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Determinants of the sustainability of microfinance institutions

Delineating the role of digitization of micro finance services

By

Amar Nath Das (</search?contributorName=Amar Nath Das&contributorRole=author&redirectFromPDP=true&context=ubx>)  (<https://orcid.org/0000-0001-7168-118X>)

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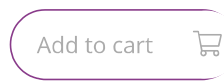
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In the present knowledge economy, intellectual capital (IC) is regarded as one of the significant determinants of efficiency, profitability, and ultimately value of a firm. This chapter empirically investigates the ramifications of the IC on the level of efficiency of the firm. In addition, exploration of the changing dynamics in the relationship between IC and firm level efficiency in the face of global economic crisis is of special interest of this chapter. In attaining the objectives of the study, a comprehensive database of 299 manufacturing firms (chosen randomly from a stratification of six BSE manufacturing industry subsectors) were utilized during the period from 1999–2000 to 2013–2014. Firm level efficiency scores and implications of IC (as measured by employing Pulic's Value Added Intellectual Capital Model) on the level of efficiency of the firms were examined simultaneously using Stochastic Frontier Analysis. Empirical results revealed that

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Size, age, and leverage were also found to be significant determinants of efficiency during the period of study. However, the impact of IC was not robust in changing the synergy between efficiency and IC. Size, age, and leverage were also

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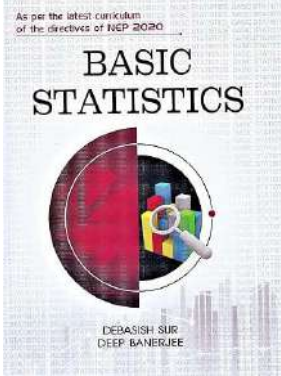
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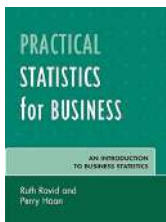
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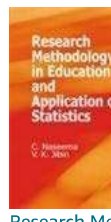
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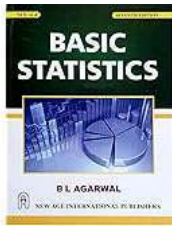


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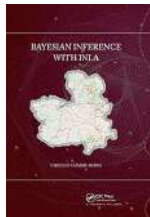
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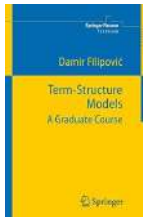


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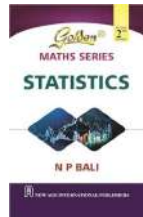


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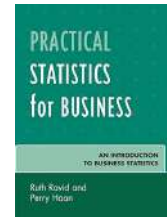


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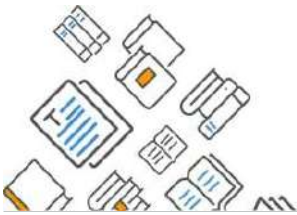
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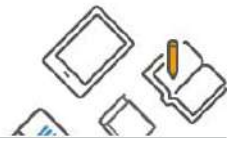


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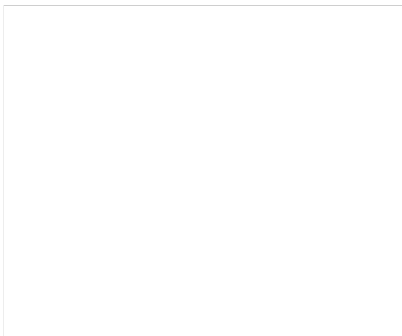


