they also end up damaging the credibility of the brand. Many a times consumers also get cheated out of their hard-earned money as they end up shelling out an exorbitant amount of money for a mere counterfeit. This Logo Detection app aims to help consumers distinguish forgeries from the original product. Using this system, a consumer can verify whether a product is in fact an original. This application can also be helpful for brands struggling to fight against forged products.

Brief History

First phishing attack was observed on America online network systems (AOL) in the early 1990s [37] where many fraudulent users registered on AOL website with fake credit card details. AOL passed these fake accounts with a simple validity test without verifying the legitimacy of the credit card. After activation of the fake account, attackers accessed the resources of America online system. At the time of billing, AOL determined that the accounts were fraudulent, and associated credit cards were also not valid; therefore AOL ceased these accounts immediately. After this incident, AOL took measures to prevent this type of attack by verifying the authenticity of credit card and associated billing identity, which also enabled the attackers to change their way of obtaining AOL accounts. Instead of creating a fake account, attackers would steal the personal information of registered AOL user. Attackers contacted registered AOL users through instant messenger or e-mail and asked them to verify the password for security purposes. E-mail and instant messages appeared to come from an AOL employee. Many users provided their passwords and other personal information to the attackers. The attackers then used the variously billed portions of America online website on behalf of a legitimate user. Moreover, an attacker no longer restricts themselves to masquerading America online website but actively masquerade a large number of financial and electronic commerce websites. classes, and rich appearance diversity of object instances. Both assumption are invalid in our setting. Another alternative approach

is synthesising training data [37] which overlays logo designs with geometry/illumination variations into context images at random scales and locations. But, it introduces appearance inconsistency between logo instances and scene context (Fig. 3(a)), which may impede the model generalization

Literature Review

Logo Detection Traditional methods for logo detection rely on hand-crafted features and sliding window based localisation [2, 15, 19, 31, 32]. Recently, deep learning methods [11, 12, 20, 36, 37] have been proposed which use generic object detection models [6, 7, 28, 30]. However, these methods are not scalable to realistic large deployments due to the need for: (1) Accurately labelled training data per logo class; (2) Strong object- level bounding box annotations. One exception is [36, 38] where noisy web logo images are exploited without manual labelling of object instance boxes. This method exploits a huge quantity of data to mine sufficient correct logo images, and is restricted for non-popular and new brand logos which may lack web data. Moreover, all the above-mentioned methods assume the availability of real training images for ensuring model generalisation. This further reduces their scalability and usability in real-world scenarios when many logo classes have no training images from real scenes such as those newly introduced logos. In this work, we investigate this under-studied Open Logo Detection setting, where the majority of logo classes have no training data. Synthetic Data There are previous attempts to exploit synthetic data for training deep CNN models. Peng et al. [26] used 3D CAD object models to generate 2D images by varying the projections and orientations to augment the training data in few-shot learning scenarios. This method is based on the R-CNN model [7] with the proposal generation component independent from fine-tuning the classifier, making the correlation between objects and background context suboptimal. The work of [40] used synthetic data rendered from 3D models against varying background to enhance the training images of a pose model. Su et al. [37] similarly generated synthetic images by overlaying logo instances with appearance changes on random background images. Rather than randomly placing exemplar objects [26, 37, 40], Georgakis et al. [5] performed object-scene compositing based on accurate scene segmentation, similar as [10] for text localisation. These existing works mostly aim to generate images with varying object appearance. In contrast, we consider the consistency between objects and the surrounding context for generating appearance coherent synthetic images. Conceptually, our method is complementary to the aforementioned approaches when applied concurrent

Dataset

Our study was conducted for a local news agency that was interested in automatically analyzing big amounts of images from real life, web and printed sources. Therefore we created our dataset from the images obtained from the agency's database. We selected 10 different company's logos and picked out images that contained one of these logos. The dataset consists of 706 images. 392 of them are used for training (when HOG method is applied) and 314 are used for evaluating the results. Widths and heights of the images range from few hundreds to 3000 pixels. Examples of the images with each logo are presented in Fig. 1. The number of images with each logo is shown in Table I.

