



Title: Deep learning-based intelligent surveillance model for detection of anomalous activities from videos

Authors: Karishma Pawar; Vahida Attar

Addresses: Department of Computer Engineering and IT, College of Engineering Pune (COEP), Pune 411005, Maharashtra, India | Department of Computer Engineering and IT, College of Engineering Pune (COEP), Pune 411005, Maharashtra, India

Abstract: For safeguarding and monitoring purposes, public places are equipped with surveillance cameras. Timely and accurate identification of suspicious activities is paramount to securing the public places. Assigning human personnel to keep continuous watch over ongoing activities is error-prone and laborious. To alleviate the need of human personnel for monitoring such videos, automated surveillance systems are required. This paper proposes a deep learning based intelligent surveillance model for detection of anomalous activities. The problem of anomaly detection has been handled as one class classification problem. The proposed approach involves two dimensional convolutional auto-encoder for feature learning, sequence-to-sequence long short term memory model for learning temporal statistical correlation and radial basis function as activation function in fully connected network for one class classification. We experimented on real-world dataset by two variants of proposed approach and achieved significant results at frame-level anomaly detection.

Keywords: anomaly detection; computer vision; convolutional autoencoder; deep learning; one class classification; radial basis function; RBF; video surveillance.

DOI: [10.1504/IJCVR.2020.108152](#)

International Journal of Computational Vision and Robotics, 2020 Vol.10 No.4, pp.289 - 311

Received: 28 Jan 2019

Accepted: 08 Jun 2019

Published online: 01 May 2020

Full-text access for editors

Access for subscribers

Purchase this article

Search for this article

Keep up-to-date

[Our Blog](#)

[Follow us on Twitter](#)

[Visit us on Facebook](#)

[Our Newsletter \(subscribe for free\)](#)

[RSS Feeds](#)

[New issue alerts](#)

[Return to top](#)

[Contact us](#)

[About Inderscience](#)

[OAI Repository](#)

[Privacy and Cookies Statement](#)

[Terms and Conditions](#)

[Help](#)

[Sitemap](#)

Statistical Study of Machine Learning Algorithms Using Parametric and Non-Parametric Tests: A Comparative Analysis and Recommendations

Vijay M. Khadse, College of Engineering Pune, (CoEP), Pune, India

Parikshit Narendra Mahalle, Department of Computer Engineering, Smt. Kashibai Navale College of Engineering, Pune, India

Gitanjali R. Shinde, Smt. Kashibai Navale College of Engineering, Pune, India

ABSTRACT

The emerging area of the internet of things (IoT) generates a large amount of data from IoT applications such as health care, smart cities, etc. This data needs to be analyzed in order to derive useful inferences. Machine learning (ML) plays a significant role in analyzing such data. It becomes difficult to select optimal algorithm from the available set of algorithms/classifiers to obtain best results. The performance of algorithms differs when applied to datasets from different application domains. In learning, it is difficult to understand if the difference in performance is real or due to random variation in test data, training data, or internal randomness of the learning algorithms. This study takes into account these issues during a comparison of ML algorithms for binary and multivariate classification. It helps in providing guidelines for statistical validation of results. The results obtained show that the performance measure of accuracy for one algorithm differs by critical difference (CD) than others over binary and multivariate datasets obtained from different application domains.

KEYWORDS

Classification, Homoscadicity, Multiple Comparisons, Non-Parametric Test, Normality, Parametric Test, Statistical Method

INTRODUCTION

Ambient computing provides an environment of response which helps businesses to perform to full capacity, helps to remove many intermediate processing steps with its ability to collect data to perform analytics and learn from it. At the core of ambient computing is IoT. Most of the developed countries use Internet of Things (IoT) to provide better services to their people e.g. smart transport, smart health and smart energy. The idea is to make use of internet-enabled devices without deliberately or intentionally using them. It is about moving computation from foreground to background. It assumes shifting of computing from desktop to invisible smart computing devices incorporated into human

DOI: 10.4018/IJACI.2020070105

Copyright © 2020, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.



An efficient feature reduction method for the detection of DoS attack

Deepak Kshirsagar*, Sandeep Kumar

Department of Computer Science and Engineering, IIT Roorkee, Roorkee, India

Received 16 March 2020; received in revised form 14 October 2020; accepted 22 December 2020
Available online 2 January 2021

Abstract

Feature selection or reduction is a significant process for intrusion detection system (IDS) in finding optimal features. Irrelevant features present in the dataset increase load on computing resources and affect the performance of the system. The present study proposes a feature reduction method based on the combination of filter-based feature reduction algorithms, namely Information Gain Ratio (IGR), Correlation (CR), and ReliefF (ReF). The system initially obtains feature subsets for each classifier based on average weight and further Subset Combination Strategy (SCS) is applied. The proposed feature reduction method results in 24 reduced features for CICIDS 2017 DoS dataset. The proposed method shows an improved performance compared to the current state-of-the-art systems on KDD Cup 99 dataset. The proposed method has also been tested and compared with the current state-of-the-art systems on CICIDS 2017 dataset. © 2021 The Korean Institute of Communications and Information Sciences (KICS). Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Feature reduction; Denial-of-Service (DoS) attack; Intrusion detection; Filter-based feature selection algorithms

1. Introduction

In recent times, the hacker uses a variety of tools to create flooding attacks to the application, network, and transport layer of the TCP/IP model. Flooding attacks generate high volume malicious packets that increase the load on the network or towards the web server with a maximum consumption of the bandwidth that results in the Denial-of-Service (DoS) attack. The behavior of the DoS attack at the application layer is different from other layers. Therefore, the detection of the DoS attack plays an important role to the design of IDS.

IDS provides an extra layer of security for the organization to stand against a variety of attacks. The network traffic consists of instances that are associated with a variety of attributes. The number of attributes associated with instances results in the curse of dimensionality in anomaly detection. Some of the irrelevant attributes affect the performance of IDS. Feature reduction or selection techniques present in machine learning are used to find relevant or irrelevant features in the dataset. This process results in an improvement in the performance with minimum built-up time. This study uses

filter-based feature selection algorithms to discover relevant features for the detection of DoS attacks.

The main contributions of this study are summarized as follows:

1. It proposes a novel technique of average weight-based feature reduction method for identification of relevant features to detect DoS attack based on the combination of IGR, CR, and ReF.
2. It tests CICIDS 2017 DoS dataset with reduced features and compares with state-of-the-art systems.
3. It also tests KDD Cup 99 dataset and compared to state-of-the-art systems.

2. Literature review

Ambusaidi et al. [1] propose a flexible mutual information-for feature selection in IDS. It achieves the highest accuracy of 99.79% on the KDD Cup 99 dataset using Support Vector Machine (SVM) with 19 reduced features. The study [2] proposes a meta-heuristic assessment for feature optimization in anomaly-based network IDS. The model uses Canonical Correlation Analysis (CCA) and association impact scale to obtain optimal features. The model produces the highest precision of 98.9% using optimal features based on lesser than the upper bound of CCA threshold on NSL-KDD dataset.

* Corresponding author.

E-mail addresses: deepak83@gmail.com (D. Kshirsagar),

sandeepkumar@ggitr@gmail.com (S. Kumar).

Peer review under responsibility of The Korean Institute of Communications and Information Sciences (KICS).

<https://doi.org/10.1016/j.iete.2020.12.006>

2405-9595/© 2021 The Korean Institute of Communications and Information Sciences (KICS). Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).



A feature reduction based reflected and exploited DDoS attacks detection system

Deepak Kshirsagar¹ · Sandeep Kumar¹

Received: 16 June 2020 / Accepted: 9 January 2021 / Published online: 28 January 2021
© The Author(s), under exclusive licence to Springer-Verlag GmbH, DE part of Springer Nature 2021

Abstract

The hacker attempts distributed denial of service (DDoS) attacks towards network resources to disturb or deny services. The hacker degrades the quality of service to legitimate users by performing reflection and exploitation based DDoS attacks with a trusted third party server that hides information of the attacker. It is, therefore, necessary to propose an intelligent intrusion detection system to detect reflection and exploitation based DDoS attacks efficiently and effectively. The present study proposes a feature reduction method by the combination of information gain (IG) and correlation (CR) feature selection techniques. This study presents a DDoS attack detection framework to detect reflection and exploitation based DDoS attacks in an efficient manner. The framework is tested on the latest DDoS evaluation (CICDDoS2019) dataset with J48 classifier. The feature reduction method obtains minimum and maximum reduction by 56 and 82.92% respectively, of the original features. The experimentation results show that the proposed framework outperforms using a reduced features subset. The validation of the proposed framework on knowledge discovery and data mining (KDD Cup 1999) dataset provides improvement in performance for binary and multi-level classification using feature reduction by 60.97% of the original features. The proposed feature reduction method is also compared to the relevant existing feature selection methods used for intrusion detection on CICDoS 2019 and KDD Cup 1999 datasets.

