The Technoarete Transactions on Intelligent Data Mining and Knowledge

ENRICHED PUBLICATIONS

The Technoarete Transactions on Intelligent Data Mining and Knowledge

Aim & Scope

Technoarete Transactions on Intelligent Data Mining and Knowledge Discovery (TTIDMKD) is a double-blinded, peer-reviewed open access International Journal published by Technoarete Publishing. With the exponential growth of data in today's digital world collected through the internet there is a definite need for mining useful information and discovering knowledge using Artificial Intelligence. The journal aims to promote and coordinate research development between academic experts, database manager, backend developer, knowledge engineers and to share their research findings in the broad area of data integration, data exchange, data architecture, data mining and warehousing, intelligent knowledge acquisition, knowledge dissemination and discovery techniques.

The journal invites original research articles in the sub discipline of basics of data mining-spatial data mining, graphing parallel, and Distributed Data Mining, Algorithms and Data-Preprocessing technique, Web mining Multimedia data mining, Data visualisation techniques, Data stream mining, Information security in data mining, Advancement of data Mining in the area of bioinformatics, Financial Modelling, Classification, Clustering, Educational data mining, Social network data mining Image analysis, Biometric are also recovered under the scope of this journal. Various knowledge Discovery and knowledge processing strategy such as knowledge representational Framework knowledge Discovery Framework, Data preprocessing and post processing strategies OLAP and Data mining, Expert system, Decision support system, Statistical Techniques, Data analysis Data protection KOD framework and process Online data mining and knowledge Discovery are also covered under the scope of this journal.

The Technoarete Transactions on Intelligent Data Mining and Knowledge

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Contents

Implementation of Blockchain Based Data Storage and Verification for Access

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A B S T R A C T

Verification for access is used in software to secure information of the user. There are some kinds of verification process, however, as per the secondary information; major users prefer the biometric verification process. On the other hand, block chain based data storage is used in businesses, banking sectors, and other sectors. In this case, this process helps to store confidential information with proper security. This research is focused on the implementation process of block chain based data storage and verification access control. The aim of this research is to demonstrate the importance of block chain data storage and verification access control in various sectors to store and secure information of the users. This research has used the quantitative research data collection method to collect information on block chain and verification access. As per the information, it can be stated that the user has increased demand for block chain due to its verification ability, and it's other benefits such as increased speed of work, traceability, track of confidential data, and others. In this research, the implementation process of block chain has been discussed with an algorithm flowchart. As per the flowchart, there is a node that helps to store the information of the user and increase the value of block chain data storage. As per the result of this research, there are few steps to implement data storage and those are increasing knowledge on block chain and verification, and strategizing block chain, and plan to implement that. After that, the simulation process needs to be entered in this process to check the progress of implementation. In this research work, the FMS model is discussed to focus on the implementation of verification for access.

KeywordsBlockchain, CSE, data storage, technology, verification access control.

INTRODUCTION

Blockchain based data storage is the process that helps to store and secure information. In this process, the information which is in digital format can be saved. Blockchain has an important role in crypto currency systems and others. This technology helps different sectors to secure their confidential information in block chain based data storage. In addition to that, verification for access is used to verify users access the information and this process helps to confirm that the data is secure. The aim of this research is to elaborate the impact of block chain based data storage and verification for access in different sectors to save and secure confidential credentials.

ROLE OF BLOCK CHAIN BASED DATA STORAGE

The main role of ***block chain based data storage*** is saving information in the node of the computer network. This process is beneficial for users because it helps to secure information of users such as banking transactions, record of other information of businesses, banks, and other kinds of crucial credentials [1]. In businesses, it helps to secure information of employees, company finance, suppliers, and other stakeholders. On the other hand, in banking sectors, the information of banking transactions, bank users, account details, and other kinds of crucial information are stored and secured. Needless to

say, block chain helps to increase trust of users on database management, and in CSE. Along with that, this process of the CSE department helps to increase transparency of data which is shared across a business network.

In addition to that, block chain helps to increase traceability of the data shared in the database system and it delivers cost savings with new efficiencies. The block chain based data storage helps different sectors through cost savings speed, along with, it reduces overhead costs, reducing paperwork errors, and transaction cost [2]. Needless to say, it helps to increase efficiency of a business and increase automation in the business process. Apart from that, it eliminates middlemen for the verification process.

