

Hybrid PSO-Fuzzy Logic Data Clustering Technique for Data Mining on Encrypted Cloud Data

¹Dr AKash Saxena , ²Mr. Ajitendra Kumar Singh

¹ Professor, ² Student

Department of Computer Science & Engineering
Compucom Institute of Technology & Management, Jaipur

Abstract— Data mining is a promising emerging technology that can facilitate knowledge discovery of large amounts of data. A number of abstraction and implementation scenarios have been demonstrated to deal with relational data issues in a secure manner. As cloud computing grows stronger, more and more data owners are able to outsource data storage and even data processing capabilities. Because user data privacy issues are critical, sensitive data should be encrypted before being stored in the cloud service. In addition, all data mining operations (such as clustering) are performed only on encrypted data.

This work demonstrates the comparison between the application of hybrid PSO (particle swarm optimization) fuzzy logic clustering technique and the effective proof KNN method. The cloud data storage and query client is implemented in MATLAB and communicates via the TCP/IP protocol. All data stored on the cloud is encrypted, and all operations on the cloud data only occur on the encrypted data. User query data is also encrypted and the results are encrypted, which provides maximum data privacy and security.

Keywords—: Relational Data Mining, Cloud Data, Cryptography, Privacy Preserving (Cloud Mining), K-NN classifier, Hybrid Fuzzy PSO Classifier.

INTRODUCTION:

A social database is a gathering of information things composed as an arrangement of formally-depicted tables from which information can be gotten to or reassembled in a wide range of courses without reorganizing the database tables. The social database was imagined by E. F. Codd at IBM in 1970. Initially, databases were level(s). This implies the data was put away in one long content record, called a tab delimited document. Every passage in the tab delimited record is isolated by a unique character, for example, a vertical bar. Every section contains numerous snippets of data (fields) about a specific question or individual gathered together as a record. The content document makes it hard to look for particular data or to make reports that incorporate just certain fields from each record. Here's a case of the document made by a level database You can see that you need to seek consecutively through the whole record to accumulate related data, for example, age or pay. A social database enables you to effortlessly discover particular data. It additionally enables you to sort in light of any field and create reports that contain just certain fields from each record. Social databases utilize tables to store data. The standard fields and records are spoken to as segments (fields) and lines (records) in a table. With a social database, you can rapidly analyze data due to the course of action of information in sections. The social database display exploits this consistency to assemble totally new tables out of required data from existing tables. At the end of the day, it utilizes the relationship of comparative information to build the speed and adaptability of the database. The "social" some portion of the name becomes possibly the most important factor due to scientific relations.

By storing this information in another table, the database can create a single small table with the locations that can then be used for a variety of purposes by other tables in the database. A typical large database, like the one a big Web site, such as Amazon would have, will contain hundreds or thousands of tables like this all used together to quickly find the exact information needed at any given time.

LITRETURE REVIEW

Ms. Anjali J. Rathod Prof. V. S. Mahalle Described That Data mining is a powerful new technique to discover knowledge within the large amount of the data. A number of theoretical and practical solutions to query processing have been proposed under various scenarios. With the recent popularity of cloud computing, data owners now have the opportunity to outsource not only their data but also data processing functionalities to the cloud. Because of data security and personal privacy concerns, sensitive data (e.g., medical records) should be encrypted before being outsourced to a cloud, and the cloud should perform query processing tasks on the encrypted data only.

[1]

Riza C. Berkan and Sheldon L. Trubatch Described That The coming of the World Wide Web amid the most recent decade has brought exceptional difficulties for associations over the globe and propelled them to adjust to another request of data conveyance. The accessibility and availability of different kinds of mission basic data has changed huge numbers of the essential standards of business forms. [2]

K Sumalatha Y AppaRao Described That Information Mining has wide applications in numerous regions, for example, keeping money, prescription, logical research and among government organizations. Order is one of the ordinarily utilized errands in information mining applications. For as far back as decade, because of the ascent of different protection issues, numerous hypothetical and reasonable answers for the arrangement issue have been proposed under various security models. [3]

Feng Yao, Suleiman Y. Yerima, BooJoong Kang, Sakir Sezer Described That Keeping in mind the end goal to address the expanding trade off of client security on cell phones, a Fuzzy Logic based verifiable validation plot is proposed in this paper. The proposed conspire processes a total score in light of those highlights and an edge progressively in light of present and noteworthy information delineating client schedule. [4]