Table I :Numbers of images with each logoin the dataset

LOGO	Number of images
airBaltic	93

Audi	87
BMW	77
Mercedes	89
Nike	46
OlyBet	32
RedBull	74
Samsung	78
Tele2	35
Volkswagen	85
TOTAL	706

2. Methodology

Counterfeit products usually have an inferior built quality and along with stealing sales, they also damaging a brand's reputation in the long run.

- Along with harming a brand's sales and reputation, unaware consumers also get cheated out of their money.
- This Logo Detection project aims to help users identify forgeries by analysing the logo on the product.
- Along with helping users identify the logo, this app also helps brands combat logo piracy.

- This project is developed using the Django framework with Python as programming language.
- The waterfall model is a classical model used in system development life cycle to create a system with a linear and sequential approach. It is termed as waterfall because the model develops systematically from one phase to another in downward fashion. The waterfall approach does

4 not define the process to go back to the previousphase to handle changes in requirement. The waterfall approach is the earliest approach that was used for software development

Modules and their Description

The system is comprised of 1 entity and its modules:

- User

➢ **Upload Image**

► The user can click and upload images in .jpg or .png format of the logo they want to detect.

➢ **Logo Detection**

► Once the logo is uploaded, the system will analyze the image based on parameters such as dimensions, color, text, etc.

► After examining these parameters, the system generates a confidence score.

► A confidence score of less than 90% means that the logo is fake.

Existing System & Proposed System

❖ **Problem with current scenario**

In the recent years, the retail market has been flooded with forgeries and counterfeits that are almost undistinguishable from the original product.
Even experts have a tough time distinguishing counterfeit goods from the original.

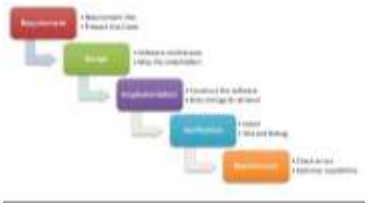
❖ **Drawbacks of the existing system**

- Customer gets cheated out of their money.
- Brand loses their sales to counterfeit goods.
- Inferior quality counterfeits damage a brand's image.