IMPORTANCE OF VERIFICATION FOR ACCESS

Verification for access is the crucial process in the block chain process that helps to verify users to access the saved information. This process helps to confirm the user that the information is secured in that technical process. Verifying the user block chain helps to increase trust of users in block chain and it also helps to make the information confidential [3]. This verification process eliminates fraud and ensures that no one can access that specific information without that user. In the verification process, the users need to provide their ID proof to access the specific information such as banking transaction, audit, and others. It helps to prevent third parties from using the information of the user to use the crucial data to make trades.
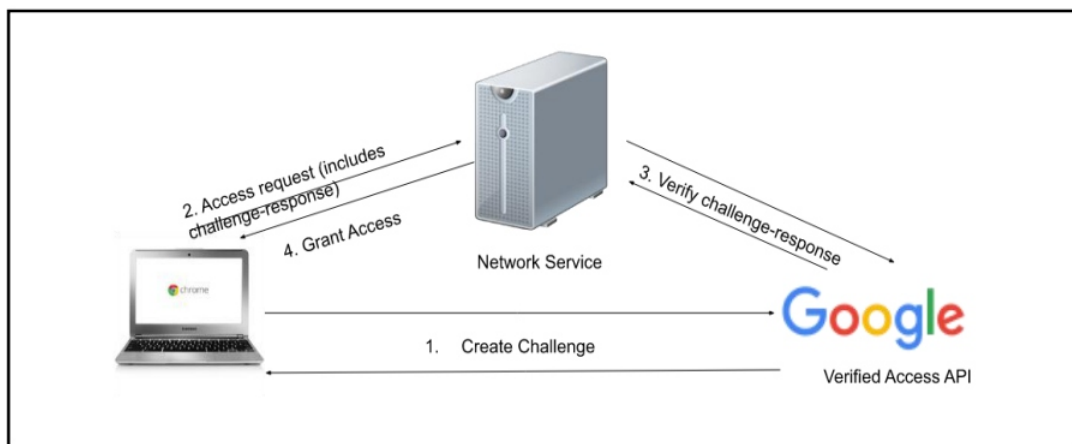
Figure 1: Verification of Access
(Source: [3])

There are some advantages of verification of access in CSE such as it helps to avoid manipulation of accounts of block chain users. Apart from that, it protects users' accounts against improper use of users' information. Verification and validation of CSE ensures valuation of assets and proper recording of users credentials [4]. In addition to that, the verification process helps to reduce the possibilities of product failure and defects in the business procedures.

IMPLEMENTATION OF BLOCKCHAIN BASED DATA STORAGE AND VERIFICATION FOR ACCESS

Blockchain implementation is the substitution of block chain solutions into software systems of users. There are some stages to implement block chain based data storage in a hardware and software system. In the implementation process, the first phase is to learn about block chain such as the role of block chain, process to use block chain, and other knowledge related to block chain based data storage [5]. Therefore, the second step of implementing block chain is developing a strategy of block chain and

integrating the block chain strategy into the strategy of business. Moreover, the user of block chain needs to create an ROI model and other costing information to implement it in the business process.
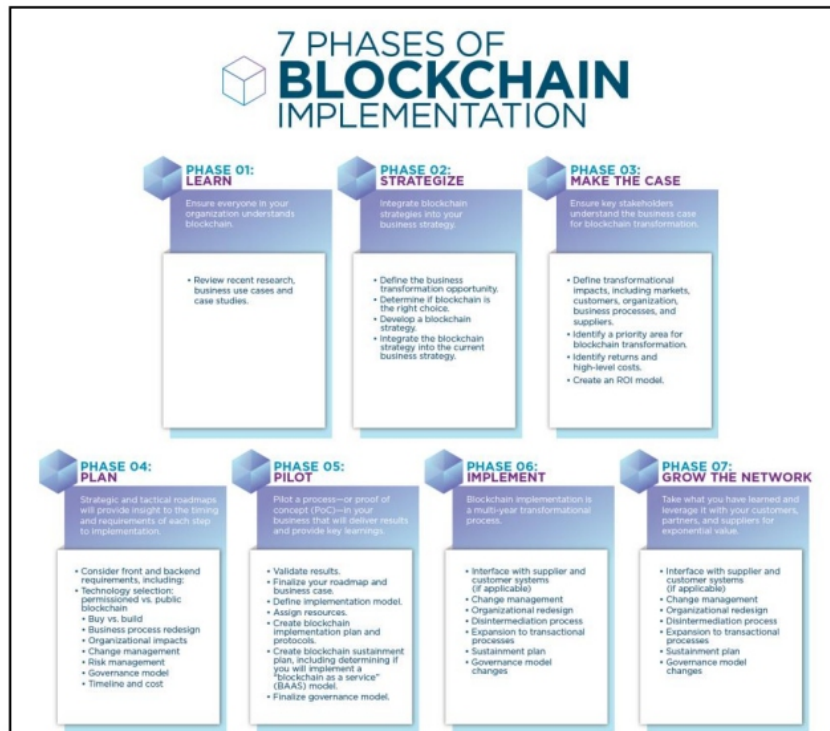
Figure 2: Blockchain Implementation Phases
(Source: [5])