Balaji.s.c.k, B. Kishore Kumar Described That The PCs irregular exercises are recognized by framework resistance. Customary Intrusion identification transfers on broad learning of conventional aptitude, specifically, on the nature with the frameworks to be secured. To diminish this reliance, different information mining and machine learning strategies have been utilized as a part of the writing. In the proposed framework, we have outlined fluffy rationale based framework for successfully distinguishing the interruption exercises inside a system. [5]

Surya S.R. Swathy J. Described That Information mining has wide assortment of constant application in numerous fields, for example, money related, media transmission, natural, and among government organizations. Grouping is the one of the principle assignment in information mining. For as long as couple of years, because of the addition in different protection issue, numerous applied and attainable answer for the characterization issue have been proposed under various sureness model. [6]

Chetan Wankhede, Nikhil Daundka, Rohan Wadmare, Tushar Hinge Described That Information Mining has wide applications in numerous regions, for example, managing an account, solution, logical research and among government offices. Order is one of the normally utilized errands in information mining applications. For as far back as decade, because of the ascent of different protection issues, numerous hypothetical and useful answers for the order issue have been proposed under various security models. [7]

Akshay Dabi, Arslan Shaikh, Pranay Bamane, Vivek Thorat Described That Information Mining has wide applications in various zones for instance saving money, drug, and exploratory examination and among government workplaces. Arrangement is one of the normally used assignments as a piece of information mining applications. For whatever length of time that decade, in view of the climb of various security issues, various speculative and convenient responses for the course of action issue have been proposed under differing security models. [8]

Senthil kumar, N.a, Sudha, J.b, Muthukumar, V. Adhiparasakthi Described That The impact of the machining parameters and approach edge of carbide embeds over instrument wear at the flank confront, surface harshness and material evacuation rate are explored tentatively in this work. The ideal conditions are discovered by utilizing a half and half grey-fuzzy calculation. The dim social examination and fluffy rationale method are coupled to get a grey-fuzzy review for assessing multi-characteristics yield from the dark social coefficient of every reaction. [9]

C.Vanathy, Ramyaseruba Described That Information Mining has wide applications in numerous regions, for example, managing an account, solution, logical research and among government organizations. Arrangement is one of the normally utilized assignments in information mining applications. For as far back as decade, because of the ascent of different protection issues, numerous hypothetical and down to earth answers for the arrangement issue have been proposed under various security models. [10]

Shona D, Dr. M. Senthil Kumar Described That In a multi-way remote system like impromptu system, co-task is considered as a noteworthy substance for dependable information dispersal. Since, MANET is exceptionally defenceless against assault than its wired partners. Further, assaults with noxious expectation enormously strengthen and misuses the vulnerabilities of the system which thusly injures the execution of MANET. The methods utilized have a low ability of grouping assaults in view of the level of effects delivered by them towards the versatility of the system. [11]

Usha B A, Srinath N K, Narayan K, Sangeetha Described That Stegnoigraphy is a craftsmanship and exploration of secure data correspondence where the mystery information or secret information is covered up in have document. It is utilized as a part of various valuable applications like secure information correspondence, medicinal services and military. Classified data's are usually put away in advanced media and transmitted through web because of the fast development of web. In the event that the data's in pictures are changed then this may prompt wrong suspicions. [12]

Bharath K. Samanthula, Yousef Elmehdwi and Wei Jiang Described That Information Mining has wide applications in numerous territories, for example, managing an account, drug, logical research and among government offices. Characterization is one of the ordinarily utilized undertakings in information mining applications. [13]

Sandhya Maitra et al scrambled information. As a future work, we will examine and stretch out our examination to other order calculations. Genuine is really spinning around information i.e. information assumes a vital part in the present data time. Distinctive kinds of vulnerability are tended to in various types of information. Till date, probabilistic hypothesis, fluffy rationale, assurance factor was produced to deal with vulnerability. [14]