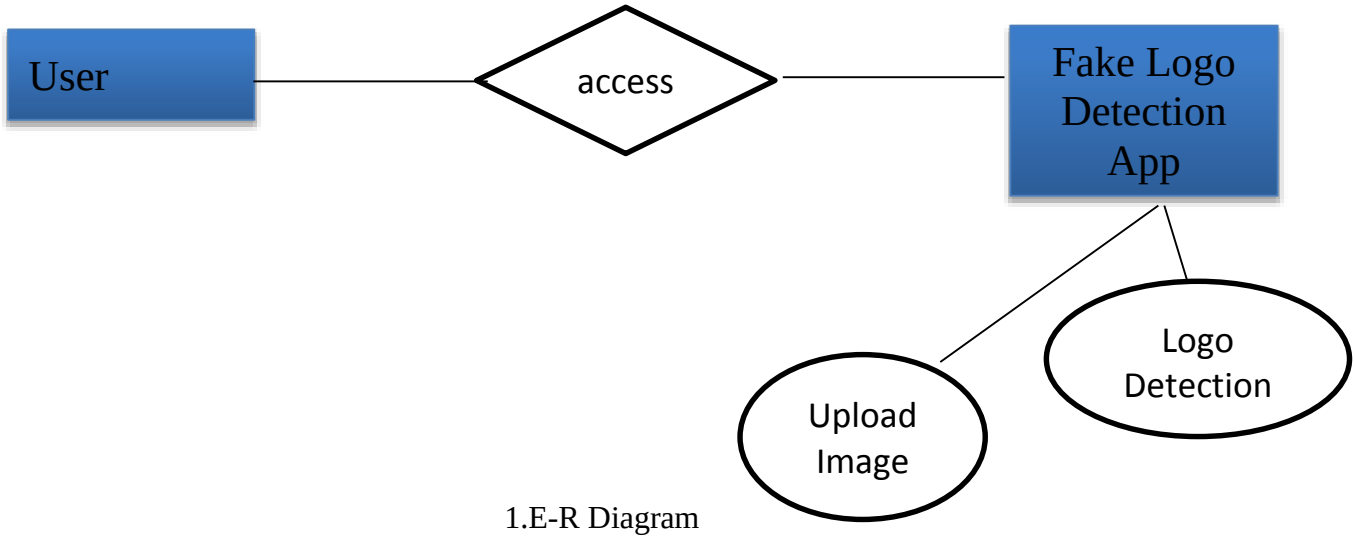
Proposed System

- Considering the anomalies in the existing system computerization of the whole activity is being suggested after initial analysis.
- This web application is developed using Python as programming language.
- Proposed system is accessed by one entity namely, the User.
- Admin need to login with their valid login credentials first in order to access the web application.
- After successful login, admin can access all the modules and perform/manage each task accurately.

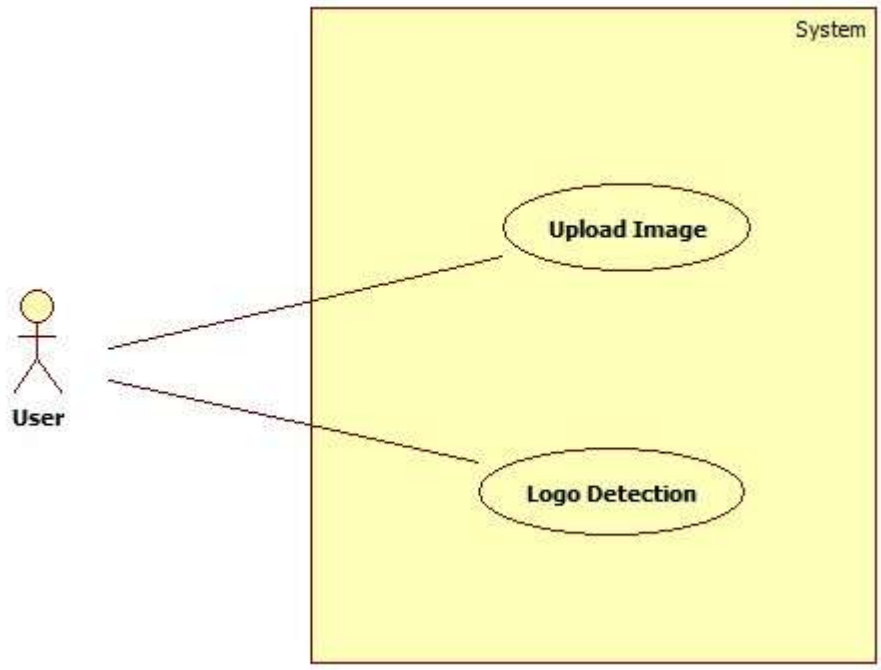
Project Lifecycle Details
Waterfall Model



