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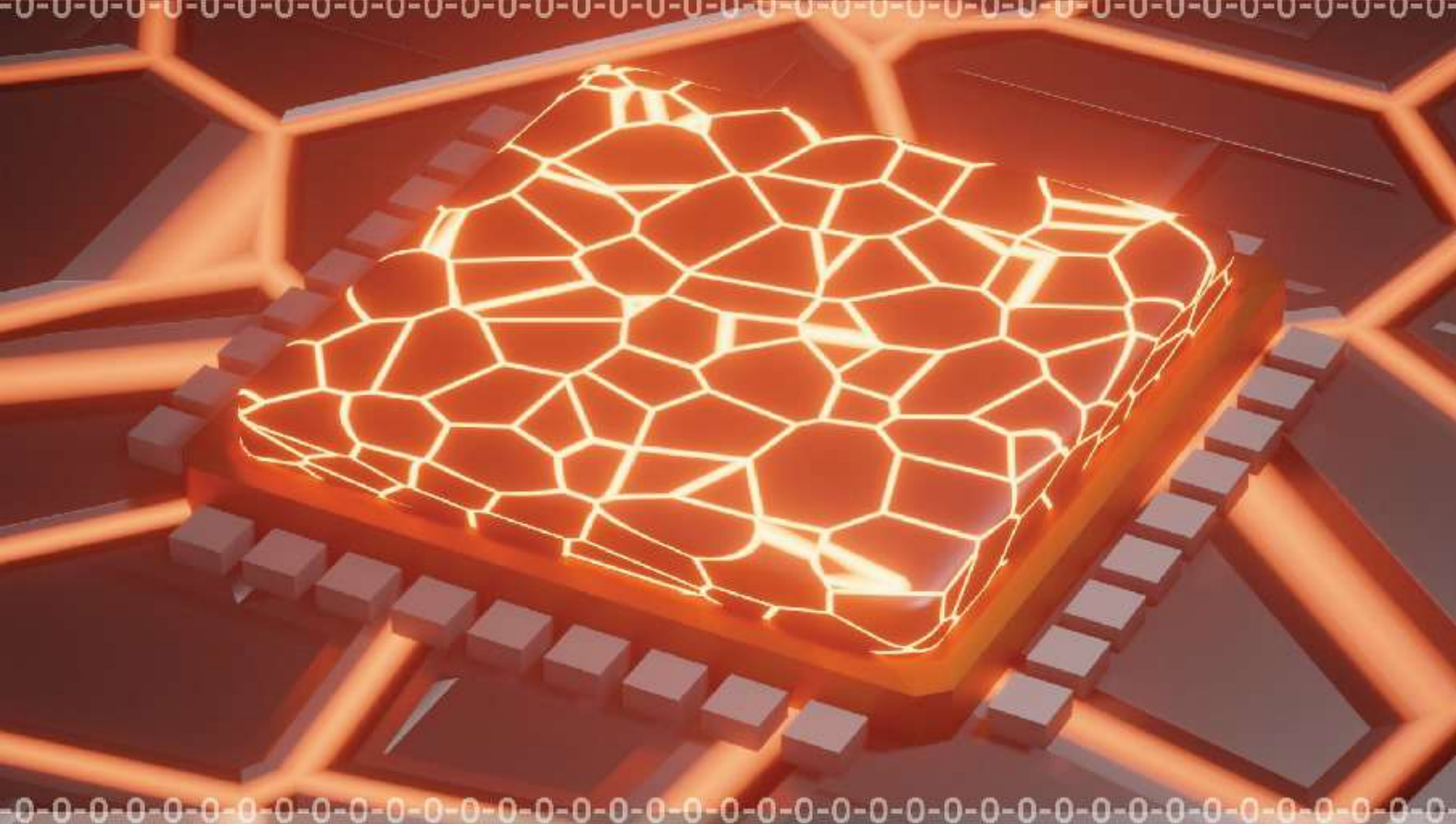