Oladipupo O. Olufunke, Uwadia O. Charles, Ayo K. Charles, Ajith Abraham, Vaclav Snasel Described That Throughout the years, one of the difficulties of a control based master framework is the likelihood of advancing a minimal and reliable information base with a less quantities of guidelines that are significant to the application area, so as to improve the fathomability of the master framework. In this paper, the half and half of fluffy administer mining intriguing quality measures and fluffy master framework is abused as a methods for taking care of the issue of clumsiness and upkeep difficulty in the manage based master framework. This adversely expands the information base space intricacy and decreases run get to rate which hinders framework reaction time. [15]

Mayadevi Kotlapure et al Information Mining has wide applications in various zones, for instance, keeping cash, solution, investigative investigation and among government workplaces. Request is one of the customarily used assignments as a piece of data mining applications. As far back as decade, because of the climb of various insurance issues, various speculative and conventional responses for the request issue have been proposed under different security models. Regardless, with the late

popularity of appropriated processing, customers now have the opportunity to outsource their data, in encoded structure, and furthermore the data mining assignments to the cloud. Since the data on the cloud is in encoded structure, existing security ensuring portrayal strategies are not proper. [16]

K Sandhya Rani, Naga lakshmi Described That Learning extraction process represents certain issues like getting to touchy, individual or business data. Protection intrusion happens attributable to the mishandle of individual data. Subsequently security issues are testing worry of the information excavators. Security safeguarding is a mind boggling assignment as it guarantees the protection of people without losing the precision of information mining comes about. In this paper, fluffy based information change techniques are proposed for protection saving bunching in brought together database condition. In the event that one, a fluffy information change strategy is proposed and different investigations are led by shifting the fluffy participation capacities, for example, Z-melded fluffy enrolment work, Triangular fluffy participation work, Gaussian fluffy enrolment capacity to change the first dataset. [17]

M. Sztandera, John F. Sanford Described That Fluffy rationale is connected to the classification separation issue identified with distinguishing proof of mammary sores as amiable or threatening. Aftereffects of other comparable investigations are assessed. The present examination extends the fluffy rationale approach by utilizing the typical circulation work as set participation capacities and utilizing a hereditary calculation to upgrade execution with the preparation segment. [18]

P. J. Escamilla-Ambrosio, N. Mort Described That In this work a novel Multi-Sensor Data Fusion (MSDF) design with blame tolerant attributes is proposed. This MSDF design depends on Kaman separating and fluffy rationale systems. In the first place, the estimation originating from every sensor is sustained to a fuzzy– adjusted Kaman channel (FKF). The adjustment is in the feeling of changing the estimation commotion covariance framework R utilizing a fluffy deduction framework (FIS) in light of a covariance coordinating strategy. [19]

Y.Dhanalakshmi and Dr.I. Ramesh Babu Amitabh Mishra Described That Interruption Detection is one of the critical region of research. Our work has investigated the likelihood of incorporating the fluffy rationale with Data Mining strategies utilizing Genetic Algorithms for interruption recognition. The explanations behind presenting fluffy rationale is two overlap, the first being the association of numerous quantitative highlights where there is no partition between ordinary activities and oddities. Along these lines fluffy affiliation tenets can be mined to locate the unique relationship among various security highlights. [20]

Lamine Mili Bradley Keith, E. Holbert Described That Supervisory Control and Data Acquisition (SCADA) frameworks speak to helplessness in essential foundations. For instance, an electric power framework is subjected to interruptions by means of its SCADA frameworks; nonetheless, the instrumentation gives recognizable varieties because of such obstruction. Displayed in this is a methodology that expands state estimation techniques utilizing a Hybrid Fuzzy System for blame observing and finding that plans to join data from different areas keeping in mind the end goal to recognize, disconnect, distinguish, and alleviate dangers to the framework. [21]

A. Gawedab, W.S. Marrasc, K. Davisd, J.M. Zuradae, D. Rodrickf Described That The primary goal of the investigation was to show the electromyography (EMG) reactions for 10 trunk muscles in manual-lifting assignments utilizing the fluffy social run arrange (FRRN). The FRRN used trunk-related factors, including sagittal and sidelong trunk minutes, pelvic tilt and pelvic pivot edges, and sagittal, parallel, and bend trunk edges as model data sources. The EMG information for display preparing and testing were arbitrarily chosen from a set gathered for 20 understudies. [22]