Keywords Distributed denial of service (DDoS) · Information gain · Correlation · Feature reduction · Intrusion detection

1 Introduction

In today's computing era, users explore mobile and hand-held devices (Sreeram and Vuppala 2019) to access services for financial, network, online shopping, retail, games, and media content using web applications through the internet. The number of users has increased using web applications to access services to perform certain tasks. Unavailability of these services (Agrawal and Tapaswi 2020) to legitimate users leads to the loss of business and finance. Therefore, the availability and quality of service to legitimate users plays a vital role in financial and retail domains. These services are disturbed or interrupted using a large flood of malicious traffic towards web applications by hackers. The hacker

uses various tools or programmes to generate large flood of malicious traffic with one or more attack vectors. Denial of service (DoS) and distributed DoS attacks are mainly used by hackers to perform the unavailability or degrade the performance of services.

DoS is a cyber-attack (Prasad et al. 2020) in which the hacker attempts to make network resources or services disturb its legitimate users by flooding a large volume of malicious traffic that targets network resources. DDoS is a large scale cyber attack in which the hacker uses more than one attack vector to generate a large amount of malicious traffic from different sources. The presence of more than one attack vector from different sources causes the challenge to security administrators in the intrusion detection mechanism.

These DoS and DDoS attacks happen in the network, transport, and application-level of the open systems interconnection (OSI) model (Obaid and Abeed 2020). The hacker uses internet protocol (IP) and internet control message protocol (ICMP) to generate attacks at a network layer. Transmission control protocol (TCP) and User Datagram Protocol (UDP) protocols are used to perform flooding

✉ Deepak Kshirsagar
kdeepak83@gmail.com

Sandeep Kumar
sandeepkumargajitr@gmail.com

¹ Department of Computer Science and Engineering, Indian Institute of Technology Roorkee, Roorkee 247667, India

[EconPapers Home](#)
[About EconPapers](#)

[Working Papers](#)
[Journal Articles](#)
[Books and Chapters](#)
[Software Components](#)

[Authors](#)

[JEL codes](#)
[New Economics Papers](#)

[Advanced Search](#)

[Quick Search](#)

[EconPapers FAQ](#)
[Archive maintainers FAQ](#)
[Cookies at EconPapers](#)

[Format for printing](#)


[The RePEc blog](#)
[The RePEc plagiarism page](#)

RePEc

This site is part of RePEc and all the data displayed here is part of the RePEc data set.

Is your work missing from RePEc? Here is how to contribute.

Questions or problems? Check the [EconPapers FAQ](#) or send mail to econpapers@oru.se.

 EconPapers is hosted by the [Örebro University School of Business](#).

PaaS Optimization of Apache Applications Using System Parameter Tuning of Big Data Platforms in Distributed Computing

[Share](#)

Tanuja Pattanshetti and Vahida Attar
[Additional contact information](#)

International Journal of Distributed Systems and Technologies (IJ DST), 2020, vol. 11, issue 4, 23-38

Abstract: Widely used data processing platforms use distributed systems to process huge data efficiently. The aim of this article is to optimize the platform services by tuning only the relevant, tunable, system parameters and to identify the relation between the software quality metrics. The system parameters of data platforms based on the service level agreements can be defined and customized. In the first stage, the most significant parameters are identified and shortlisted using various feature selection approaches. In the second stage, the iterative runs of applications are executed for tuning these shortlisted parameters to identify the optimal value and to understand the impact of individual input parameters on the system output parameter. The empirical results imply significant improvement in performance and with which it is possible to render the proposed work optimizing the services offered by these data platforms.

Date: 2020

References: [Add references at CitEc](#)

Citations: [Track citations by RSS feed](#)

Downloads: (external link)

<http://services.igi-global.com/resolvedoi/resolve. ... 018/IJDST.2020100102> (application/pdf)

Related works:

This item may be available elsewhere in EconPapers: [Search](#) for items with the same title.

Export reference: [BibTeX](#) [RIS](#) (EndNote, ProCite, RefMan) [HTML/Text](#)

Persistent link:

<https://EconPapers.repec.org/RePEc:igg:jdst00:v:11:y:2020:i:4:p:23-38>

[Access Statistics](#) for this article

International Journal of Distributed Systems and Technologies (IJ DST) is currently edited by *Nik Bessis*

[More articles](#) in International Journal of Distributed Systems and Technologies (IJ DST) from [IGI Global](#)
 Bibliographic data for series maintained by Journal Editor (journaleditor@igi-global.com).



Volume 15

February 2021

Backup and Recovery Mechanisms of Cassandra Database: A Review

Karina Bohora
College of Engineering, Pune, bohoraka16.it@coep.ac.in


Amol Bothe
College of Engineering, Pune, botheap16.it@coep.ac.in

Damini Sheth
College of Engineering, Pune, daminihs16.it@coep.ac.in

Rupali Chopade
College of Engineering, Pune, rmc18.comp@coep.ac.in

V. K. Pachghare
College of Engineering, Pune, vkp.comp@coep.ac.in

Follow this and additional works at: <https://commons.erau.edu/jdfsl>

 Part of the Computer Law Commons, and the Information Security Commons

Recommended Citation

Bohora, Karina; Bothe, Amol; Sheth, Damini; Chopade, Rupali; and Pachghare, V. K. (2021) "Backup and Recovery Mechanisms of Cassandra Database: A Review," *Journal of Digital Forensics, Security and Law*, Vol. 15, Article 5.

DOI: <https://doi.org/10.15394/jdfsl.2021.1613>

Available at: <https://commons.erau.edu/jdfsl/vol15/iss2/5>

This Article is brought to you for free and open access by the Journals at Scholarly Commons. It has been accepted for inclusion in Journal of Digital Forensics, Security and Law by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.





CaneSat dataset to leverage convolutional neural networks for sugarcane classification from Sentinel-2

Shyamal S. Virnodkar^{a,*}, Vinod K. Pachghare^a, V.C. Patil^b, Sunil Kumar Jha^b

^a Department of Computer Engineering & IT, College of Engineering Pune, Savitribai Phule Pune University, India

^b K J Somaiya Institute of Applied Agricultural Research (KIAAR), Sameerwadi, Mudhol Taluka, Bagalkot District, 587316, India

ARTICLE INFO

Article history:

Received 30 April 2020

Revised 3 August 2020

Accepted 8 September 2020

Available online xxx

Keywords:

Multi-temporal remote sensing images

Sugarcane classification

Convolutional neural network

Deep network

ABSTRACT

The ubiquitous deep learning (DL) in remote sensing (RS) motivates the most challenging problem of crop classification. To perpetrate such an exigent task, an attempt is made to prepare a novel dataset, the CaneSat dataset, in two formats: RGB color space and geo-tiff images, covering the region of four talukas in Karnataka, India. This research aims to build a model for sugarcane classification using two-dimensional convolutional neural network (CNN or ConvNet) applying RS time series data. Further, the study intends to evaluate competency of four state-of-the-art deep CNNs namely AlexNet, GoogleNet, ResNet50 and DenseNet201 using fine tuning and deep CNNs as feature extractors to classify sugarcane and non-sugarcane areas from Sentinel-2 data. The results of the research are expressive on CaneSat dataset. It shows that the CNN model performs significantly good producing 88.46% accuracy, whereas all deep networks exhibit more than 73.00% overall accuracy. When used as feature extractors, ResNet50 and DenseNet201 outperform all other models with precision of 85.65% and 87.70%, respectively. Noticeably, the results indicate that 2D CNN model and features extracted using CNNs with SVM classifier are efficient methods for sugarcane classification from Sentinel-2 time series data in peninsular zone of India.