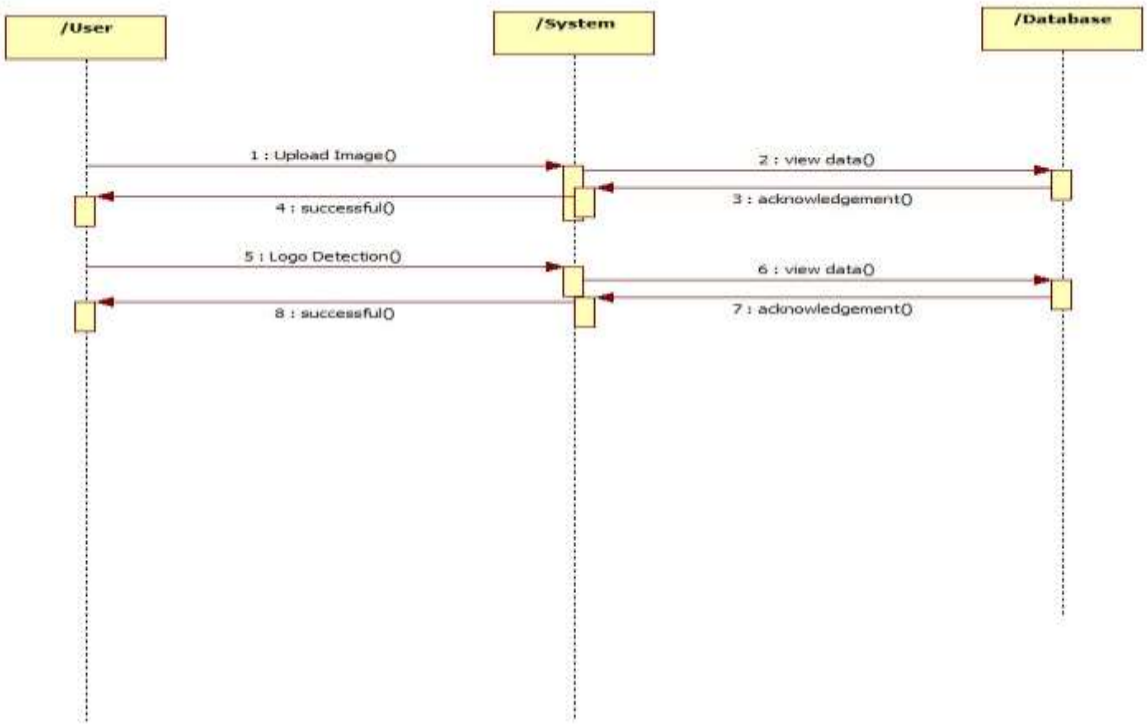
Project Design



1.E-R Diagram

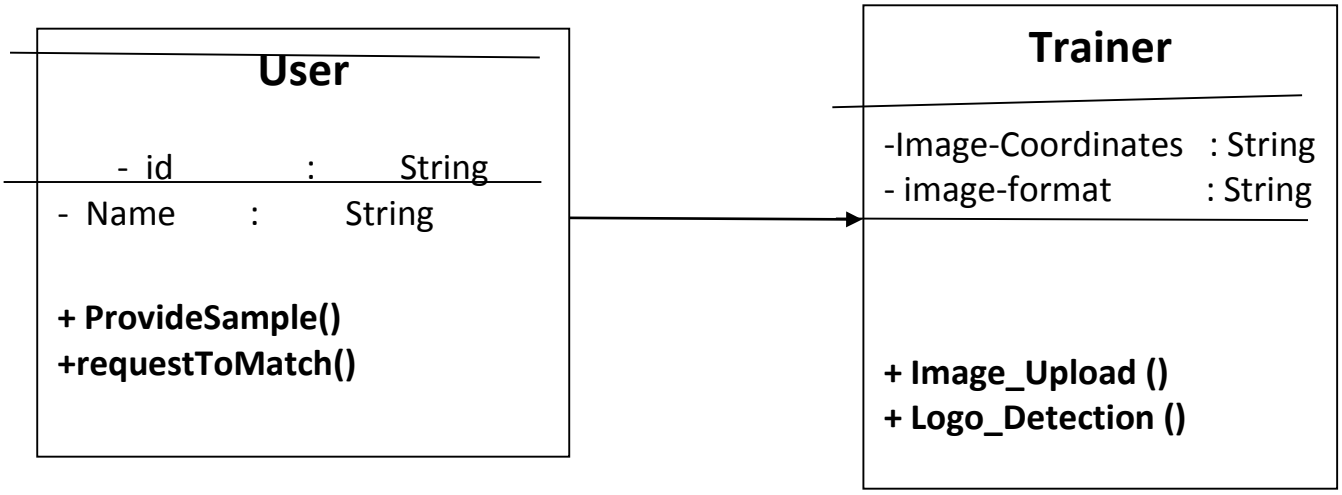


2. Use Case Diagram



3. Sequence Diagram

4.Activity Diagram



5.Class Diagram

Project Implementation

Project Implementation Technology

The Project is developed using WAMP Server & Notepad++. We used that software's for Design and coding of project. Created and maintained all databases into My SQL 5.6, in that we create tables, write query for store data or record of project.