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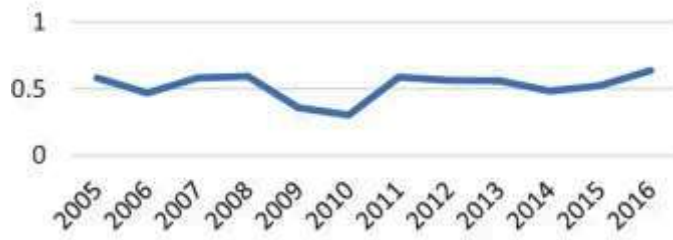
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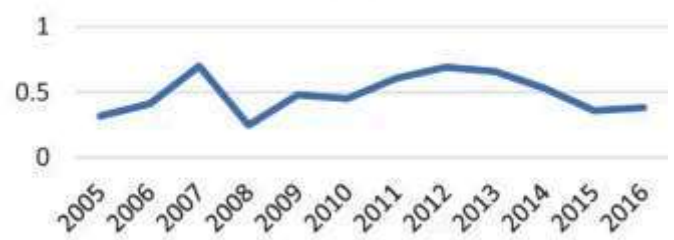
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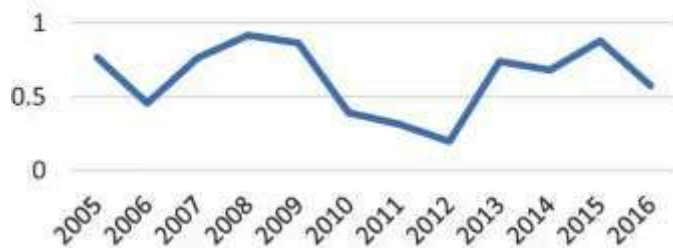
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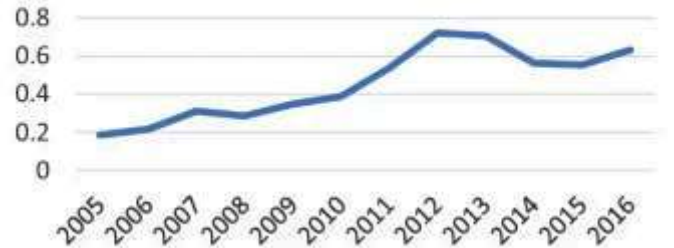
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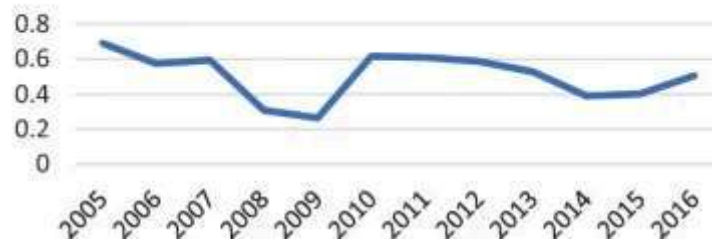
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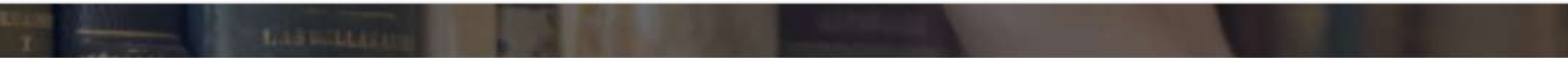
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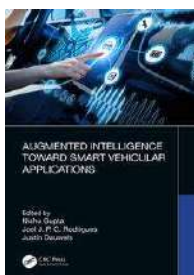
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


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Symmetric Key and Artificial Neural Network With Mealy Machine: A Neoteric Model of Cryptosystem for Cloud Security

Anirban Bhowmik ✉ Sunil Karforma, Joydeep Dey

Book Editor(s): Rajdeep Chakraborty, Anupam Ghosh, Jyotsna Kumar Mandal

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Summary

Cloud computing is defined as the distribution of computing which include hardware and software program to the patron through the Internet. In the technology of ICT, cloud computing has encouraged via many industries which includes technology, enterprise, management, logistics, and numerous other enterprises. But some new kind of risks and vulnerabilities exist in cloud environment. Users of cloud services are under constant threat. Hence, security-related risks are the main drawback of cloud computing. The aim of this paper is to enhance the cloud security by designing a secure cryptosystem. At first, we have emphasized on secure key generation algorithm based on coupled artificial neural network (ANN) with Mealy machine and then weight vector-based authentication mechanism. We have used coupled multilayer feedforward neural network and Mealy machine for security issues of cloud computing. Machine learning is done “n” times between two ANNs, and after several steps, we have generated session key for encryption. A novel key wrapping protocol has also introduced using one way function. For encryption and decryption, we have used XOR and CLS (Circular Left Shift) operation and for authentication purpose weight vectors of ANN with hash function is used. Different types of experimental results and analysis prove the efficiency and robustness of our technique in the field of artificial intelligence.