© 2020 The Authors. Published by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Agriculture accounts for over 50% of Indian population livelihood and is backbone of the Indian economy and food system. Sugarcane is a cash crop of India and sugar mills want to know the cane availability, so that they can plan their harvesting schedule. Field assistants are assigned this job to get the information of cane availability which eventually leads to human error and mills shortfall in crushing every year. Sugarcane classification at every stage would not only help mills but also the farmers who are holding significantly large area to manage their farm. Earth observation (EO) becomes powerful technology to achieve this challenging

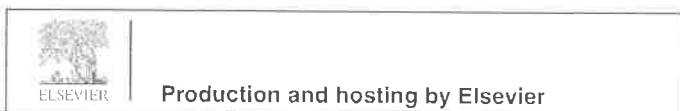
task. EO provides continuous, autonomous, high quality dataset with a global coverage of earth observation. With open access to such a huge amount of satellite data, abundant applications in the domains of agriculture (Virnodkar et al., 2019a, 2020) and urban development (Panti et al., 2016) have successfully been realized. The high temporal revisit period becomes a powerful source for time series datasets that can be useful for monitoring geographical area and vegetation dynamics (Zheng et al., 2020) through time. How to analyze and utilize this time series to leverage the seasonal characteristics of vegetations varying with time and season is still an unfastened issue in the RS research field. Notwithstanding the usefulness of the time series, the traditional approach is to execute futuristic ML techniques like SVM and RF on stacked satellite images (Yang et al., 2011). Time series data exhibits temporal correlations which are failed to model by these traditional approaches, as they extract the features autonomously from one another regardless of temporal dependencies.

Recently, DL technology have achieved astonishing performance in crop and land use land cover (LULC) classification from RS time series images, in particular; the CNN and the long short-term memory (LSTM) which is a gated recurrent unit of recurrent neural network (RNN). Prior to the development of DL, the RS

* Corresponding author.

E-mail addresses: ssv18.comp@ceep.ac.in (S.S. Virnodkar), vkp.comp@ceep.ac.in (V.K. Pachghare), patil.v.c@somaiya.com (V.C. Patil), jha.sunilkumar@somaiya.com, www@somaiya.com (S.K. Jha).

Peer review under responsibility of King Saud University.



<https://doi.org/10.1016/j.jksuci.2020.09.005>

1319-1578/© 2020 The Authors. Published by Elsevier B.V. on behalf of King Saud University.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article as: S. S. Virnodkar, V. K. Pachghare, V. C. Patil et al., CaneSat dataset to leverage convolutional neural networks for sugarcane classification from Sentinel-2, Journal of King Saud University – Computer and Information Sciences, <https://doi.org/10.1016/j.jksuci.2020.09.005>.

Solid State Technology

[Home](#) [Current](#) [Aims and Scope](#) [For Authors](#) [Archives](#) [Ethics & Policies](#) [About](#)

[Home](#) / [Archives](#) / [Vol. 63 No. 2 \(2020\)](#) / [Articles](#)

Transfer Learning for Aspect Term Polarity Determination

Hetal V. Gandhi¹, Vahida Z. Attar

Abstract

Social Media and E-commerce have led to extensive growth in the amount of data collected as feedback from people, related to product, entity or person of interest. This feedback, in the form of online reviews, is analyzed at different levels. The sentence based and document based sentiment analysis are coarsegrained. However, the sentiment analysis done at a deeper level is Aspect Based Sentiment Analysis (ABSA).

Among the four subtasks of ABSA, we focus on the second, Aspect Term Polarity subtask. Aspect Term

Polarity subtask is concerned with determining the sentiment associated separately for each aspect term in the

review sentence in terms of positive, negative, neutral or conflict. In this paper, we target this subtask for HindiABSA dataset. Hindi, being a resource-scarce language, the Transfer Learning based method which involves

fine-tuning ULMFiT and MultiFiT models, is being proposed. The system shows an improvement in percentage

accuracy of 2.89%, over that of best reported state-of-the-art models. T

 PDF

Multimodal Sentiment Analysis of Nursery Rhymes for Behavior Improvement of Children

Makarand Velankar^{1*}, Vaibhav Khatavkar², Dr. Parag Kulkarni³

^{1*} Assistant Professor, MKSSS Cummins College of Engineering Pune, 411052, And Ph.D. Research Scholar PICT, Pune Maharashtra, India.

² Ph.D. Research Scholar College of Engineering Pune, Maharashtra, India.

³ CEO and Chief Scientist at Kvinna Limited, Pune, Maharashtra, India.

Abstract: *Introvert children have behavioral issues such as self-centric, poor communication, low confidence, less participation and physically weak, whereas hyperactive children have issues related to non-obedient, aggression, lack of patience, lower concentration levels, and disturbance to others. There is a need to do some remedial measures to improve the behavior of children for their better future. Music interactions with the specific sentiment, i.e. positive sentiments for introvert and negative sentiments for hyperactive children are a proposed approach used. Multimodal analysis of 50 nursery rhymes using cognitive music models with analysis of lyrics and acoustic parameters was performed to select rhymes in specific categories. Specific sets of rhymes were repeatedly played and the behavior was observed and noted for specific predefined parameters by teachers and parents. The improvement noticed in the initial 3 months with about 10 musical sessions per month was in the range of 20 to 40 %. This is probably the first kind of study to use multimodal music sentiment analysis for the behavioral improvement of kids with hyperactive and introvert characteristics. The study also provides effective use of selected acoustic and text features with a normalization approach for sentiment analysis.*

Keywords: Multimodal sentiment analysis; Music interactions; children's Behavior improvement; nursery rhymes.

1. Introduction

According to renowned psychologists like Sigmund Freud [1], childhood has a profound effect on the development of human psychology. Similar observations were noted by many researchers related to children [2-3]. The childhood experience is built by extracting information from the environment with the preliminary senses, such as touch, smell, vision, taste, and hearing. Child psychologists observing behavior and issues of children at an early age have come up with the terms as hyperactive and introvert to represent specific behavior among children. The problem observed about a hyperactive child full of energy is to showcase the abilities like to dominate others, tend to perform activities that are at times dangerous to them and others, etc. An introvert child with fewer reactions to the external world has issues related to the expression of emotions, quiet, and no or less participation in sports and other activities, etc.

The problem of specific children having an age group about 3 to 4 years was mentioned by the school teacher teaching at the nursery level during one informal get-together. According to the observations by the teacher, some children were hyperactive

Request full-text

Download citation

Copy link



Article

Cost-based Recommendation of Parameters for Local Differentially Private Data Aggregation

December 2020 - Computers & Security, 102(1):102144

DOI:10.1016/j.cose.2020.102144

Authors:



Snehkumar Shahani
Persistent Systems Ltd



R Venkateswaran



Jibi Abraham
College of Engineering, Pune

To read the full-text of this research, you can request a copy directly from the authors.

Citations (1)

References (62)

Abstract

The ability to analyze personal data for a group of individuals without compromising their respective privacy has been a focus of significant research in recent years. For such analyses, data analysts need to acquire data from individuals without revealing their Individually Identifiable Data (IID). Well established Differentially Private techniques, characterized by privacy parameters (ϵ, δ) , transform the data to protect the IID. However, such transformations adversely affect the usefulness of data leading to a trade-off between usefulness and privacy. Therefore, negotiating appropriate values of privacy parameters before data acquisition is a challenging task for data analysts. Most of the work, in selecting values of privacy parameters, is either based on constraining all other parameters or they provide a set of acceptable values. Here also the problem of selecting the best value from the set of acceptable values is left to the analyst. A major contribution of this paper is the method of identifying the best value of privacy parameters in a trade-off between usefulness and privacy by introducing a cost-based model, thereby addressing the issue. To enable estimation of usefulness and its cost before data acquisition, we have mathematically modeled utility in terms of data and privacy parameters. We have considered standard statistical aggregates such as Sum, Mean and Standard Deviation as compared to most of the existing works that consider only Count query as aggregate analysis. The correctness of our mathematical estimation has been validated on a diverse set of synthetic and real-world datasets spanning popular data distributions.