❖ **Hardware Requirement:**

- i3 Processor Based Computer or higher
- Memory: 1 GB
- Hard Drive: 50 GB
- Monitor
- Internet Connection

❖ **Software Requirement:**

- Windows 7 or higher
- WAMP Server
- Notepad++
- My SQL 5.6
- Google Chrome Browser

Sections

This was our project of System Design about Logo Detection developed in Python programming language. The Development of this system takes a lot of efforts from us. We think this system gave a lot of satisfaction to all of us. Though every task is never said to be perfect in this development field even more improvement may be possible in this application. We learned so many things and gained a lot of knowledge about development field. We hope this will prove fruitful

REFERENCES

[1] Chinmoy Biswas, Joydeep Mukherjee, "Logo Recognition Technique using Sift Descriptor, Surf Descriptor and Hog Descriptor", International Journal of Computer Applications (0975 – 8887)
[2] Volume 117 – No. 22, May 2015
[3] Stefan Romberg, Lluis Garcia Pueyo, Rainer Lienhart, Roelof van Zwol, "Scalable Logo Recognition in Real-World Images", In Proceedings of the 1st ACM International Conference on Multimedia Retrieval, p. 25. ACM, 2011.
[4] Psyllos, Apostolos P., Christos-Nikolaos E. Anagnostopoulos, and Eleftherios Kayafas. "Vehicle logo recognition using a sift-based enhanced matching scheme." IEEE transactions on intelligent transportation systems 11, no. 2 (2010): 322-328.
[5] Romberg, Stefan, and Rainer Lienhart. "Bundle min-hashing for logo recognition." In Proceedings of the 3rd ACM conference on in association with International Journal on Emerging Trends in Technology (IJETT) ISSN: 2455 - 0124 (ONLINE)
[6] Kalantidis, Yannis, Lluis Garcia Pueyo, Michele Trevisiol, Roelof van Zwol, and Yannis Avrithis. "Scalable triangulation-based logo recognition." In Proceedings of the 1st ACM International Conference on Multimedia Retrieval, p. 20. ACM, 2011.
[7] Kleban, Jim, Xing Xie, and Wei-Ying Ma. "Spatial pyramid mining for logo detection

in natural scenes." In Multimedia and Expo, 2008 IEEE International Conference on, pp. 1077-1080. IEEE, 2008.

[8] Liu, Fank, and Yanlin Chen. "Fast and robust storefront logo recognition in shopping centers." ICME, 2015.

[9] Zyga, Kathleen, Richard Price, and Brenton Williams. "A generalized regression neural network for logo recognition." In Knowledge-Based Intelligent Engineering Systems and Allied Technologies, 2000. Proceedings. Fourth International Conference on, vol. 2, pp. 475-

[10] 478. IEEE, 2000.

[11] Cesarini, Francesca, Enrico Francesconi, Marco Gori, Simone Marinai, J. Q. Sheng, and Giovanni Soda. "A neural-based architecture for spot-noisy logo recognition." In Document Analysis and Recognition, 1997., Proceedings of the Fourth International Conference on, vol. 1, pp. 175-179. IEEE, 1997.

[12] Francesconi, Enrico, Paolo Frasconi, Marco Gori,Simone Marinai, J.

[13] Q. Sheng, Giovanni Soda, and Alessandro Sperduti. "Logo recognition by recursive neural networks." In International Workshop on Graphics Recognition, pp. 104-117. Springer, Berlin, Heidelberg, 1997.

[14] Duffner, Stefan, and Christophe Garcia. "A neural scheme for robust detection of transparent logos in TV programs." Artificial Neural Networks–ICANN 2006 (2006): 14-23.

[15] Tafazzoli, Faezeh, and Hichem Frigui. "Vehicle make and model recognition using local features and logo detection." In Signal, Image, Video and Communications (ISIVC), International Symposium on, pp. 353-358. IEEE, 2016.