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Proceedings of the Global AI Congress 2019

Arindam Sarkar, Joydeep Dey & Sunil Karforma

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Abstract

Technological emergence-based user-friendly systems have emerged to cope up the security issues in online medical portals. The Government of India is doing loads of works on online health schemes such as “Ayushman Bharat Yojana.” The proposed research technique may be incorporated with existing online portal for secured data transmission. In this proposed methodology, nature-inspired biological algorithm based on salp swarm

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Chapter 4

Approximation Algorithm and Linear Congruence: An Approach for Optimizing the Security of IoT-Based Healthcare Management System

Anirban Bhowmik  Sunil Karforma

Book Editor(s): Shibin David, R. S. Anand, V. Jeyakrishnan, M. Niranjanamurthy

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Summary

In the healthcare industry, privacy and security of patient information is the most crucial issue at present. Considering current legal regulations, every healthcare organization should impose a prominent security technique to maintain a secure electronic health records system. On the other hand, the realization of Internet of Things is the most notable advancement in the field of computer science and electronics. The healthcare services have increased with the help of IoT. Nowadays security flaws on patient information are a significant issue in the healthcare system. Electronic health records, i.e., collections of health-related information, are sensitive in nature, so it is very significant to impose advanced security techniques in the system. Here we have focused on security issues like technical safeguards. Our technique proposes an approximation algorithm-based security model for securing the diagnostics text data of patients and an authentication technique. For encryption, intermediate key, approximation algorithm-based session key are used. This new approach of session key generation provides beauty as well as extra robustness in our technique. The different types of experiments on this technique and their results confirms that our technique is very secure and efficient for data transmission in the medical sector.

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Linear Congruence Generator and Chaos Based Encryption Key Generation for Medical Data Security in IoT Based Health Care System

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[Anirban Bhowmik](#), [Sunil Karforma](#), [Joydeep Dey](#) & [Arindam Sarkar](#)

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Abstract

In the healthcare industry privacy and security of patient's information is the most crucial issue at present. Considering current legal regulations, every healthcare organization should impose a prominent security technique to maintain a secure electronic health records system. On the other hand the realization of Internet of Things is the most notable advancement in the field of computer science and electronics. The

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Abstract

Nowadays vehicles have been used at a large scale in the modern society. But in many countries the current traffic-safety statistics is very terrifying. Many people are killed and injured in road accident. To reduce this problem government and manufacturers of countries have launched different initiatives like use of safety belt, airbags, antiblocking

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Chapter 5

Symmetric Key and Artificial Neural Network With Mealy Machine: A Neoteric Model of Cryptosystem for Cloud Security

Anirban Bhowmik  Sunil Karforma, Joydeep Dey

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Computational Intelligence for Medical Internet of Things (MIoT) Applications

Machine Intelligence Applications for IoT in Healthcare

Volume 14 in Advances in ubiquitous sensing applications for healthcare

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Chapter 15 - Hybrid intelligence-based cryptosystem: security and privacy enhancement in telemedicine system

Anirban Bhowmik¹, Sunil Karforma²

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Abstract

In healthcare informatics, telemedicine is a vital topic especially in the covid19 situation. Telemedicine means the remote delivery of medical services with the help of telecommunication. It has proven that this type of medical service is very helpful in any pandemic like COVID-19 or in the situation of chronic disease. Telemedicine itself functions via physical devices, software, and applications working together to connect remote patients and even multiple networks to a healthcare provider. While the benefits of the telemedicine are clear for the healthcare industry, it also poses the cyber risks that could lead to a misdiagnosis and also bad for well-being of the patients. For secure communication, any telehealth system must address the issues like multifactor authentication, data loss prevention, advanced threat protection, secure telephony, and electronic health record (EHR) security in wireless communication. In this paper we have introduced a hybrid intelligence-based cryptosystem for secure data communication in the telehealth system. Our system is developed by integrating three modules: Hopfield model, Cramer's rule, and DNA sequence-based dynamic S-box; round key generation;



Accelerating Strategic Changes for Digital Transformation in the Healthcare Industry

Information Technologies in Healthcare Industry

2023, Pages 293-305

Chapter 14 - Heterogeneous cardiological data communication in telecardiology with music-key generation scheme