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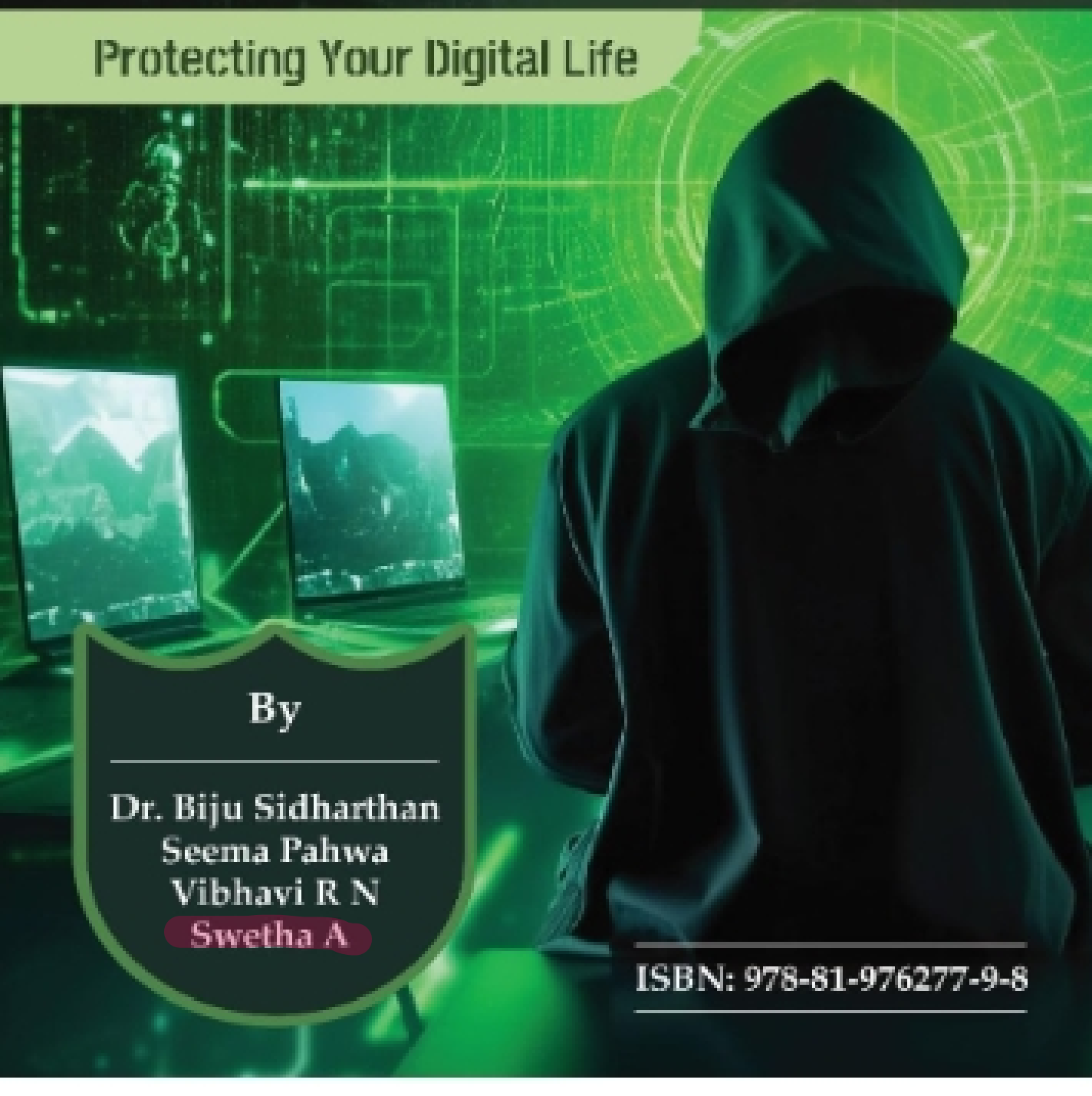