Discover the world's research

21+ million members

137 million publications

7,000+ Join for free

Sponsored videos



Data Science and Security pp 461–467

Analysis of Rule-Based Classifiers for IDS in IoT

[Pushparaj Nimbalkar](#) & [Deepak Kshirsagar](#)

Conference paper | [First Online: 27 August 2021](#)

172 Accesses | **1** Citations

Part of the [Lecture Notes in Networks and Systems](#) book series (LNNS, volume 290)

Abstract

The Internet of Things (IoT) networks suffered from different types of cyber attacks due to vulnerabilities present in IoT devices. The attacker creates Denial of Service (DoS) and Distributed DoS (DDoS) quickly towards IoT networks. Therefore, to secure IoT networks from such types of cyber attacks intelligent intrusion detection system is needed. This paper proposes the IDS with and without feature selection to detect DoS and DDoS attacks in IoT. The proposed system achieves higher accuracy of 99.9992% with a JRip classifier from the suite of rule-based classifiers using 36 features obtained using pre-processing data phase. The proposed approach brings relevant features using



Feature selection for intrusion detection system in Internet-of-Things (IoT)

Pushparaj Nimbalkar*, Deepak Kshirsagar

Department of Computer Engineering and IT, College of Engineering Pune, India

Received 31 January 2021; received in revised form 25 March 2021; accepted 30 April 2021

Available online 7 May 2021

Abstract

Internet of Things (IoT) is suffered from different types of attacks due to vulnerability present in devices. Due to many IoT network traffic features, the machine learning models take time to detect attacks. This paper proposes a feature selection for intrusion detection systems (IDSs) using Information Gain (IG) and Gain Ratio (GR) with the ranked top 50% features for the detection of DoS and DDoS attacks. The proposed system obtains feature subsets using insertion and union operations on subsets obtained by the ranked top 50% IG and GR features. The proposed method is evaluated and validated on IoT-BoT and KDD Cup 1999 datasets, respectively, with a JRipclassifier. The system provides higher performance than the original feature set and traditional IDSs on IoT-BoT and KDD Cup 1999 datasets using 16 and 19 features, respectively.

© 2021 The Korean Institute of Communications and Information Sciences (KICS). Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Denial-of-service; Internet of Things; Feature selection; Intrusion detection system

1. Introduction

Internet of Things (IoT) is a globally adopted technology in automated network systems. The next stage of the Information Technology (IT) rising and interconnectivity is the IoT, from little toy to homemade application to the smart city in IoT. IoT is a mixture of cloud-connected embedded systems used by the consumer to access IT-related services utilizing the combination of electronics-related things and internet protocol.

In IoT systems, protocols used may have security vulnerabilities [1] that can impact the whole system. IoT devices are vulnerable targets for cybercriminals and attackers because of their lack of fundamental security protocols. That implies that they can be hacked and attacked by botnets, which are used to initiate DDoS against organizations.

The noisy captured network traffic in IoT consists of a large number of traffic features. The machine learning models require more time to build models and affect the performance of IDS due to the presence of a large number of features in IoT network traffic. Therefore, feature selection is required for

intrusion detection in IoT that builds the models in minimum time and achieves higher performance.

The contributions of this paper are summarized as follows:

1. This paper proposes a feature selection method using Information Gain (IG) and Gain Ratio (GR) with top 50% ranked features for IDS in IoT.
2. The proposed feature selection method is tested on BoT-IoT dataset and validated on the prominent KDD Cup 1999 dataset.
3. The proposed feature selection method provides higher performance with JRip classifier on BoT-IoT and KDD Cup 1999 datasets using obtained features in minimum model build time.
4. The proposed system is also compared to the existing systems on BoT-IoT and KDD Cup 1999 datasets.

2. Literature review

DDoS attacks features and principal component analysis (PCA) [2] is presented to detect DDoS attacks in IDS. The system achieved higher precision of 92% with Mahalanobis Distance (MD) using reduced features on KDD Cup 1999 dataset. The network IDS presented in [3] with K-means clustering achieved higher detection of 96.8% with K-means clustering using manually selected 8–16 features. The work [4]

* Corresponding author.

E-mail addresses: nimbalkarpri9.comp@ceip.ac.in (P. Nimbalkar), dkk.comp@ceip.ac.in (D. Kshirsagar).

Peer review under responsibility of The Korean Institute of Communications and Information Sciences (KICS).

<https://doi.org/10.1016/j.ict.2021.04.012>

2405-9595/© 2021 The Korean Institute of Communications and Information Sciences (KICS). Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

[BACK]

Computers, Materials & Continua

DOI:10.32604/cmc.2021.020110

Article

Deep Learning Based License Plate Number Recognition for Smart Cities

T. Vetriselvi¹, E. Laxmi Lydia², Sachi Nandan Mohanty^{3,4}, Eatedal Alabdulkreem⁵, Shaha Al-Otaibi⁶, Amal Al-Rasheed⁶ and Romany F. Mansour^{7,*}

¹Department of Computer Science and Engineering, K. Ramakrishnan College of Technology, Trichy, 620002, India

²Computer Science and Engineering, Vignan's Institute of Information Technology, Visakhapatnam, 530049, India

³Department of Computer Science & Engineering, Vardhaman College of Engineering (Autonomous), Hyderabad, 501218, India

⁴Department of Informatics and Computing, Singidunum University, Serbia

⁵Computer Science Department, College of Computer and Information Sciences, Princess Nourah Bint Abdulrahman University, Riyadh, 11564, Saudi Arabia

⁶Information Systems Department, College of Computer and Information Sciences, Princess Nourah Bint Abdulrahman University, Riyadh, 11564, Saudi Arabia

⁷Department of Mathematics, Faculty of Science, New Valley University, El-Kharga, 72511, Egypt

*Corresponding Author: Romany F. Mansour. Email: romanyf@scinv.au.edu.eg

Received: 09 May 2021; Accepted: 14 June 2021

Abstract: Smart city-aspiring urban areas should have a number of necessary elements in place to achieve the intended objective. Precise controlling and management of traffic conditions, increased safety and surveillance, and enhanced incident avoidance and management should be top priorities in smart city management. At the same time, Vehicle License Plate Number Recognition (VLPNR) has become a hot research topic, owing to several real-time applications like automated toll fee processing, traffic law enforcement, private space access control, and road traffic surveillance. Automated VLPNR is a computer vision-based technique which is employed in the recognition of automobiles based on vehicle number plates. The current research paper presents an effective Deep Learning (DL)-based VLPNR called DL-VLPNR model to identify and recognize the alphanumeric characters present in license plate. The proposed model involves two main stages namely, license plate detection and Tesseract-based character recognition. The detection of alphanumeric characters present in license plate takes place with the help of fast RCNN with Inception V2 model. Then, the characters in the detected number plate are extracted using Tesseract Optical Character Recognition (OCR) model. The performance of DL-VLPNR model was tested in this paper using two benchmark databases, and the experimental outcome established the superior performance of the model compared to other methods.

Keywords: Deep learning; smart city; tesseract; computer vision; vehicle license plate recognition

1 Introduction

There is a tremendous increase in the usage of vehicles in recent years, thanks to rapid economic growth of the country. In smart cities, road safety can be achieved for people through automated VLPNR process. VLPNR makes a significant gain in real-time under several aspects. It is useful in several applications like automated toll fee collection systems [1], car parking access controls [2] and road traffic control [3]. VLPNR is an active research domain that received more attention in the recent years. Various applications have been developed recently deploying intelligent transportation and surveillance systems along with the enhancement of digital camera and increased computation complexity. These systems are intended to recognize vehicles using their number plates. Such systems offer automated

SECURITY AND PRIVACY

RESEARCH ARTICLE

Smart contract-based land registry system to reduce frauds and time delay

Sandeep Kumar Panda, Gouse Baig Mohammad, Sachi Nandan Mohanty , Sipra Sahoo

First published: 15 June 2021

<https://doi.org/10.1002/spy2.172>

Get access to the full version of this article. View access options below.

Institutional Login

College Of Engineering Pune does not provide access to this content.



Log in with a different institution

Log in to Wiley Online Library

If you have previously obtained access with your personal account, please log in.