Joydeep Dey^a, Anirban Bhowmik^a, Sk. Samim Ferdows^b, Bappaditya Chowdhury^c, Sunil Karforma^d

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Abstract

The novel coronavirus had entirely changed the health sector. A parallel wing of telemedicine had blossomed rapidly in this critical phase to treat noninvasive and nonemergency patients. In the field of COVID-19 telehealth, Internet technology and nature-motivated innovations help to transmit the private and confidential information present in multiple cardiological reports. These reports can be sent to different cardiologists for better treatments, opinions, and research purposes. These cardiac reports must be protected against intruders in order to maintain patients' confidentiality. The cardiac reports should be converted into nonreadable text for the intruders, which is the main objective of this chapter. Music-key has been derived through a nature-motivated harmony search metaheuristic algorithm followed by classical AES cryptography. Cardiovascular diseases (CVDs) are one of the cardiac diseases connected to the blockage of arteries and veins in the human body. Cardiac comorbid patients were at the largest risk zone during the COVID-19 period. Those patients were treated properly with the help of telecardiology in the critical times of COVID-19. A secure transmission of multiple cardiac reports of the patients can be carried out without the loss of patients'

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Abstract

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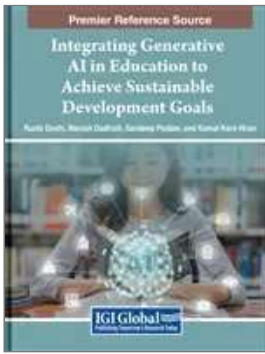
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Abstract

This book chapter contains the basics of generative AI, evaluation of generative AI, working process of generative AI, and applications of generative AI in Education 2030. In this chapter, the authors will introduce the emerging concept of large language model (LLM), reinforcement learning, response generation, neural network, and tokenization as the building blocks of generative AI. In this context, the authors will analyze the role of AI based ChatGpt technology in Education. The applications of generative AI in educational policy making, infrastructure development, research, innovation, activity building, and content generation for the students at schools and colleges will be discussed. But the contents of above mentioned activities must be guided by a teacher of school and college because such contents have more context wise decision making abilities rather than AI based solutions.

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In this chapter, we are going to present the basic building blocks that are required for understating of the concept of generative AI. Now, in the next section, the large language model is depicted.

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University of Calcutta


Date Written: December 30, 2019

Abstract

There exist several modeling languages and frameworks for formal representation and analysis of systems. This paper aims to present an in-depth survey on Event-B based model checking. Event B is an evolution from the earlier B language. It has drawn reasonable attention both for industrial and academic communities due to its openness towards the iterative refinements which validate designs starting from a high-level abstraction of the system. The Rodin is a tool that provides an open-source implementation platform for Event-B based model checking and mathematical proofs. Researchers across the globe are using Event B for industry automation, design of embedded and safety-critical systems, and in many more areas. The manuscript presented a well-researched classification considering diverse broad fields where Event-B modeling is applied. Accordingly, research gaps have been identified to highlight future research directions and application domains for event B.

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Intelligent Systems Design and Applications (ISDA 2020)

Susmita Guha, Akash Nag & Rahul Karmakar



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6 Citations

Abstract

Safety-critical systems are systems that cannot be allowed to fail. Such systems, if they fail, may cause economic damage or even loss of life. As a result, bug-fixes and patches are routinely applied to traditional software. But such updates are rarely feasible in

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Event-B Based Formal Modeling of a Controller: A Case Study

Rahul Karmakar^{1*}, Bidyut Biman Sarkar², and Nabendu Chaki³

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Abstract: Event-B is an event-driven approach for system development. It has the flexibility to develop different discrete control systems. It is a modeling language over a wide range of application domains. It is a refinement based step by step modeling methodology, used to develop the model of the system incrementally. There is a well-tested open-source tool available for model B checking, formalization of mathematical proofs and system validation is RODIN. In this paper, we present a short survey on usage of Event-B based model to locate the research gaps followed by a case study to build a model using 2 stage refinement strategy of event B to stop the precious groundwater wastage and conserve it. We try to model the behavior required for the environment of the system. Our proposed controller then controls the environment. The controller acts accordingly and we achieve the goal of groundwater conservation.