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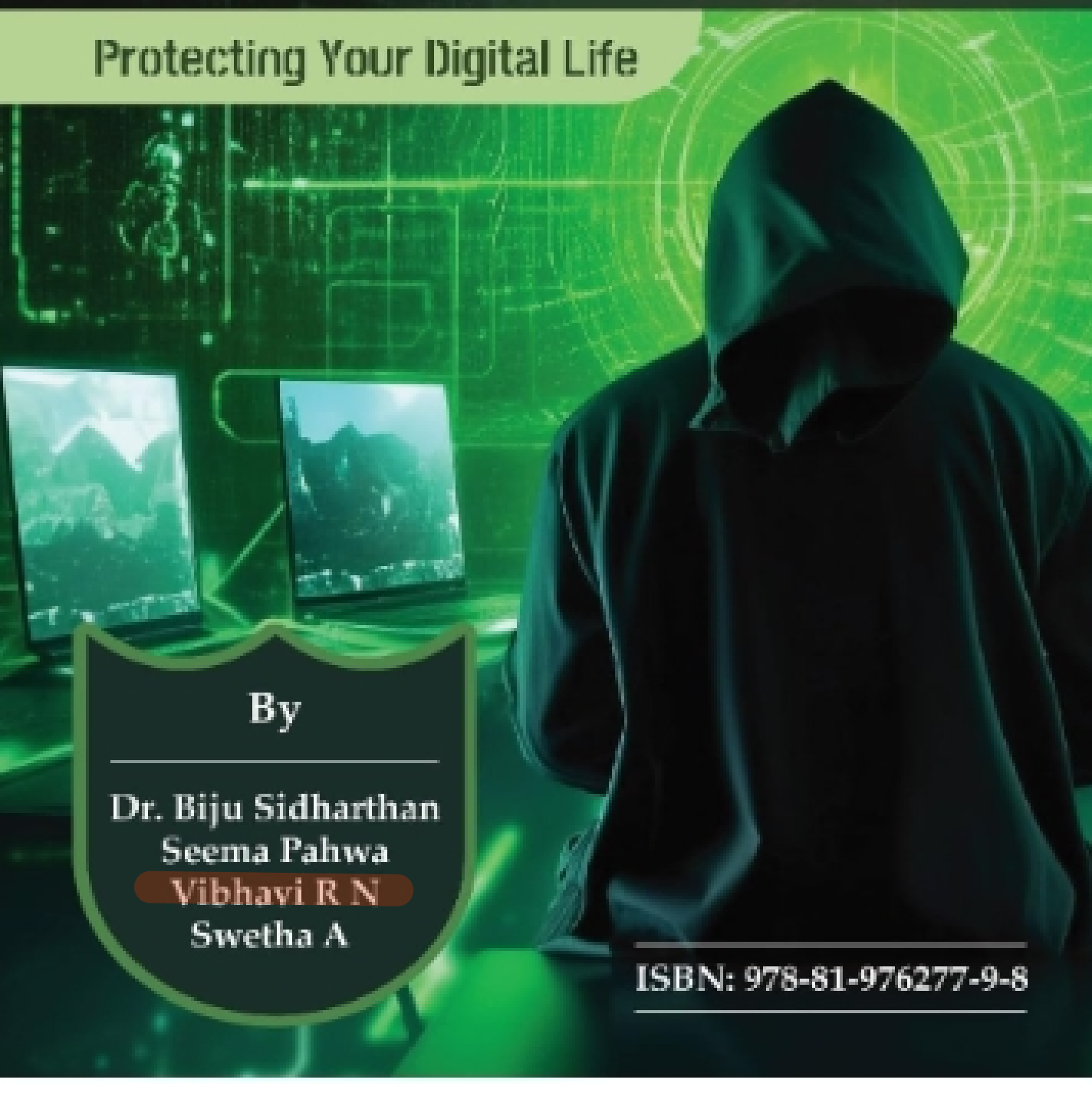

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A Survey on Security of Cyber Physical Systems(CPS) : Industrial Internet of Things Networks