[Log in](#)

Purchase Instant Access

- | | |
|---|----------------|
| <input type="radio"/> 48-Hour online access | \$12.00 |
| Details | ▼ |
| <input type="radio"/> Online-only access | \$20.00 |
| Details | ▼ |
| <input type="radio"/> PDF download and online access | \$49.00 |



Sustainable Computing: Informatics and Systems

journal homepage: www.elsevier.com/locate/suscom



Forecasting energy generation in large photovoltaic plants using radial belief neural network

Yuvaraj Natarajan^a, Srihari Kannan^{b,c}, Chandragandhi Selvaraj^b, Sachi Nandan Mohanty^d

^a Training and Research, ICT Academy, Chennai, 600096, India

^b Department of Computer Science and Engineering, SNS College of Technology, Coimbatore, 641107, India

^c Department of Computer Science and Engineering, JCT College of Engineering and Technology, Coimbatore, 641105, India

^d Department of Computer Engineering, College of Engineering Pune, pune, India

ARTICLE INFO

Keywords:

Photovoltaic
Back propagation neural network
Restricted boltzmann machines
Radial belief neural network

ABSTRACT

Forecasting the energy generation from the solar power is considered challenging due to inaccuracies in forecasting, reliability issues and substantial economic losses in power systems. Hence, it is necessary to consider wide features from the solar power generation point of view. In this paper, the study uses large features set to feed the deep learning classifier for optimal prediction of energy generation from the photovoltaic (PV) plants. The features selection and prediction modules automates the process of optimal prediction of energy using Radial Belief Neural Network (RBNN). The Restricted Boltzmann Machines (RBM) is used for rule set generation based on the feature extracted and the rule set generation is powered by action-reward based Reinforcement Learning (RL) method. The experiments are conducted with rich set of input features on large PV plants that ranges between 1, 50, 100 and 1000. The performance of the proposed model is compared with various metrics that includes: Root mean squared error (RMSE), normalized root mean squared error (NRMSE), mean bias error (MBE), Mean absolute error (MAE), Maximum absolute error (MaxAE), mean absolute percentage error (MAPE), Kolmogorov–Smirnov test integral (KSI) and OVER metrics, Skewness and kurtosis and variability estimation metrics. The simulation results show that the RBNN offers improved prediction ability with reduced errors than other deep and machine learning classifiers.

1. Introduction

Artificial Intelligence (AI) is a computing engine that performs complex tasks than a straightforward programming [16]. It offers the ability of exploiting itself to offer a power computation. In order to produce efficient and effective computations, wide features are often necessary to interpolate the knowledge on the field [21].

Solar energy solutions are the core components of sustainable energy for a clean, green or domestic energy supply. Global solar radiation is divided into two parts: one is the diffuse solar radiation originating from the dispersion of gas in the earth's atmosphere, water droplets and particles; and the other is direct solar radiation that is not scattered. The algebraic sum of the two elements is global solar radiation. Global and diffuse radiation values are important for applications in science and engineering.

In addition to optimum site selection for solar power plants, solar

radiation data are critical for their architecture, scale, service, and economic evaluation. The sizing of photovoltaic (PV) systems plays an important role. However such data, particularly in remote areas, is not always accessible. The only practical means of collecting radiation data in daily or hourly time scales is to produce synthetic solar radiation values. This is since only a handful of sites or areas are present in each country with calculated sequences of radiation values, and even when available they are typically available at various times. Several models in the study and numeric simulation were developed for the calculation of global solar radiation data, insolation and daily cleanliness index on different scales.

The existing methods [3–15, 17–26, 29, 30] at times falls with inaccurate forecast due to increased parameters and that causes higher prediction error. Usually, these models encounter into various other problems like missing data, inaccurate forecast on long run, prediction of data based on a specific location with inaccurate measurement

* Corresponding author.

E-mail addresses: ycs1239@gmail.com (Y. Natarajan), hurjontu6@gmail.com (S. Kannan), chandragandhi09@gmail.com (C. Selvaraj), sachinandan09@gmail.com (S.N. Mohanty).

<https://doi.org/10.1016/j.suscom.2021.100578>

Received 16 December 2020; Received in revised form 11 May 2021; Accepted 6 June 2021

Available online 9 June 2021

2210-5379/© 2021 Published by Elsevier Inc.



Biomedical Signal Processing and Control

journal homepage: www.elsevier.com/locate/bspc



A smart ontology-based IoT framework for remote patient monitoring

Nonita Sharma^a, Monika Mangla^b, Sachi Nandan Mohanty^c, Deepak Gupta^d, Prayag Tiwari^{e,f,g},
Mohammad Shorfuazzaman^h, Majdi Rawashdeh^h

^a Department of Computer Science & Engineering, Dr. B. R. Ambedkar National Institute of Technology Jalandhar, India

^b Department of Computer Engineering, Lokmanya Tilak College of Engineering, Navi Mumbai, India

^c Department of Computer Engineering, College of Engineering Pune, Pune, India

^d Maharaja Agrasen Institute of Technology, India

^e Department of Computer Science, Aalto University, Finland

^f Department of Computer Science, College of Computers and Information Technology, Taif University, Taif 21944, Saudi Arabia

^g Department of Business Information Technology, Princess Sumaya University for Technology, Jordan

ARTICLE INFO

Keywords:

COVID-19
Internet of Things (IoT)
Healthcare
Ontology
Remote monitoring
1D biomedical signals
Image processing

ABSTRACT

The Internet of Things (IoT) is the most promising technology in health technology systems. IoT-based systems ensure continuous monitoring in indoor and outdoor settings. Remote monitoring has revolutionized healthcare by connecting remote and hard-to-reach regions. Specifically, during this COVID-19 pandemic, it is imperative to have a remote monitoring system to assess patients remotely and curb its spread prematurely. This paper proposes a framework that provides the updated information of the Corona Patients in the vicinity and thus provides identifiable data for remote monitoring of locality cohorts. The proposed model is IoT-based remote access and an alarm-enabled bio wearable sensor system for early detection of COVID-19 based on ontology method using sensory 1D Biomedical Signals such as ECG, PPG, temperature, and accelerometer. The proposed ontology-based remote monitoring system analyzes the challenges of encompassing security and privacy issues. The proposed model is also simulated using cooja simulator. During the simulation, it is observed that the proposed model achieves an accuracy of 96.33 %, which establishes the efficacy of the proposed model. The effectiveness of the proposed model is also strengthened by efficient power consumption.

1. Introduction

Biomedical Signals play an essential role in IoT-based Healthcare monitoring systems. The integration of these different signals allows us to a better healthcare monitoring system and detect other health-related issues. Healthcare IoT is predominantly a resonant concept in medicine to connect a person, device, or virtually any place as it evolves to change the very concept of care. Healthcare with IoT and remote patient monitoring has transformed healthcare during the past few decades due to the field's technological revolution [1,2]. The application of IoT in the medical domain, referred to as the Internet of Medical Things (IoMT) paved the way for telemedicine, telecare, and remote health services. It encompasses the collection of various medical devices, systems, or applications that can connect to a computer network and further comprising of the collection of health data, its analysis, and transmission through the Internet in consort with connected medical devices and

medical applications. The future of IoMT has potential as a result of cloud computing that allows connected devices to store the data on the cloud in order to provide uninterrupted availability, thus opening new opportunities in the field of healthcare. Further, IoMT is the first generation of wireless healthcare IT systems and thus is an essential milestone in developing smart healthcare systems and medical devices. The various IoMT applications in hospitals and clinics include intelligent apps to connect patients and doctors in remote locations.

There are several technological solutions for remote patient monitoring (RPM) that offer various services and devices. Resultantly, RPM gains traction in the front line of healthcare with the introduction of IoMT technologies. When a doctor monitors patient remotely using IoT-based medical devices, there is enhanced scope for specialized and tailored treatments. This is achieved as a result of enhanced access to remote patient data in the future. In this direction, bio wearable trackers are the principal component as they can collect, analyze, generate, and

* Corresponding author.

E-mail addresses: nonita@nitj.ac.in (N. Sharma), manglamonika@gmail.com (M. Mangla), sachi.nandan19@gmail.com (S.N. Mohanty), deepak.gupta@nitj.ac.in (D. Gupta), prayag.tiwari@aalto.fi (P. Tiwari), m.shorfuazzaman@psut.edu.jo (M. Shorfuazzaman), m.rawashdeh@psut.edu.jo (M. Rawashdeh).