Keywords: Formal Modeling, Event-B, RODIN tool, Industry automation, Eclipse IDE, Water pump controller.

1 Introduction

Event-B [1] is a modeling language and its application range is versatile. Not only a sequential program to distributed systems but it has the privilege to model different control systems. Event-B models the environment which is the necessity to assure the correctness of the proposed systems[3].The Event-B based formal modeling proposed by Jean-Raymond Abrial [1], is a top-down engineering approach consists of step-by-step refinement strategy. The designers, therefore, design the refinement strategies to meet the system requirements and specifications.

2020 | OriginalPaper | Chapter

Event Ordering Using Graphical Notation for Event-B Models

Authors : Rahul Karmakar, Bidyut Biman Sarkar, Nabendu Chaki

Published in: Computer Information Systems and Industrial Management

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Abstract

System requirements are sometimes either too complex or undefined. Event-B is a formal modeling method and is being used increasingly to model various systems. Event-B models support atomicity decomposition and are quite useful for complex refinement structures. However, neither a Event-B model represents any explicit control flows among the events, nor does it support links between the new events during refinements. This work aims to model the Stop and Wait mechanism for an Automatic Repeat Request (ARQ) protocol to analyze the complexities due to communication errors during data re-transmissions. The limitation is the lack of control flows among the events during successive refinements. This has been graphically represented in this work and embedded with Event-B notations for the atomicity decomposition of the model. Finally, the successive refinements presented using an Event-B model, has been validated using the Rodin tool. This leads to a successful ARQ model.

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Aqueous solubility (AS) is defined as balancing the pure compound in its gaseous, liquid, or solid phase at a specific temperature and pressure. An organic molecule may or may not like being bounded by water molecules. It is imperative to assess its environmental behavior. To understand how an organic compound dissolves in water, one must know the molecular forces and interactions. The solubility of molecules is an essential physical-chemical property for drug discovery as performed by pharmaceutical companies and academia. Aqueous solubility (AS) is a critical physical property that has been used by a medicinal as well as an agrochemical chemist. Solubility distributes biologically active compounds, thus moving the possible productivity. The same steadiness experiment to determine solubility is very time-consuming. To be able to calculate solubility when a physical sample is not present is helpful. This paper has built three linear models for predicting the AS directly from the molecular structure. This research work has compared three models based on their predictability accuracy.

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Second International Conference on Sustainable Technologies for Computational Intelligence

[Rahul Karmakar](#) 

 Part of the book series: [Advances in Intelligent Systems and Computing](#)
((AISC, volume 1235))

 502 Accesses  [2 Citations](#)

Abstract

Medical diagnosis is the key prerequisite for any medical treatment. To get that optimized result of any diagnosis, several tests have been proposed in a cost and time-effective manner. Metaheuristic algorithms are used in many fields; especially in medical science, it has a huge impact. With the help of these algorithms, many models have been developed to get accurate results during diagnosis. In this paper, we are elaborating on the

Serial No. 182

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Mapping UML Activity Diagram into Z Notation


| Conference paper | First Online: 24 February 2022

| pp 301–318 | [Cite this conference paper](#)



Innovative Data Communication Technologies and Application

[Animesh Halder](#) & [Rahul Karmakar](#)

 Part of the book series: [Lecture Notes on Data Engineering and Communications Technologies](#) ((LNDECT, volume 96))

 1085 Accesses  4 [Citations](#)

Abstract

The unified modeling language (UML) is widely used for modeling a system. It captures different views of the system. But the semantics of UML is semi-formal and sometimes ambiguous. On the other hand, Z is a formal specification language based on set theory and predicate logic used to prove the required properties of a system mathematically. In this paper, we proposed some rules which help to convert the semi-formal semantics of the activity diagram. It also shows the dynamic aspect of a system, into formal Z notation with example. We also make a case study on the ATM withdrawal system using the

Serial No. 183

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Symbolic Model Checking: A Comprehensive Review for Critical System Design

| Conference paper | First Online: 08 February 2022

| pp 693–703 | [Cite this conference paper](#)



**Advances in Data and Information
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Rahul Karmakar ✉

📖 Part of the book series: [Lecture Notes in Networks and Systems](#) ((LNNS, volume 318))