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***Abstract*— Modern industries adapted Internet of Things (IoT) devices as a integral part in the organization for the smooth functioning of industries. However, adaption of IoT devices introduces various challenges with respect to integration, data collection and data security. Industries control the activity of different processes through the devices which involve in data exchange and data sharing. However, security is the most concern as the devices incorporated would not be trusted and there will be number of threats would be introduced by the devices. Presence of malicious devices introduces different attacks on the data and operation of the industry which would degrade the performance of the entire system. This article presents the detailed survey on the cyber physical systems (CPS) security in Industrial IoT networks. There are number of security measures and protocols prescribed by researchers for the security of CPS. They enforce security in terms of key exchange, data encryption and blockchain models for the security enhancement of CPS in IIoT. Also, data analysis techniques, deep learning models and machine learning models are greatly incorporated for the concern problem. A detailed review and analysis of various methods are presented in this article. Finally, a comparative study is presented in detail.**

Keywords*— *IIoT, Cyber Threat, CPS, Machine Learning, Deep Learning, Optimization, Intrusion Detection

I. INTRODUCTION

The growing information and communication technology has great influence in various industries from medical, manufacturing, healthcare, IT industries and so on. The recent advancement in communication technology enables the adaption of IIoT (Industrial Internet of Things) in many levels to enable access and control various operations to be performed remotely. For example, the influence of Covid-19 leverages the employees of various organizations to work remotely from their home where the industries provide access for their users to access various resources through different devices. However, the security is the most concern in any industry which must be ensured to safeguard the resource and process of the industry.

Like any organization, the industries have great threat from cyber-attacks which increases the requirement of monitoring, controlling the access and functionality of the resources. Cyber physical systems (CPS) are embedded system or device which is intended to perform different communication towards monitor and controlling the devices. Security is the most concern of the industries which can be enforced by monitoring the trust of the devices through which the users access the resources. Any resource in the organization would be accessed through different devices, machines and so on. However, restricting the malformed access is the major concern in providing data security [21]. This research is focused on enforcing rigid CPS model for the industries which would support the QoS maximization of the organizational process.

A CPS in Industry 5.0 is defined as a collection of mechanical components, sensors, and IT systems. In terms of manufacturing sector, there will be another component machine operator. The CPS sense real data of physical system and control it. For example, the temperature monitor on any industry would sense the temperature and would control the working of any machine accordingly. It comes with the temperature sensor and other devices. Similarly, any industry would contain a CPS which would be intended to control other devices and process [17].

A major challenge in the IIoT is cyber physical security, because devices are outside the environment and must be trusted before accessing data. Industrial consumers access external resources and data, but cyber-attacks like Distributed Denial of Service (DDoS), intrusion or Sybil should be treated cautiously for better performance [53]. To handle the cyber threats in IIoT environment, there are number of approaches is described in literature. Some of the methods use access restriction schemes and some others use authentication/authorization schemes, where some other uses cryptographic methods [2].

On the other side, blockchain based approaches are used in several occasion which maintains the data in blocks which are shared among trusted parties and users and can be accessed based on the access restriction. In this case, the data can be accessed only when the user has the concern key for the block which has been shared in a proactive way. Similarly, the access restriction is enforced to secure the data as well as communication in several occasion. The user access is enforced based on profile of the user where there are methods which enforce access restriction in data level, feature level or attribute level. In all the cases, the access restriction in IIoT environment is enforced for the growth of industries. All these constraints and the methods around them are analyzed in detail in next section.

II. LITERATURE SURVEY

Number of secure transmission and access restriction models is described in literature. Such methods are analyzed in detail in this part.

2.1 Blockchain Based Approaches:

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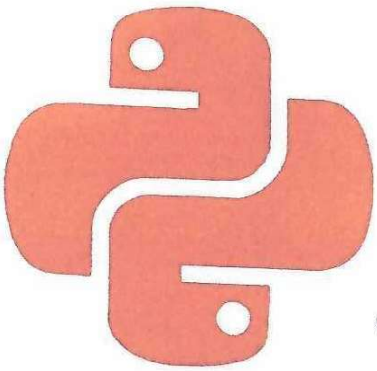