Dr. Anjali, B. Raut Described That DBSCAN is a thickness based grouping calculation. This calculation bunches information of high thickness. For discovering center articles customary DBSCAN utilizes this centre protest as focus centre which broadens outwards consistently. As centre articles are developing, the natural items which are held in memory, will possess a considerable measure of memory and I/O overhead which tends to low effectiveness of calculation. [23]

Silva, B.P. Amorim, P. G. Campos, L.M. Brasil Described That In the most recent decades an awesome development in the limit of creating and gathering information has happened. The advances in the information gathering and capacity, joined with the broad utilization of the Database Management System and Data Warehousing innovation, have added to this development. Be that as it may, the customary techniques used to control these information can produce useful reports, however they can't investigate the substance of the information to call attention to what learning premiums most. These troubles added to the emerging of astute apparatuses and procedures to break down information resultant from the developing field of the Knowledge Discovery in Databases (KDD). KDD isn't a paltry procedure and it is utilized to recognize substantial, conceivably valuable and intelligible examples in the database. [24]

III METHODOLOGY

3.1.1 System Block Diagram

A. Client – Cloud Interaction Interpretation

The system block diagram described in Fig3.1 demonstrates the operation of the entire system. User data is encrypted & stored on cloud via TCP/IP access. Also the clustering algorithm KNN & Hybrid PSO-FL are already stored on the cloud server. Whenever the client intends to run an clustering operation, it sends the clustering request with information such as type of clustering algorithm to be employed number of clusters required & other such parameter which do not number user data privacy are sent to cloud server. The cloud server performs the clustering operation on encrypted user data only using the parameters passed & then passes on the result to the client side. The client side receives the clustered data in encrypted form as, clustering was performed on encrypted data itself, & then the data is decrypted in to meaningful clustered data at client side.

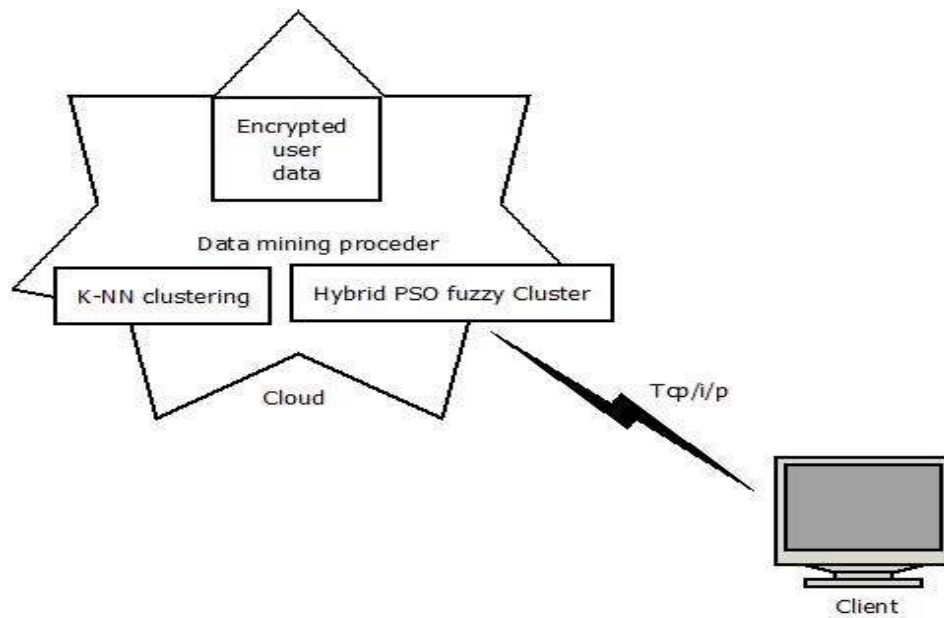


Fig 3.1 Client – Cloud Interaction Interpretation

Client – Cloud Interaction Interpretation diagram depicts the communication between the client code & the cloud server. As evident from the diagram itself, much of the processing & clustering is done at the cloud part & the client code is only responsible for query input, encryption & decryption of query & results & display of results acquired & decrypted.