[16] Iandola, Forrest N., Anting Shen, Peter Gao, and Kurt Keutzer. "DeepLogo: Hitting logo recognition with the deep neural network hammer." arXiv preprint arXiv:1510.02131 (2015).

[17] Bianco, Simone, Marco Buzzelli, Davide Mazzini, and Raimondo Schettini. "Deep learning for logo recognition." Neurocomputing 245 (2017): 23-30.

[18] Lowe, David G. "Object recognition from local scale-invariant features." In Computer vision, 1999. The proceedings of the seventh IEEE international conference on, vol. 2, pp. 1150-1157. Ieee, 1999.

[19] Dalal, Navneet, and Bill Triggs. "Histograms of oriented gradients for human detection." In Computer Vision and Pattern Recognition, 2005. CVPR 2005. IEEE Computer Society Conference on, vol. 1, pp. 886-893. IEEE, 2005

[20] Tan, J.; Goyal, S.B.; Singh Rajawat, A.; Jan, T.; Azizi, N.; Prasad, M. Anti-Counterfeiting and Traceability Consensus Algorithm Based on Weightage to Contributors in a Food Supply Chain of Industry 4.0. Sustainability 2023, 15, 7855. https://doi.org/10.3390/su15107855

[21] Rajawat, A.S. et al. (2023). Real-Time Driver Sleepiness Detection and Classification Using Fusion Deep Learning Algorithm. In: Singh, Y., Singh, P.K., Kolekar, M.H., Kar, A.K., Gonçalves, P.J.S. (eds) Proceedings of International Conference on Recent Innovations in Computing. Lecture Notes in Electrical Engineering, vol 1001. Springer, Singapore. https://doi.org/10.1007/978-981-19-9876-8_34.

[22] Rajawat, A.S.; Goyal, S.B.; Bedi, P.; Verma, C.; Ionete, E.I.; Raboaca, M.S. 5G-Enabled Cyber-Physical Systems for Smart Transportation Using Blockchain Technology. Mathematics 2023, 11, 679. https://doi.org/10.3390/math11030679

[23] Rajawat, A.S.; Goyal, S.B.; Chauhan, C.; Bedi, P.; Prasad, M.; Jan, T. Cognitive Adaptive Systems for Industrial Internet of Things Using Reinforcement Algorithm.