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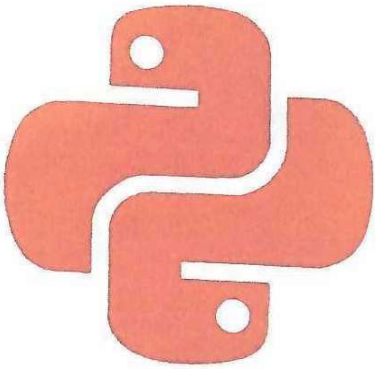

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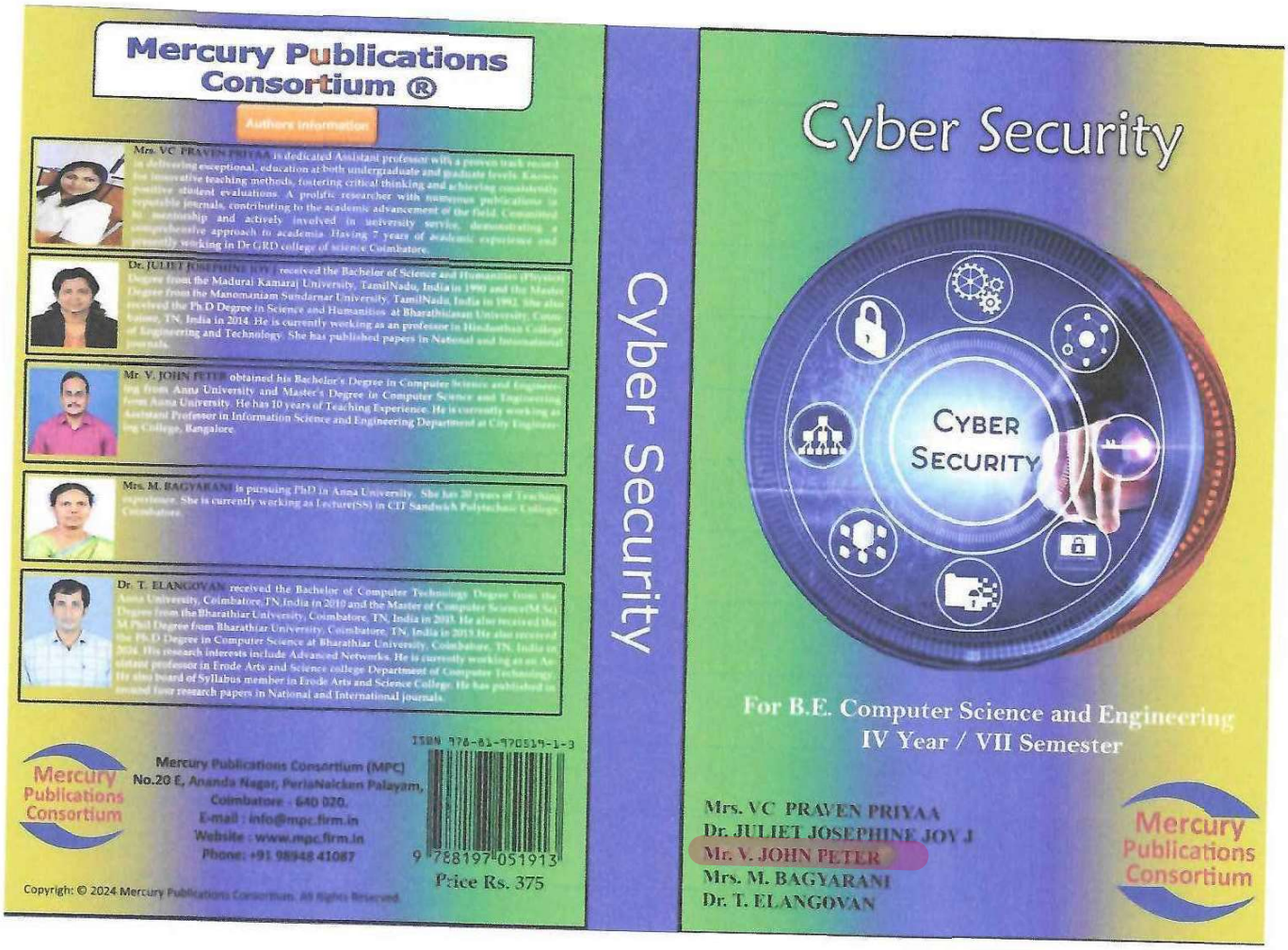
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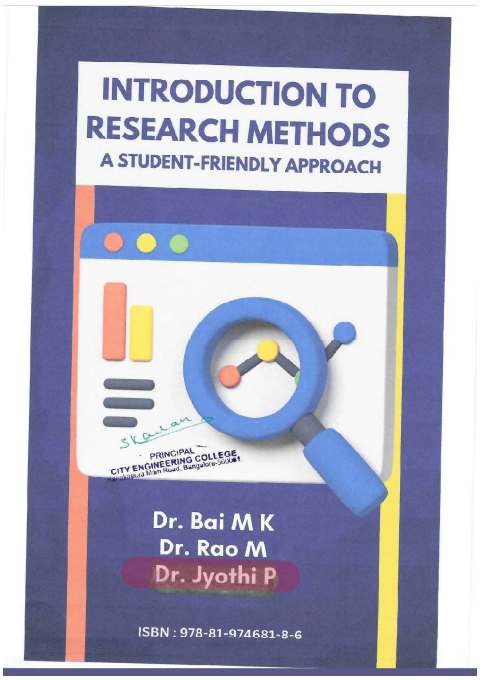