B. Clustering & Data Storage Process Depiction

The same process described above is explained using a simple line diagram on in Fig3.2 which illustrates that when a clustering request originates, it is send to the server with information about which clustering algorithm to be employed (KNN Or Hybrid PSO-FL) & the encrypted data is divided in to encrypted clusters. The clustered encrypted, once received at client side, data is decrypted using a pre shared private key & meaningful clustering of user data is obtained securely.

A. System Block Diagram of Operation

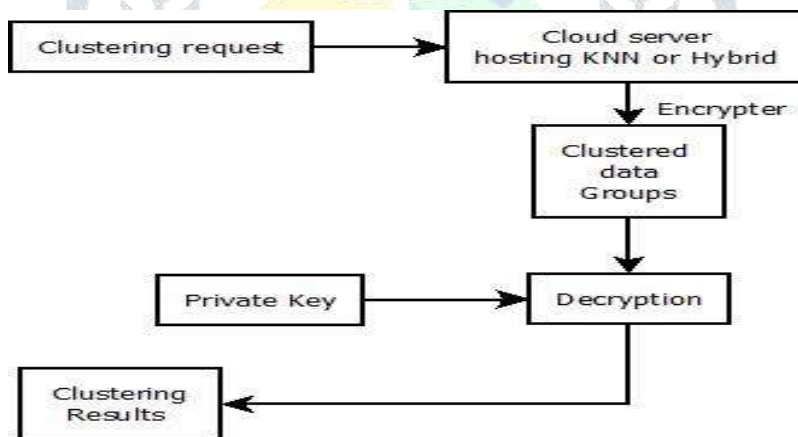


Fig 3.2 System Block Diagram

The clustering operation process flow is demonstrated by the above diagram. The clustering query is originated at the Client Side, it is encrypted, & it is then forwarded for the Cloud Server, hosting User Data & K-NN & Hybrid Fuzzy PSO Clustering Algorithms. After Clustering the Clustered Data Groups are sent to the client, which after decryption obtains the clustered results.

modern day classification system employing high performance distributed KNN comparing, cloud storage, mobile device access, simultaneously. Protecting confidentiality of data user's input queries and encapsulates data access parameters. Main menu in Clint server 8 processes, we will choose the process according step wise and we select fisher iris database first, second k-means database set and after select data wine set user can defined the data set after we encrypted data and upload the data to server k-means clustering is performed and performed adaptive PSO clustering employing fuzzy logic, above two process is taken for user encrypted data prevention.

B. Datasets

To analysis the traits of the particular clustering methods, four experimental datasets are used in this thesis. These datasets are taken from UCI machine learning repository which signifies examples of data with low, medium and high dimension. The description of datasets are defined in table 5.1 and in different sections.

TABLE 5.1 Summaries of Datasets

Name of Data Set	Number of classes	Number of features	Size of data set
Fisher Iris	3	4	150
K-Means	4	4	560
Wine	3	13	178

TABLE 5.1 Summaries of Datasets

C. Comparative Result

Table 5.2 summarizes the execution time (in seconds) obtained from the three algorithms ie K-Means, APSO and from the four datasets. Result has been obtained by using 100 iterations and 10 population size .The best results are highlighted with bold fonts.