<https://doi.org/10.1016/j.bspc.2021.102717>

Received 13 March 2021; Received in revised form 21 April 2021; Accepted 29 April 2021

Available online 18 May 2021

1746-8094/© 2021 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

A fuzzy-based expert system to analyse purchase behaviour under uncertain environment

Doan Van Thang¹ · Monika Mangla²  · Suneeta Satpathy³ · Chinmaya Ranjan Pattnaik⁴ · Sachi Nandan Mohanty⁵

Received: 1 July 2020 / Accepted: 18 January 2021 / Published online: 6 April 2021
© Bharati Vidyapeeth's Institute of Computer Applications and Management 2021

Abstract This study develops a Mamdani based Fuzzy inference model to explore the behaviour of customers during purchase of an E-commerce product under an uncertain environment. For the purpose of illustration, product laptop has been considered. The data for this study is primarily collected through questionnaire that involved around 464 participants who are habituated to such online purchase, thus, improving the authenticity of the study. Six such independent input variables like Brand name, Processor speed, RAM capacity, internal storage, Screen size and Graphics are considered in the study. The study proposes Mamdani based Fuzzy inference model that has six inputs and one output. Each input variable is measured on a

scale expressed in linguistic terms. For the model, set of all possible rules are generated in the form of antecedent and consequences principle. The proposed model establishes a basis for understanding the influence of various input parameters on the purchase behaviour.

Keywords FLC · E-commerce · Purchase behaviour · Uncertain environment

1 Introduction

In the era of technological revolution, Internet is accessible to individual on finger tips. This convenient access to Internet has resulted a significant transformation in the shopping habits. Moreover, it also leads to emergence of new business entities (online and offline) in market and thus leading to explosion of data [8]. Each online business entity is trying its level best to garner maximum share of business and thus, have been trying various tactics to lure customers. If these companies succeed in attracting a significant portion of the market, it will boost their professional reputation and brand image [10]. Thus, E-commerce is a key business strategy which enables companies to achieve their goals and improve their position as online purchase makes a huge share of each business.

Apart from numerous benefits, online purchase has some associated challenges as well. Shopping through e-commerce sites is quite challenging as it involves a particular product by different brands and configuration, obscuring the process of product selection for customer. For Instance, product laptop is available in wide range of varieties (For Notebook, Ultrabook, Gaming laptop, Workstations); from different brands (HP, DELL, Wipro, HCL etc.); for different group of customers. With this wide range of options,

✉ Monika Mangla
manglamona@gmail.com

Doan Van Thang
vanthangdn@gmail.com

Suneeta Satpathy
suneeta1912@gmail.com

Chinmaya Ranjan Pattnaik
chinmaya.pattnaik@rediffmail.com

Sachi Nandan Mohanty
sachinandan09@gmail.com

¹ Faculty of Information Technology, Industrial University of Ho Chi Minh City, Ho Chi Minh City, Vietnam

² Department of Computer Engineering, Lokmanya Tilak College of Engineering, Navi Mumbai, Maharashtra, India

³ Department of Computer Science and Engineering, College of Engineering Bhubaneswar, Bhubaneswar, Odisha, India

⁴ Department of Computer Science and Engineering, Ajaya Binaya Institute of Technology, Cuttack, Odisha, India

⁵ Department of Computer Engineering, College of Engineering Pune, Pune, Maharashtra, India



A sequential ensemble model for software fault prediction

Monika Mangla¹ · Nonita Sharma² · Sachi Nandan Mohanty³

Received: 10 September 2020 / Accepted: 11 November 2020

© The Author(s), under exclusive licence to Springer-Verlag London Ltd., part of Springer Nature 2021

Abstract

Unlike several other engineering disciplines, software engineering lacks well-defined research strategies. However, with the exponential rise in automation, the demand for software has observed an enormous elevation. Simultaneously, it necessitates having zero failures in the software modules to maximize the availability and optimize the maintenance cost. This has attracted many researchers to try their hand in formalizing the strategies for testing of software. Numerous researchers have suggested various models in this context. The authors in this paper present a sequential ensemble model to predict software faults. The employment of ensemble modeling in software fault prediction is motivated by its competence in various domains. The proposed model is also implemented on the 8 datasets taken from PROMISE and ECLIPSE repository. The proposed model's performance is evaluated using various error metrics, viz. average absolute error, average relative error, and prediction. The obtained results are encouraging and thus establish the competence of the proposed model.

Keywords Ensemble modeling · Software fault prediction · Normalization · Fault proneness · Software module

1 Introduction

Various researchers generally have well-defined research strategies that not only have detailed guidance but also possess simplified views from observers' perspectives. For instance, the public can understand large-scale medical studies well enough so as to discuss the risks associated with an experimental treatment. However, this is not true for software engineering researchers as they do not have any well-understandable guidance [1]. Various researchers have made several attempts to formalize software engineering research, but it fails to paint a comprehensive picture [2]. As a result, rigorous research is taking place in this dimension to fill the void. Authors in this paper attempt to formalize the method of software fault prediction through a sequential ensemble model [3, 4].

The motive for selecting this topic for research is that the prime reason for software failures is the faults present in

software modules affecting the software's reliability. It may lead to dissatisfaction among users, eventually leading to the downfall of the company. However, in the current scenario, when software demand is exponentially increasing in the industries, there is nearly a zero-tolerance for software faults. Additionally, the software has a considerable number of modules that further intricate the identification of fault-prone modules. This has further opened avenues for research in the field of software engineering, particularly in the field of software fault prediction (SFP) [5, 6].

SFP aims to thoroughly inspect the software's quality before its release by inspecting the fault vulnerability of the software modules [7]. Identification of fault vulnerable modules emphasizes a specific focus on these modules to efficiently manage the resources by reducing the number of faults post-implementation [8]. SFP focuses on accurately predicting the fault vulnerability of the software modules so as to maximize software availability. Moreover, it also helps to minimize the maintenance cost and thus achieves high-quality software products [9].

Machine Learning (ML) has demonstrated successful and widespread deployment for solving classification problems of SFP [10]. Here, classification problem refers to classifying Fault-Prone (FP) and Non-Fault-Prone (NFP) modules. Now, this classification problem in SFP has several associated challenges: class imbalance

✉ Nonita Sharma
nonita@nitj.ac.in

¹ Lokmanya Tilak College of Engineering, Navi Mumbai, India

² Dr. B.R. Ambedkar National Institute of Technology
Jalandhar, Jalandhar, India

³ College of Engineering Pune, Pune, India

Article

Ubiquitous Vehicular Ad-Hoc Network Computing Using Deep Neural Network with IoT-Based Bat Agents for Traffic Management

Srihari Kannan¹, Gaurav Dhiman², Yuvaraj Natarajan³, Ashutosh Sharma⁴, Sachi Nandan Mohanty⁵, Mukesh Soni⁶, Udayakumar Easwaran⁷, Hamidreza Ghorbani⁸, Alia Asheralieva^{9,*} and Mehdi Gheisari^{9,*}

- ¹ Department of Computer Science and Engineering, SNS College of Technology, Coimbatore 641035, India; harionto@gmail.com
- ² Department of Computer Science, Government Bikram College of Commerce, Punjabi University, Patiala 147002, India; gdhiman0001@gmail.com
- ³ Research and Development, ICT Academy, Chennai 600096, India; yraj1989@gmail.com
- ⁴ Institute of Computer Technology and Information Security, Southern Federal University, 344006 Rostov-on-Don, Russia; sharmaashutosh1326@gmail.com
- ⁵ Department of Computer Engineering, College of Engineering Pune, Pune 411005, India; sachinandan@ieee.org
- ⁶ Department of Computer Science and Engineering, Jagran Lakecity University, Bhopal 462044, India; soni.mukesh15@gmail.com
- ⁷ Department of ECE, KIT-Kalaignarkarunanidhi Institute of Technology, Coimbatore 641402, India; udayakumar.sujith@gmail.com
- ⁸ Department Electrical Engineering and Information Technology, Azad University of Tehran, Tehran, Iran; h.r.ghorbani@hotmail.com
- ⁹ Department of Computer Science and Engineering, Southern University of Science and Technology, Shenzhen 518055, China
- * Correspondence: aasheralieva@gmail.com (A.A.); mehdi.gheisari61@gmail.com (M.G.)

check for updates

Citation: Kannan, S.; Dhiman, G.; Natarajan, Y.; Sharma, A.; Mohanty, S.N.; Soni, M.; Easwaran, U.; Ghorbani, H.; Asheralieva, A.; Gheisari, M. Ubiquitous Vehicular Ad-Hoc Network Computing Using Deep Neural Network with IoT-Based Bat Agents for Traffic Management. *Electronics* **2021**, *10*, 785. <https://doi.org/10.3390/electronics10070785>

Academic Editor: Paul Mitchell

Received: 3 January 2021

Accepted: 17 February 2021

Published: 26 March 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: In this paper, Deep Neural Networks (DNN) with Bat Algorithms (BA) offer a dynamic form of traffic control in Vehicular Adhoc Networks (VANETs). The former is used to route vehicles across highly congested paths to enhance efficiency, with a lower average latency. The latter is combined with the Internet of Things (IoT) and it moves across the VANETs to analyze the traffic congestion status between the network nodes. The experimental analysis tests the effectiveness of DNN-IoT-BA in various machine or deep learning algorithms in VANETs. DNN-IoT-BA is validated through various network metrics, like packet delivery ratio, latency and packet error rate. The simulation results show that the proposed method provides lower energy consumption and latency than conventional methods to support real-time traffic conditions.