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Chapter

Malicious data detection in IoT using deep learning approach

By Srinivas Kolli, Aravindan Srinivasan, R. Manikandan, Shalini Prasad, Ashok Kumar, S. Ramesh

Book Artificial Intelligence, Blockchain, Computing and Security Volume 1

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ABSTRACT

This article compares the efficacy of various DL intrusion detection techniques and identifies the optimal DL methodology for ID in the IoT. In this study, the DL techniques employed were artificial neural networks (ANN), long short-term memory (LSTM), and gated recurrent units (GRUs). The suggested model is assessed using a common dataset for IoT intrusion detection. Next, the experimental findings are scrutinized and contrasted with existing IoT techniques for intrusion detection. When compared to the previously used approaches, the suggested technique appeared to have the highest accuracy (99.9%).

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EXPLOITING THE PHOTO STABLE PROPERTIES OF COUMARIN DERIVATIVE FOR THE DETECTION OF METAL IONS IN SOLUTIONS

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Department of Physics, Bangalore Institute of Technology, Bangalore

RAJU P
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ABSTRACT

Metal ions are essential in many biochemical and physiological functions if they are in low concentrations and become dangerous when certain limit is exceeded. Their detection even at low concentration is very much required. This research article register the detection of Cu++ using a coumarin derivative 3-(Bromoacetyl) coumarin by spectroscopic methods. Metal ions are capable of decreasing the absorbance (OD) and emission intensity of the coumarin derivative dissolved in methanol. The sample concentration is maintained at 10-5M. The addition of Cu++ decreases OD by nearly 72% . The absorption peak is located at 270nm and remains undisturbed with the addition of metal ion and increase in the concentration of metal ion. This indicates that the ground state is not affected. Emission spectra are recorded by exciting the sample at a wavelength 272nm. When metal ion concentration is increased a gradual decrease in the emission intensity from 1025 to 487 (about 53% decrease) is observed. This is a clear indication of successful quenching effective binding between the host (coumarin) and the guest (metal ion) with no modifications in the excited state properties.

The experimental data is handled using Benesi-Hildebrand plots which are found to be linear. Binding constant is evaluated by taking the ratio of intercept and slope. The higher value of binding constant represents the formation of stable complex between metal ion and studied compound. The studied coumarin derivative has greater affinity towards metal ions. It can play a vital role in the designing of metal ion sensor

***KEYWORDS** : Metal ions, Coumarin, Binding constant*

INTRODUCTION

Biologically effective fluorescent organic molecules such as derivatives of coumarins, boronic acids, imdazoles, thiophenes etc. play important roles in the design metal ion sensors. They are also used to study binding interactions of biomolecules namely proteins, lipids and carbohydrates.