Table 5.2 Execution Time

Dataset	K-Means	APSO
Iris	3.82	1.05
K-Means	6.61	2.84
Wine	1.19	1.34

Table 5.2 Execution Time

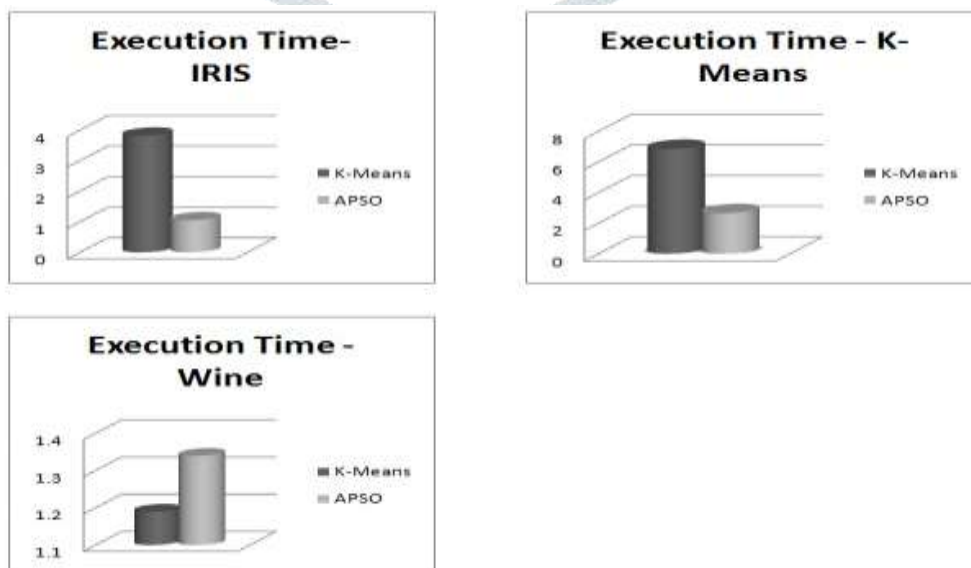


Figure 5.1

Figure 5.1 Execution time comparisons between K- Means, APSO on Iris, K-Means and Wine dataset As graph shows when we use datasets of low dimension, then APSO algorithm takes less time to execute than the existing k-means and APSO algorithms and when we use the high dimensional dataset than it is again true that APSO takes less time to execute than other two algorithms.

V CONCLUSION

Cloud computing has gained widespread acceptance in the past few years, and has indeed revolutionized data storage a remote services. As the user data may contain private & sensitive information, the data is generally encrypted before uploading to the cloud. A challenge presented by encrypted data is out sourcing of computation of data, because only data mining operation or quarry operation performed at the cloud end must be performed on encrypted data. K-NN classification is a popular & robust, PPDM (private-preserving data mining) technique, that is studied in contrast to the proposed hybrid fuzzy PSO clustering, as results demonstrated, the hybrid fuzzy-PSO clustering algorithm significantly improves performance & reduces time of classification. Truly random mixed key generation cryptography has been employed to provide for high data security & integrity. The results of clustering are encrypted to be decrypted at the user end using user's private key with which the user encrypted data while uploading to cloud.

VI FUTURE SCOPE

The proposed system demonstrate privacy preceding data mining (PPDM) over cloud data, but as cloud storage is a relatively nascent & developing technology, & and gaining wide spread popularity, the proposed technique have to adopt & improve to meet future challenges & expectations. One of the key security improvements sought is use of hybrid techniques such as cryptography combined with randomization. Another important adaptation is reduction of space & time complexity of PPDM techniques to effective manage cloud services disk space & power resources. Also the proposed system should be scalable to large volumes of data so as to cater to real life data mining challenge.