Electronics 2023, 12, 217. https://doi.org/10.3390/electronics12010217.
[24] Nagaraj, S.; Kathole, A.B.; Arya, L.; Tyagi, N.; Goyal, S.B.; Rajawat, A.S.; Raboaca, M.S.; Mihaltan, T.C.; Verma, C.; Suciu, G. Improved Secure Encryption with Energy Optimization Using Random Permutation Pseudo Algorithm Based on Internet of Thing in Wireless Sensor Networks. Energies 2023, 16, 8. https://doi.org/10.3390/en16010008.
[25] R. S. Chouhan et al., "Experimental Analysis for Position Estimation using Trilateration and RSSI in Industry 4.0," 2022 11th International Conference on System Modeling & Advancement in Research Trends (SMART), Moradabad, India, 2022, pp. 904-908, doi: 10.1109/SMART55829.2022.10047276.
[26] Rajawat, A.S. et al. (2023). Real-Time Driver Sleepiness Detection and Classification Using Fusion Deep Learning Algorithm. In: Singh, Y., Singh, P.K., Kolekar, M.H., Kar, A.K., Gonçalves, P.J.S. (eds) Proceedings of International Conference on Recent Innovations in Computing. Lecture Notes in Electrical Engineering, vol 1001. Springer, Singapore. https://doi.org/10.1007/978-981-19-9876-8_34
[27] A. S. Rajawat, S. B. Goyal, P. Bedi, N. B. Constantin, M. S. Raboaca and C. Verma, "Cyber-Physical System for Industrial Automation Using Quantum Deep Learning," 2022 11th International Conference on System Modeling & Advancement in Research Trends (SMART), Moradabad, India, 2022, pp. 897-903, doi: 10.1109/SMART55829.2022.10047730.
[28] A. S. Rajawat et al., "Security Analysis for Threats to Patient Data in the Medical Internet of Things," 2022 11th International Conference on System Modeling & Advancement in Research Trends (SMART), Moradabad, India, 2022, pp. 248-253, doi: 10.1109/SMART55829.2022.10047322.
[29] P. Pant et al., "Using Machine Learning for Industry 5.0 Efficiency Prediction Based on Security and Proposing Models to Enhance Efficiency," 2022 11th International Conference on System Modeling & Advancement in Research Trends (SMART), Moradabad, India, 2022, pp. 909-914, doi: 10.1109/SMART55829.2022.10047387.
[30] P. Pant et al., "AI based Technologies for International Space Station and Space Data," 2022 11th International Conference on System Modeling & Advancement in Research Trends (SMART), Moradabad, India, 2022, pp. 19-25, doi: 10.1109/SMART55829.2022.10046956
[31] Rajawat, A.S.; Goyal, S.B.; Bedi, P.; Simoff, S.; Jan, T.; Prasad, M. Smart Scalable ML-Blockchain Framework for Large-Scale Clinical Information Sharing. Appl. Sci. 2022, 12, 10795. https://doi.org/10.3390/app122110795.
[32] A. S. Rajawat et al., "Visual Cryptography and Blockchain for Protecting Against Phishing Attacks on Electronic Voting Systems," 2022 International Conference and Exposition on Electrical And Power Engineering (EPE), Iasi, Romania, 2022, pp. 663-666, doi: 10.1109/EPE56121.2022.9959765.
[33] A. S. Rajawat et al., "Electrical Fault Detection for Industry 4.0 using Fusion deep Learning Algorithm," 2022 International Conference and Exposition on Electrical And Power Engineering (EPE), Iasi, Romania, 2022, pp. 658-662, doi: 10.1109/EPE56121.2022.9959762.
[34] Rajawat, Anand Singh and Chauhan, Chetan and Goyal, S B and Bhaladhare, Pawan R and Rout, Dillip and Gaidhani, Abhay R, Utilization Of Renewable Energy For Industrial Applications Using Quantum Computing (August 11, 2022). Available at SSRN: https://ssrn.com/abstract=4187814 or http://dx.doi.org/10.2139/ssrn.4187814
[35] Anand Singh Rajawat, Pradeep Bedi, S. B. Goyal, Sandeep Kautish, Zhang Xihua,

Hanan Aljuaid, Ali Wagdy Mohamed, "Dark Web Data Classification Using Neural Network", Computational Intelligence and Neuroscience, vol. 2022, Article ID 8393318, 11 pages, 2022. https://doi.org/10.1155/2022/8393318.

[36] Piyush Pant, Anand Singh Rajawat, S.B. Goyal, Pradeep Bedi, Chaman Verma, Maria Simona Raboaca, Florentina Magda Enescu, Authentication and Authorization in Modern Web Apps for Data Security Using Nodejs and Role of Dark Web, Procedia Computer Science, Volume 215, 2022, Pages 781-790, ISSN 1877-0509, https://doi.org/10.1016/j.procs.2022.12.080.

[37] Robin Singh Chouhan, Anand Singh Rajawat, SB Goyal, Pradeep Bedi , AI-Enabled Augmented Reality-Based Shared Collaborative Experience, Book AI-Enabled Multiple-Criteria Decision-Making Approaches for Healthcare Management Pages 85-96 Publisher IGI Global.

[38] Anand Singh Rajawat, Pradeep Bedi, S. B. Goyal, Piyush Kumar Shukla, Atef Zaguia, Aakriti Jain, Mohammad Monirujjaman Khan, "Reformist Framework for Improving Human Security for Mobile Robots in Industry 4.0", Mobile Information Systems, vol. 2021, Article ID 4744220, 10 pages, 2021. https://doi.org/10.1155/2021/4744220