Keywords: deep neural network; VANETs; routing; IoT agents

1. Introduction

Vehicular Ad-hoc Networks (VANETs) are an important class of ubiquitous computing, which operate as a key technology for enabling the VANET applications [1–4].

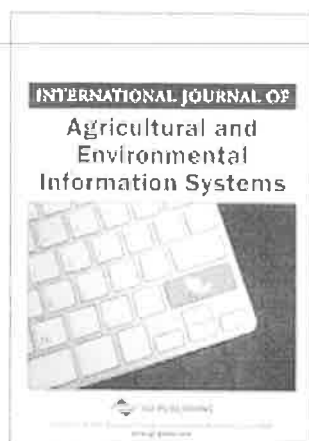
VANETs have recently provided their users with the means for safety management and data management, where the control methods are designed to work under any circumstances based on network dynamics [5]. On the one hand, the use of centralized [5] and distributed algorithms makes traffic management more complex one regarding the increasing adoption of vehicles in VANETs. On the other hand, the increase in traffic affects urban transport indirectly, and it increases the delay in transportation, fuel consumption, and emission values [6].

Even in real-time with precise traffic flow predictions, the traffic management systems in VANETs often play a vital role in predicting the traffic flow. The Intelligent Transport

10% Discount on All E-Books through IGI Global's Online Bookstore Extended

(10% discount on all e-books cannot be combined with most offers. Discount is valid on purchases made directly through IGI Global Online Bookstore (www.igi-global.com (<https://www.igi-global.com/>)) and may not be utilized by booksellers and distributors. Offer does not apply to e-Collections and exclusions of select titles may apply. Offer expires June 30, 2022.)

[Browse Titles \(https://www.igi-global.com/search/?p=&ctid=1\)](https://www.igi-global.com/search/?p=&ctid=1)



Agricultural Recommendation System for Crops Using Different Machine Learning Regression Methods

Mamata Garanayak (School of Computer Engineering, KIIT University (Deemed), Bhubaneswar, India), Goutam Sahu (Department of Computer Science and Engineering, Centurion University of Technology and Management, Bhubaneswar, India), Sachi Nandan Mohanty (Department of Computer Engineering, College of Engineering Pune, Pune, India) and Alok Kumar Jagadev (School of Computer Engineering, KIIT University (Deemed), Bhubaneswar, India)

Source Title: International Journal of Agricultural and Environmental Information Systems (IJAEIS) (/journal/international-journal-agricultural-environmental-information/1160) 12(1)

Copyright: © 2021

Pages: 20

DOI: 10.4018/IJAEIS.20210101.0a1

Article PDF Download

Open access articles are freely available for download

(/pdf.aspx?

tid=273707&ptid=2!

Abstract

Agriculture is a foremost field within the world, and it's the backbone in the Republic of India. Agriculture has been in poor condition. The impact of temperature variations and its uncertainty has engendered the bulk of the agricultural crops to be overripe in terms of their manufacturing. A correct forecast of crop expansion is a vital character in crop forecast management. Such forecasts will hold up the federated industries for accomplishing the provision of their occupation. ML is the method of finding new models from giant information sets. Numerous regressive ways like random forest, linear regression, decision tree regression, polynomial regression, and support vector regression will be used for the aim. Area and production are among the meteorological information that's made by necessary data. This paper figures out the yield recommendation of the crop by the accurate comparison of numerous machine learning ML regressions where the overall percentage improvement over several existing methods is 3.6%.

PDF

Help

Article Preview

Introduction


Top

Agricultural Recommendation System for Crops Using Different Machine Learning Regression Methods

Mamata Garanayak, School of Computer Engineering, KIIT University (Deemed), Bhubaneswar, India

Goutam Sahu, Department of Computer Science and Engineering, Centurion University of Technology and Management, Bhubaneswar, India

Sachi Nandan Mohanty, Department of Computer Engineering, College of Engineering Pune, Pune, India

 <https://orcid.org/0000-0002-4939-0797>

Alok Kumar Jagadev, School of Computer Engineering, KIIT University (Deemed), Bhubaneswar, India

ABSTRACT

Agriculture is a foremost field within the world, and it's the backbone in the Republic of India. Agriculture has been in poor condition. The impact of temperature variations and its uncertainty has engendered the bulk of the agricultural crops to be overripe in terms of their manufacturing. A correct forecast of crop expansion is a vital character in crop forecast management. Such forecasts will hold up the federated industries for accomplishing the provision of their occupation. ML is the method of finding new models from giant information sets. Numerous regressive ways like random forest, linear regression, decision tree regression, polynomial regression, and support vector regression will be used for the aim. Area and production are among the meteorological information that's made by necessary data. This paper figures out the yield recommendation of the crop by the accurate comparison of numerous machine learning ML regressions where the overall percentage improvement over several existing methods is 3.6%.

KEYWORDS

Crop Yield, Decision Tree (DT) Regression, Linear Regression (LR) Prediction, Machine Learning, Polynomial Regression (PR), Random Forest (RF) Regression, Support Vector Regression (SVR)

INTRODUCTION

Agriculture is the leading hold up and the paramount territory of the Indian wealth. The manufacturing of farming is very little. As the ultimatum for daily bread is heighten epidemically, the farmers, investigators, analysts, scientists, and government attempt to site further attempts and schemes to heighten the agricultural manufacturing to lodge the needs (Shastry et al., 2017). India is generally stubby despite being a huge sector and yields of crops per hectare. Correct productivity of crops hangs on numerous parameters such as properties of soil, irrigation, terrain, and climate.

Owing to several components such as change of climate, tumble levels of water, accidental rainfall, imprudent utilize of bio-pesticides, etc., the intensity of agricultural manufacturing is diminishing in India. The majority of farmers do not attain awaited crop yield for a variety of grounds (Kumar et al., 2018) To acknowledge manufacturing intensity, yield manufacturing is carried out which

DOI: 10.4018/IJAEIS.20210101.oa1

This article, published as an Open Access article on February 26th, 2021 in the gold Open Access journal, the International Journal of Agricultural and Environmental Information Systems (converted to gold Open Access January 1st, 2021), is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

Predicting mortality rate and associated risks in COVID-19 patients

Suneeta Satpathy¹ · Monika Mangla² · Nonita Sharma³ · Hardik Deshmukh² · Sachinandan Mohanty⁴

Received: 12 November 2020 / Revised: 4 January 2021 / Accepted: 8 January 2021 / Published online: 26 January 2021
© Korean Spatial Information Society 2021

Abstract The genesis of novel coronavirus (COVID-19) was from Wuhan city, China in December 2019, which was later declared as a global pandemic in view of its exponential rise and spread around the world. Resultantly, the scientific and medical research communities around the globe geared up to curb its spread. In this manuscript, authors claim competence of AI-mediated methods to predict mortality rate. Efficient prediction model enables healthcare professionals to be well prepared to handle this unpredictable situation. The prime focus of the study is to investigate efficient prediction model. In order to determine the most effective prediction model, authors perform comparative analysis of numerous models. The performance of various prediction models is compared using various error metrics viz. Root mean square error, mean

absolute error, mean square error and R^2 . During comparative analysis, Auto seasonal auto regressive integrated moving average model proves its competence over comparative models.

Keywords COVID-19 · Mortality rate · Predictive modelling · Risk assessment

1 Introduction

World health organization (WHO) has declared COVID-19 infectious disease to be a global pandemic in March 2020 in view of its exponential rise. Moreover, the spread of the virus crossed geographical boundaries spreading across the world. The spread is more concerning as the disease is closely related to respiratory tract infections. The additional symptoms of the disease include fever, cold and cough, breathlessness as well as diarrhea. In the worst cases, such type of disease can lead to death causing pneumonia [1, 2].