REFERENCES

- [1] Resolve the Classification Problem on Secure Encrypted Relational Data Ms. Anjali J. Rathod Prof. V. S. Mahalle M.E. Computer Engineering, Asst. professor, Department of SSGM College of Engineering, Computer Science & Engineering Shegaon,(M.S)444203,INDIA SSGM College of Engineering, anjalirathod93@gmail.com Shegaon(M.S)444203,INDIA vsmahalle@gmail.com
- [2] Fuzzy Logic and Hybrid Approaches to Web Intelligence Gathering and Information Management. Riza C. Berkan and Sheldon L. Trubatch Answer Chase, Inc. 34 Defense Street, Annapolis, 21401 Maryland, USA
- [3] K-Nearest Neighbor Classification over Semantically Secure Encrypted Relational Data K Sumalatha Y AppaRao, International Journal of Engineering Research in Computer Science and Engineering (IJERCSE) Vol 3, Issue 3, March 2016 All Rights Reserved © 2016 IJERCSE 485 Prasad B II/IV, Associate Professor Department of CSE, Marri Laxman Reddy Institute of Technology and Management (MLRITM) Hyderabad
- [4] Fuzzy Logic-based Implicit Authentication for Mobile Access Control SAI Feng Yao, Suleiman Y. Yerima, BooJoong Kang, Sakir Sezer Computing Conference 2016 July 13-15, 2016 | London, UK Centre for Secure Information Technologies, Queen's University Belfast Belfast, Northern Ireland, UK fyao02@qub.ac.uk, s.yerima@qub.ac.uk, b.kang@qub.ac.uk, s.sezer@ecit.qub.ac.uk
- [5] A New Intrusion detection system in data mining & fuzzy logic Balaji.s.c.k, B.Kishore Kumar International Journal of Modern Engineering Research (IJMER) www.ijmer.com Vol. 3, Issue. 6, Nov - Dec. 2013 pp-3425-3428 Assistant professor, SVIT, Hampapuram, Anantapuram (Dt), Andhra Pradesh
- [6] k -Nearest Neighbor Classification over Semantically Secure Encrypted Relational Data Surya S.R. Swathy J. International Journal of Computer Applications (0975 - 8887) Volume 133 - No.8, January 2016 Review on P G Scholar Department of Computer Science & Engineering College of Engineering, Perumon(CUSAT), Kerala, India Assistant Professor in CSE Department of Computer Science & Engineering College of Engineering, Perumon(CUSAT), Kerala, India.
- [7] K-Nearest Neighbor Classification over Semantically Secure Encrypted Relational Data. Chetan Wankhede, Nikhil Daundka, Rohan Wadmare, Tushar Hinge, Prof. M.A.Ansari Student, Dept. of IT, Rajarshi Shahu College of Engineering, Tathawade, Savitribai Phule Pune University, Pune, India International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 5, Issue 3, March 2016 Copyright to IJIRSET DOI:10.15680/IJIRSET.2016.0503197 3587
- [8] K-NN Classification Over Secure Encrypted Relational Data In Outsourced Environment Multidisciplinary Akshay Dabi, Arslan Shaikh, Pranay Bamane, Vivek Thorat,Journal of Research in Engineering and Technology, Volume 2, Issue 4, Pg 783-787 M38-2-4-10-2015 Prof. Popat Borse. Computer Engineering. Dr. D.Y Patil School of Engineering Pune, India.
- [9] Original scientific paper A grey-fuzzy approach for optimizing machining parameters and the approach angle in turning Advances in Production Engineering & Management Senthil kumar, N.a, Sudha, J.b, Muthukumar, V. Adhiparasakthi ISSN 1854-6250 Volume 10 | Number 4 | December 2015 | pp 195–208 Journal home: apem-journal.org http://dx.doi.org/10.14743/apem2015.4.202 AISI 1045 steel Engineering College, Melmaruvathur, Tamil Nadu, India College of Engineering, Anna University, Chennai, Tamil Nadu, India Saveetha Engineering College, Chennai, Tamil Nadu, India