📄 958 Accesses 📄 3 Citations

Abstract

Model-checking is largely used in formal verification of hardware and software systems. The advantage of model checking is producing counterexamples when properties are not satisfied. Formal modeling specifies the system requirements and validates the model. These approaches are getting popular in industrial automation. Usually, it is used to check safety-critical systems, the failure of which may be catastrophic, e.g. The control systems of a nuclear power station may be checked using a model checker before being commissioned. Otherwise, it will cause huge damage. This paper presents an in-depth

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Formal Verification Techniques: A Comparative Analysis for Critical System Design

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Abstract

Formal methods are used to verify software systems. The system requirements are modeled using specification languages. The models are validated by their tool supports. The Formal methods provide consistency between software development phases and also do the early verification of a system. It provides the blueprint of software. Formal

Serial No. 185

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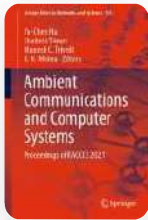
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A Framework for Component Mapping Between Event-B and Python

| Conference paper | First Online: 08 May 2022

| pp 129–139 | [Cite this conference paper](#)



Ambient Communications and Computer Systems

[Rahul Karmakar](#) 

 Part of the book series: [Lecture Notes in Networks and Systems](#) ((LNNS, volume 356))

 625 Accesses

Abstract

Event-B is a formal modeling language that helps to prove the critical requirement properties of a software. The failure or malfunction of this software may cause a huge loss in terms of life and money. Executable code generation from Event-B makes the validation and early verification process more accurate. The proposed framework would improve requirement specification that eventually leads toward a consistent system design. This approach is very useful for industrial automation. Event-B has the extended tool support RODIN to verify the model and generate proof obligations. This paper

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A Geometry Based Algorithm for Comparison of Tetrahedral Metal Binding Sites

| Conference paper | First Online: 19 June 2021

| pp 191–199 | [Cite this conference paper](#)



Computer Communication, Networking and IoT

[Swati Adhikari](#) & [Parthajit Roy](#)

 Part of the book series: [Lecture Notes in Networks and Systems](#) ((LNNS, volume 197))

 559 Accesses

Abstract

In this study, a geometry-based novel algorithm has been proposed to compute structural deviation of two tetrahedral metal-binding sites on protein's structure that compares one user-provided protein structure with standard one. It is proposed to change the orientation of both structures by applying some mathematical transformation in such a way so that minimum mean square error (MSE) will be produced due to their deviation. Total 998 tetrahedral zinc-binding sites on protein's structures have been tested to

Serial No. 187

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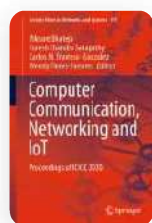
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Sentiment Analysis through Word Vectors: A Study on Movie Reviews from IMDb

| Conference paper | First Online: 19 June 2021

| pp 261–270 | [Cite this conference paper](#)



Computer Communication, Networking and IoT

[Abhijit Roy](#) & [Parthajit Roy](#)

📖 Part of the book series: [Lecture Notes in Networks and Systems](#) ((LNNS, volume 197))

📄 584 Accesses

Abstract

The present study emphasizes the challenges of labeling the correct semantic orientation of movie review texts due to the high degree of ambiguity and varied narratives of the reviewers. The study uses a vector-based model of sentiment analysis on IMDb movie review data set. The model computes the attributes of text reviews based on singular words and the longest common subsequence of words. We present a comparative assessment of unsupervised vector-based model (K-means clustering) and supervised models (support vector machine with linear kernel and naïve Bayesian classifier) for

Serial No. 188

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Abstract

Automatic recognition systems have recently gained enormous attentions from the research community. This is mainly because an automatic recognition system greatly reduces the human labor and intervention in the respective domains. It also eliminates

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A Convolutional Neural Network Model for Automatic Leaf Recognition

| Conference paper | First Online: 03 August 2021


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Abstract

In this study, an automatic recognition system has been designed for detection of leaves from their images. The model has been developed based on the Object Oriented software engineering model. For the bottom level machine learning, convolution neural network based deep learning has been used. The present study uses two benchmark datasets one