The maturation time period for the disease has been calculated to be 14 days but in some cases, it can be more than the estimated time [3]. The epidemic is also declared to be contagious as it can spread widely among the persons through respiratory droplets and contact with the persons suffering from COVID-19. To date no definite medicines or vaccines have been developed for such an epidemic except few preventive and awareness measures like social distancing, wearing masks, patient isolation, as well as travel constraints as guidelines, are made as compulsory rules to be adopted by everyone in the society [4]. But the success of these protocols being put forth in almost all countries depends on the people practicing the same

✉ Suneeta Satpathy
suneeta1912@gmail.com

Monika Mangla
manglamona@gmail.com

Nonita Sharma
nonita@nitj.ac.in

Hardik Deshmukh
hardikdeshmukh999@gmail.com

Sachinandan Mohanty
sachinandan09@gmail.com

¹ College of Engineering Bhubaneswar, Bhubaneswar, Odisha, India

² Lokmanya Tilak College of Engineering, Navi Mumbai, India

³ Dr. B.R. Ambedkar National Institute of Technology Jalandhar, Jalandhar, India

⁴ Department of Computer Sc & Engineering, ICFAI Tech, ICFAI Foundation for Higher Education, Hyderabad, India



A Heterogeneous Ensemble Forecasting Model for Disease Prediction

Nonita Sharma¹ · Jaiditya Dev² · Monika Mangla³ · Vaishali Mehta Wadhwa⁴ · Sachi Nandan Mohanty⁵ · Deepti Kakkar¹

Received: 21 July 2020 / Accepted: 12 November 2020 / Published online: 4 January 2021
© Ohmsha, Ltd. and Springer Japan KK, part of Springer Nature 2021

Abstract

The manuscript presents a bragging-based ensemble forecasting model for predicting the number of incidences of a disease based on past occurrences. The objectives of this research work are to enhance accuracy, reduce overfitting, and handle overdrift; the proposed model has shown promising results in terms of error metrics. The collated dataset of the diseases is collected from the official government site of Hong Kong from the year 2010 to 2019. The preprocessing is done using log transformation and z score transformation. The proposed ensemble model is applied, and its applicability to a specific disease dataset is presented. The proposed ensemble model is compared against the ensemble models, namely dynamic ensemble for time series, arbitrated dynamic ensemble, and random forest using different error metrics. The proposed model shows the reduced value of MAE (mean average error) by 27.18%, 3.07%, 11.58%, 13.46% for tuberculosis, dengue, food poisoning, and chickenpox, respectively. The comparison drawn between the proposed model and the existing models shows that the proposed ensemble model gives better accuracy in the case of all the four-disease datasets.

Keywords Bootstrapping · Bragging · Disease forecasting · Ensemble · Time series forecasting

Introduction

The rising prevalence of data acquisition applications leads to the collection of a vast amount of time-series data that enable forecasting for many medical applications. A multitude of end-use cases for time-series applications in the medical domain exists that aims to process thousands of time-series and millions of data points on an immense scale. Across the world, human populations are afflicted by

✉ Nonita Sharma
nonita@nitj.ac.in

Extended author information available on the last page of the article



SRCP: sharing and reuse-aware replacement policy for the partitioned cache in multicore systems

Soma Niloy Ghosh¹ · Lava Bhargava¹ · Vineet Sahula¹

Received: 27 January 2020 / Accepted: 26 May 2021 / Published online: 12 June 2021
© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

Abstract

Although multi-core processors enhance the performance yet the challenge of estimating Worst-Case Execution Time (WCET) of a task remains in such systems due to interference in shared resources like Last Level Caches (LLC). Cache partitioning has been used to reduce the interference problem by isolating the shared cache among each thread to ease the WCET estimation. However, it prevents information shared among parallel threads running in different cores. In current work, we propose sharing and reuse aware partitioned cache (SRCP) framework such that replication of shared information, data, or instruction, in different partitions could be avoided in LLC. Further, enhancement in existing cache replacement policy is proposed, which avoids eviction of cache blocks shared among multiple cores accessing partitioned last level cache. Tighter WCET, as well as improved resource utilization, is thereby ensured with the proposed framework. Experimental results show that SRCP shows significant improvement in cache hit-rate for PARSEC and SPLASH2 benchmarks as compared to least recently used cache replacement policy and outperforms EHC and TA-DRRIP, which are state-of-the-art replacement policies.

Keywords WCET · Shared cache · Multi-core processors · Cache partitioning · Real-time systems

1 Introduction

Integrating tasks in cyber-physical and real-time embedded systems with different levels of criticality onto a single hardware platform results in a mixed-criticality system. WCET is an essential parameter for designing mixed-criticality systems. WCET of an application is the

✉ Soma Niloy Ghosh
2016rcc9053@mnit.ac.in

Lava Bhargava
lavab@mnit.ac.in

Vineet Sahula
vsahula.ece@mnit.ac.in

¹ Electronics and Communication Engineering Department, Malaviya National Institute of Technology Jaipur, Jaipur, India

Orthogonal Attention: A Cloze-Style Approach to Negation Scope Resolution

Aditya Khandelwal

College of Engineering Pune
Pune, India

khandelwalar16.comp@coep.ac.in

Vahida Attar

College of Engineering Pune
Pune, India

vahida.comp@coep.ac.in

Abstract

Negation Scope Resolution is an extensively researched problem, which is used to locate the words affected by a negation cue in a sentence. Recent works have shown that simply finetuning transformer-based architectures yield state-of-the-art results on this task. In this work, we look at Negation Scope Resolution as a Cloze-Style task, with the sentence as the Context and the cue words as the Query. We also introduce a novel Cloze-Style Attention mechanism called Orthogonal Attention, which is inspired by Self Attention. First, we propose a framework for developing Orthogonal Attention variants, and then propose 4 Orthogonal Attention variants: OA-C, OA-CA, OA-EM, and OA-EMB. Using these Orthogonal Attention layers on top of an XLNet backbone, we outperform the finetuned XLNet state-of-the-art for Negation Scope Resolution, achieving the best results to date on all 4 datasets we experiment with: BioScope Abstracts, BioScope Full Papers, SFU Review Corpus and the *sem 2012 Dataset (Sherlock).

1 Introduction

Negation Scope Resolution involves finding the words in a sentence whose meaning was affected by the use of a negation cue (a word that expresses negation). Consider the following examples:

1. This place is[n't] *familiar*.
2. I do [not] *know the answer*.
3. I am [neither] *a saint* [nor] *a sinner*.

The words enclosed in square brackets are the negation cues, and the words in italics are their corresponding scopes. As we can see, negation cues can be of multiple types: an affix (1), a single word cue (2) and a multi-word cue (3). A sentence can also have multiple cue words, each of which can

have different scopes. Hence, the input to any system performing Negation Scope Resolution is the sentence-negation cue pair.

Approaches to solve the task of negation scope resolution have varied significantly over the years, ranging from simple rule based systems to BiLSTM and CRF classifiers. To represent the cue word input, traditionally, these methods utilized either cue dependent hand-crafted features (for CRF classifiers), or an additional binary input vector representing the cue words in the sentence. More recently though, Khandelwal and Sawant (2020) and Britto and Khandelwal (2020) used transformer-based architectures to address the task, and represented the cue words in the sentence via a preprocessing strategy: by augmenting the input sentence with a special token which is added before each cue word to tell the system that the following word is a cue word.

In this paper, we propose a novel approach to solving the problem of Negation Scope resolution: by viewing it as a Cloze-Style task, where the sentence is used as the Context input and the cue words are used as the Query input. We also develop a novel Cloze-Style Attention mechanism called Orthogonal Attention, which uses the key-query-value structure used in Self-Attention (Vaswani et al., 2017).

Cloze-Style Question Answering (and Machine Reading Comprehension) are 2 classes of problems that involve using 2 distinct inputs to produce the output desired. In most cases, the input is a query-context pair $\langle Q, C \rangle$ from which an answer $\langle A \rangle$ is generated. This is akin to posing a Question (Query) over a paragraph containing information (Context). The format of the answer can vary significantly, from pointing to a part of the context that contains the answer, as in SQuAD(Rajpurkar et al., 2016), to filling in the blanks of the Query using relevant information from the Context. Thus, these