- [10] K-NN Classification over Semantically Secure Encrypted Relational Data C.Vanathy, Ramyaseruba 1,2 Dept of CSE Sree Sastha Institute of Engg & Tech, Chennai
- [11] A Survey on Intrusion Detection Techniques in MANETs by Shona D, Dr. M. Senthil Kumar Volume 3, Issue 10, October 2015 International Journal of Advance Research in Computer Science and Management Studies Research Article / Survey Paper / Case Study Available online at: www.ijarcsms.com
- [12] A Secure Data Embedding Technique In Image Steganography For Medical Images International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 8, August 2014 Copyright to IJARCCCE www.ijarccce.com Usha B A, Srinath N K, Narayan K, Sangeetha K N Assistant Professor, Department of CSE, RVCE, Bangalore, India Professor and Dean PG Studies, Department of CSE, RVCE, Bangalore, India
- [13] K-Nearest Neighbor Classification over Semantically Secure Encrypted Relational Data Bharath K. Samanthula, Yousef Elmehdwi and Wei Jiang Email: {bspq8, ymez76, wjiang}@mst.edu March 10, 2014 Technical Report Department of Computer Science, Missouri S&T 500 West 15th Street, Rolla, Missouri 65409
- [14] A Hybrid Approach For Handling Uncertainty - Probabilistic Theory, Certainty Factor And Fuzzy Logic Sandhya Maitra et al., International Journal of Computer Science and Mobile Computing Vol.2 Issue. 11, November- 2013, pg. 70-78 © 2013, IJCSMC All Rights Reserved 70 Available Online at www.ijcsmc.com International Journal of Computer Science and Mobile Computing A Monthly Journal of Computer Science and Information Technology ISSN 2320-088X IJCSMC, Vol. 2, Issue. 11, November 2013, pg.70 – 78 Associate Professor - Department of Computer Applications and Institute of Information Technology and Management, India
- [15] A Fuzzy-Mining Approach For Solving Rule Based Expert System Unwieldiness In Medical Domain Oladipupo O. Olufunke, Uwadia O. Charles, Ayo K. Charles, Ajith Abraham, Vaclav Snasel Received: July 7, 2013 Revised and accepted: November 2, 2013
- [16] A Survey on k-NN Classification over Semantically Secure Encrypted Relational Mayadevi Kotlapure International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611 Volume 4 Issue 11, November 2015 www.ijsr.net Licensed Under Creative Commons Attribution CC BY ME Student, Department of Computer Engineering, Sinhgad Academy of Engineering, Pune, Maharashtra, India
- [17] Privacy Preserving Clustering Based on Fuzzy Data Transformation Methods M. Volume K Sandhya Rani, Naga lakshmi 3, Issue 8, August 2013 ISSN: 2277 128X International Journal of Advanced Research in Computer Science and Software Engineering Research Paper online at: www.ijarcsse.com
- [18] Classification Data Mining with Hybrid Fuzzy Logic Aggregation M. Sztandera John F. Sanford Information Systems Philadelphia University Philadelphia, PA 19144-5497 USA e-mail: SanfordJ@PhilaU.edu LES Computer Information Systems Philadelphia University Philadelphia, PA 19144-5497 USA e-mail: SztanderaL@PhilaU.edu
- [19] A Hybrid Kalman Filter-Fuzzy Logic Multisensor Data Fusion Architecture With Fault Tolerant Characteristics P. J. Escamilla-Ambrosio, N. Mort Department of Automatic Control and Systems Engineering University of Sheffield Mappin Street, Sheffield S1 3JD, United Kingdom Phone: +44 (0) 114 222 5619, Fax: +44 (0) 114 222 566
- [20] Intrusion Detection Using Data Mining Along Fuzzy Logic and Genetic Algorithms Y.Dhanalakshmi and Dr.I. Ramesh Babu Amitabh Mishra IJCSNS International Journal of Computer Science and Network Security, VOL.8 No.2, February 2008 27 Manuscript received February 5, 2008 Manuscript revised February 20, 2008 Research Scholar Professor Dept of Computer Science & Engineering Acharya Nagarjuna University, Guntur, A.P. India
- [21] Intrusion detection through SCADA systems using fuzzy logic-based state estimation methods Lamine Mili Bradley Keith, E. Holbert 58 Int. J. Critical Infrastructures, Vol. 3, Nos. 1/2, 2007 Copyright © 2007 Inderscience Enterprises Ltd. Department of Electrical Engineering Arizona State University Tempe, Arizona 85287-5706, USA E-mail: holbert@asu.edu Corresponding author Department of Electrical and Computer Engineering Virginia Tech Blacksburg, Virginia 24061, USA E-mail: mishra@vt.edu Department of Electrical and Computer Engineering Virginia Polytechnic Institute and State University Alexandria Research Institute Alexandria, VA 22314, USA E-mail: lmili@vt.edu
- [22] A fuzzy relational rule network modeling of electromyographical activity of trunk muscles in manual lifting based on trunk angles. A. Gawedab, W.S. Marrasc, K. Davisd, J.M. Zuradae, D. Rodrick a International Journal of Industrial Ergonomics 36 (2006) 847-859, moments, pelvic tilt and rotation angles W. Karwowskia, Center for Industrial Ergonomics, University of Louisville, Lutz Hall, Room 445, Louisville, KY 40292, USA
- [23] A Hybrid Framework using Fuzzy if-then rules for DBSCAN Algorithm Advances in Wireless and Mobile Communications. Dr. Anjali, B. Raut ISSN 0973-6972 Volume 10, Number 5 (2017), pp. 933-942 © Research India Publications <http://www.ripublication.com> Head, Department of Computer Science & Engineering H.V.P.M'S, C.O.E.T., Amravati. (MS) India.
- [24] Integration of Data Mining and Hybrid Expert System I.G.L. da Silva, B.P. Amorim, P. G. Campos, L.M. Brasil Informatics Laboratory in Health (LABIS) Nucleus of Studies and Technology in Biomedical Engineering (NETEB) Federal University of Paraíba (UFPB), Campus I - Postal Box 5095.