After that, the user needs to focus on the business development procedures through risk management, change management, cost management, and then needs to make a plan to implement block chain. Then the user needs to pilot the block chain process in the company to reassure that the planning is successful and after that the implementation process can be started. In this process, verification for access processes needs to include with block chain to develop the security in the business [6]. Verification access control systems need to apply in the business process to increase the ability of use of block chain in the business process. Through the FSM model of computation, the efficiency of verification of access can be checked. It is the mathematical process that helps to implement a simulation process. Needless to say, this model can help to simulate the efficiency of verification access in block chain to improve the security process.

MATERIALS AND METHODOLOGY

5.1 Research Philosophy
Positivism research philosophy is used in this research process to collect authentic information. Positivism is defined as a process that can help to collect factual knowledge of a research topic through observation [7]. This research is related to the block chain implementation in anysector to save information of that sector. The users want safe and secure technology to store information and block chain can meet the demand of the user. Through using positivism philosophy, the research information can get easily through an observation process and it helps to provide real data to readers.

5.2 Research Design

Descriptive research design is used in this research of implementation of block chain based data storage and verification for access. Descriptive research design is the process of a research method that helps to demonstrate the information of a research topic with a proper example [8]. In this research, the description of verification of access and block chain has been given. Verification process in the technological field is required to secure the information of the user. For example, in the banking department, if a user is not verified, then after a while the user has a high chance to get fraud from any third party.

5.3 Research Strategy

Quantitative research strategy is used in this research to complete the research work with proper quantitative information. Quantitative research is the research strategy that collects numeric information of a research. In this research, the importance of block chain and verification access control is discussed properly through focusing the users of block chain. In addition to that, the percentage of usage of verification access control is given with graphs and tables. There are approximately 80.24M people using block chain globally in 2021 [9]. Needless to say, there are many benefits of using block chain that allows people to gather and store their information securely.

5.4 Data Collection Method

Secondary quantitative data collection method is used in this research to provide the information of block chain and verification access. The information of secondary quantitative studies has been collected from the journals, newspaper, and academic pdfs. The journals of this research are collected from Google Scholar to provide authentic information related to the topic. As per the collected information, the block chain based data storage is used in every sector to check property confinement checking, rule coverage information storing [10]. On the other hand, verification of access is used by the users to check models to implement block chain in the business.

DATA ANALYSIS METHOD

As per the collected information of block chain management and implementation in the business and other sectors, it helps to collect confidential information of banking transactions, audit, and profit and loss. In addition to that, as per the business perspective, the block chain implementation helps in the collection of business employee's personal and professional information, salary and wages data, and others. From 2017, the user rate of block chain is increasing and the block chain has a demand in the marketplace because of its security and verification policy [11]. Verification control helps the users to get more satisfaction to store information properly and they feel safe because the block chain cannot be accessed by third parties.

There are many kinds of verification processes that help to verify that the user is opening the document which is already stored in the block chain based data storage. Through using pin, personal security questions, traditional pass code, biometric authentication and others, the block chain technology can be secured to safe and secure information [12].

Table 1: Global Number of Blockchain User

Year	Number of Users
2017	21.51M
2018	31.91M
2019	44.51M
2020	63.48M
2021	80.24M

(Source: Self-developed)
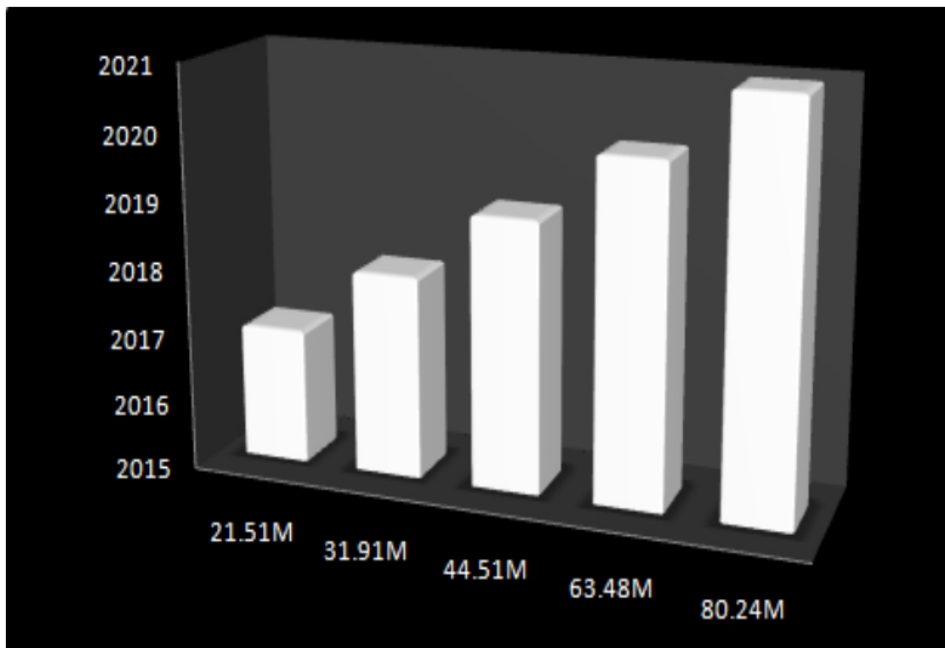
Figure 3: Global Number of Blockchain User
(Source: Self-developed)