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In digital images, the digital device usage and availability of open source for image editing applications are easily manipulating the digital images. The Copy Move Forgery (CMF) is an extensive technique for duplicate or hide particular image portion without leaving visual signs. Therefore, it is complex to detect the CMF and the forensic experts are rely on efficient technique for CMF detection. The Multi Plane Convolutional Neural Network (MP-CNN) is proposed in this research for detecting CMF in images. The MICC-F220, MICC-F2000 and CASIA 2.0 datasets are used which is publicly available Kaggle dataset. This dataset is preprocessed by image denoising which reduces the noise from input image. Then, the pre-processed images are provided to MP-CNN for detecting the CMF. The metrics such as precision, accuracy, f1score and recall are applied for estimating the MP-CNN performance. The MP-CNN attains accuracy of 99.45%, 99.26% and 98.61% for MICC-F220, MICC-F2000 and CASIA 2.0 datasets when compared to existing techniques like CNN, Masked Region CNN (M-RCNN) and Contrast Limited Adaptive Histogram Equalization with CNN (CLAHE+CNN).

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In today's world, the images and videos are enormously significant which are essential for various fields like social media, intelligence, newspaper and military operations [1]. The Copy Move Forgery (CMF) is an image manipulation technique which utilized data from same image for manipulating with mandatory content [2]. In CMF, the one part of image is copied and pasted at particular region in the same image for hiding duplicate areas. It makes duplicate areas that affects image statistical properties and these differences are discovered for forgery detection [3, 4]. The tampered regions are recognized through exposing designated tampered image to translate, rotate, add some noise and illumination change which creates complex to recognize [5]. The image authentication technique is classified into passive and active in that digital signatures and watermarking is a primary class and CMF is a secondary class [6]. The digital crime is enhanced day by day along with innovative technologies and applications. The Deep Learning (DL) based techniques are utilized for CMF detection particularly, the CNN is used which provides better performance in detection and finds CMF regions [7]. Contribution of the paper is given bellow: 1.

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The Multi Plane CNN (MP-CNN) is used in this research for detecting CMF in images which evades overfitting issues.

2.
The MICC-F220, MICC-F2000 and CASIA 2.0 datasets are used which is publicly available Kaggle dataset. This dataset is preprocessed by image denoising which reduces the noise from input image.

3.
The metrics such as precision, accuracy, f1score and recall are applied for estimating the MP-CNN performance in CMF detection.

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Abstract:
The ransomware exploits the system data and takes off the significant information of the user without any intimation. Moreover, the ransomware furtively directs that information to the servers which are organized by the attackers. In recent years, many researchers and scientists discovered anti-malware products to identify known malware. But these methods are not robust to detect complicated and packed malware. To overcome these problems, the Sine Cosine Reptile Search Algorithm with Grid Search Support Vector Machine (SCRSA-GSSVM) is proposed for ransomware detection and classification. The Drebin dataset is employed in this paper and min-max standardization is utilized aimed at preprocessing. The SCRSA is utilized for feature selection and GSSVM is utilized for classification. The SVM is tuned by GS which reduces the noise and false positives to enhance the model performance. Performance of SCRSA-GSSVM is assessed with presentation measure of accuracy, precision, recall and f1-score. The SCRSA-GSSVM attains 99.85% accuracy, 99.83% precision, 99.83% recall and 99.78% f1-score which is better when compared to Random Forest (RF) and Artificial Neural Network (ANN).

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The Deep Learning (DL) involves the inter-connection of various devices and can be described as a network of physical objects connected with limited communication capabilities, enabling the exchange, analysis, and collection of data [1]. While these techniques prove effective in dealing with attacks, they involved short when confronted with new or unknown threats [2]. Additionally, the need for manual updates to signature databases limits the effectiveness of signature-based detection systems [3]. To evaluate malware detection, malicious software developers using minimum changes on actual source code in advance to produce innovative malicious software variants [4]. However, in units requiring robust protection, this approach is no longer adequate due to personalization settings and increased latency for new types of network security measures [5]. Although, detailed data of ransomware original behavior is unavailable in image-based malware detection [6]. The existing ransomware detection technique like rules based to access the heuristics based and deep learning based to analysis the static and dynamic [7]. The main contribution of the research is given below:

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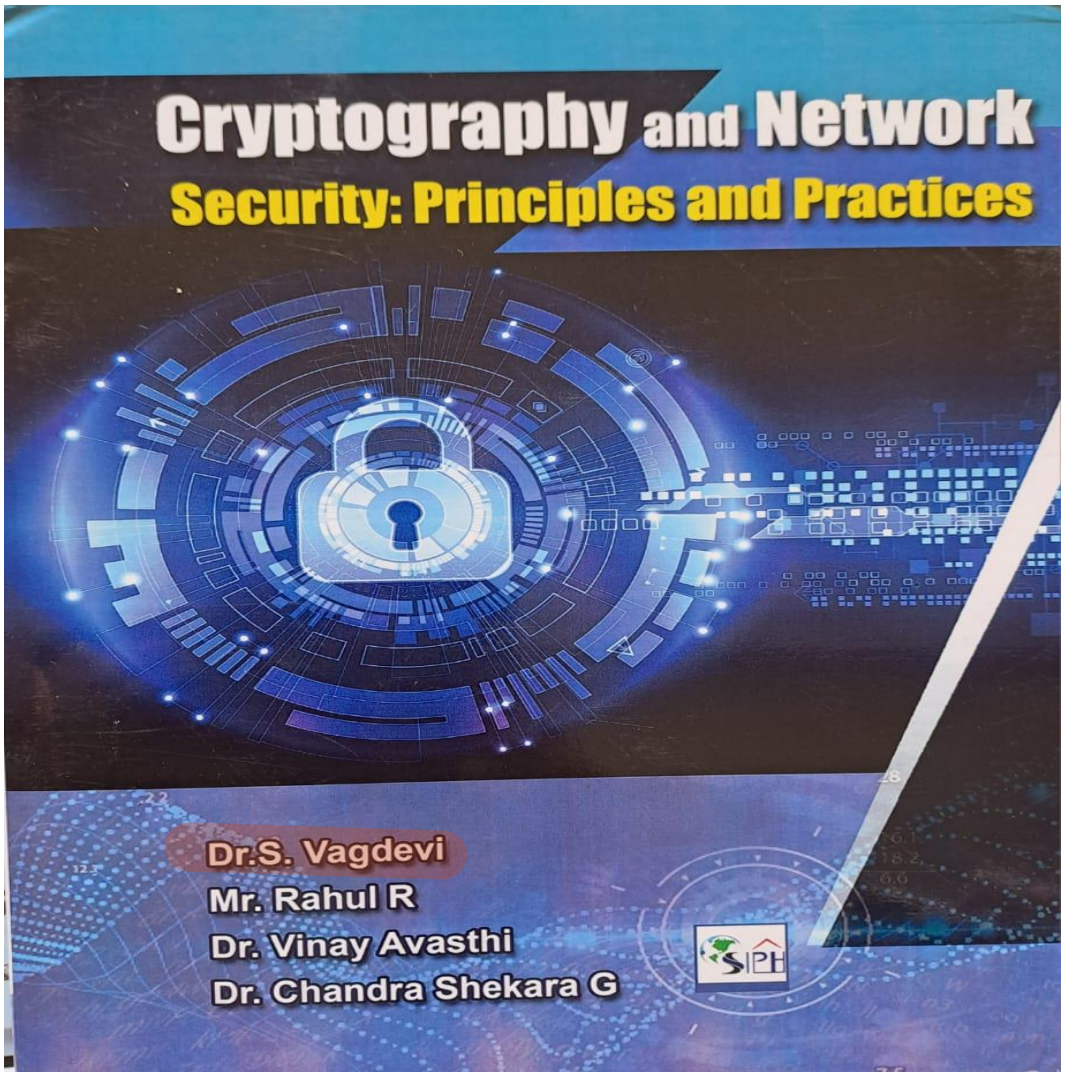

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Mr. S.R. Sridhar
(Organizing Secretary)

Dr. G. Kavitha
(Convener)

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Assistant Professor

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