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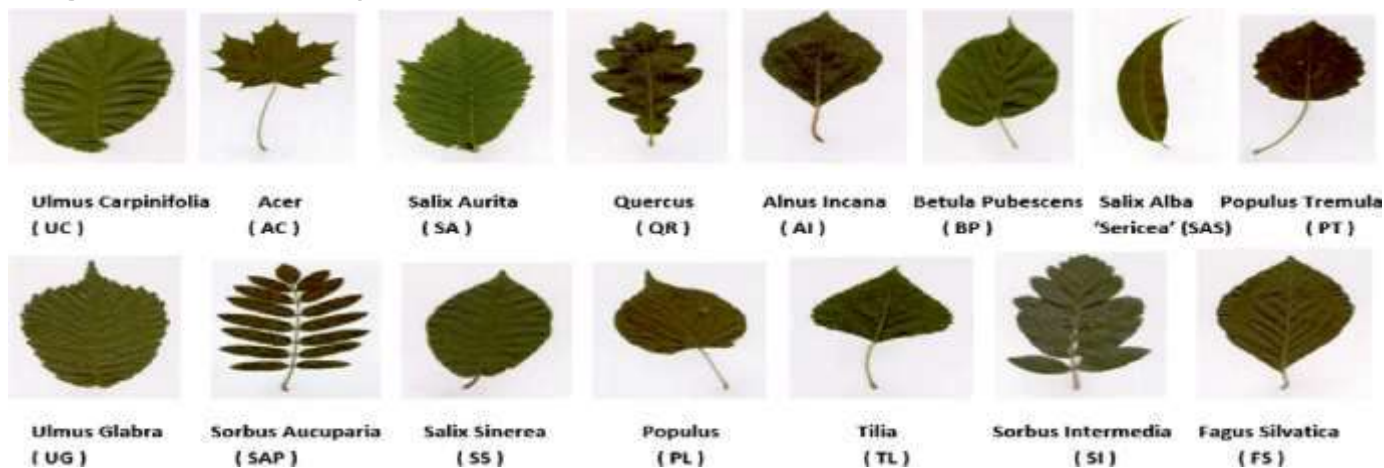
Debashis De

A Dataset Description

Table 4. Description of the Flavia [3] Dataset. This dataset consists of 1906 images, out of which 80% have been taken for training and 20% for testing.

Fig. 8.

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Description of Swedish [4] Dataset. This dataset consists of 1125 images with 75 samples per species. Approximately, 80% have been used for training and 20% for testing.

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The lifespan of a man can be sustained only with adequate nourishment. To lead a productive, healthy life, human needs nutritious food. In this pandemic COVID-19 situation humans need more nutritious food for combating infectious disease along with a strong immune system in our body. Nutritious foods recognition is one of the major tasks for a customer. In large stores plenty of agricultural products are stored, then there needs a classification for separating normal food and nutritious food. The real time decision will alert the consumer by predicting nutritious foods. By the use of deep learning, it may be possible to classify nutritious food along with their nutrient content and give the possible particular rating view image through the deep learning method. Enormous development in deep learning is possible due to the advancement of the Convolutional Neural Network (CNN) algorithms. CNN is a modern technique inspired by biological neurons mainly used for image processing and data analysis, producing encouraging results. The principal objective of our work is to detect and segregate normal food and nutritious food. This is accomplished using the combination of both nutrition and image Classification techniques. Hence, the proposed system achieved average overall accuracy is more than 91%.

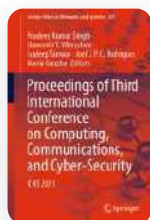
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Sentiment Analysis of Twitter Data Using Clustering and Classification

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Abstract

Data mining helps in collecting and managing data besides performing analysis and prediction analysis. The process that is implemented to discover useful data patterns may have different names. Statisticians, database researchers, and professional organizations were among the first to use term data mining. The fundamental steps for sarcasm detection are dataset collection, feature extraction, and classification. This work puts forward a new model of sarcasm detection formed by fusing K-mean, PCA, and SVM

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The Internet of Things (IoT) is the most promising technology of recent times that is anticipated to bring a revolutionary change in the way heterogeneous devices can be connected through a perpetual connection. Some of the IoT-centric processes are auto-

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