As per the above graph, from 2017 to 2021, the user rate of block chain is increasing. In 2016, the rate of users was 21.51M of block chain based data storage [9]. Needless to say, the demand of block chain increased in these years for its beneficial processes. In 2021, 80.24M people users joined the block chain based data storage [9]. In this case, the users also have preference on the verification process because there are some kinds of verification process that can secure information differently. For example, a pin can easily be hacked, however, SMS based authentication cannot be hacked easily. On the other hand, biometrics is a more secure authentication process than other verification processes.

Table 2: Preferred Authentication Process

User Percentage	Verification process
Pin	30%
Traditional Passwords	38%
SMS based authentication	64%
Phone call verification	57%
Biometric authentication	74%
Personal security Question	33%

(Source: Self-developed)
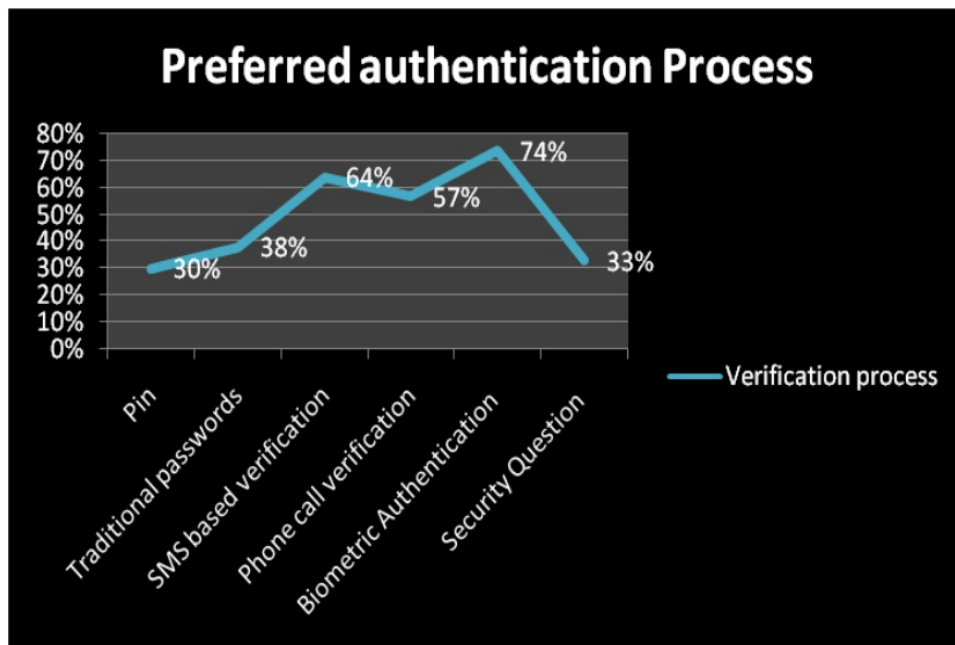
Figure 4: Preferred verification process
(Source: Self-developed)

As per the above graph and table, it can be stated that the users of block chain prefer biometric verification processes to secure their information. 74% of users like biometric processes to verify themselves to open confidential information from block chain [13]. On the other hand, the users do not prefer the pin and security question as verification access control.

RESULT AND DISCUSSION

7.1 Result
Implementation of block chain based data storage and verification of access is used mostly in the business operations, banking operations, and crypto currency. As per the above analysis, it can be stated that block chain technology stores confidential information with a proper security and that is why the users have trust on this process [14]. Through using different kinds of pass codes, biometrics, login process, and id checking process, the block chain can be accessed by the user to access the data.
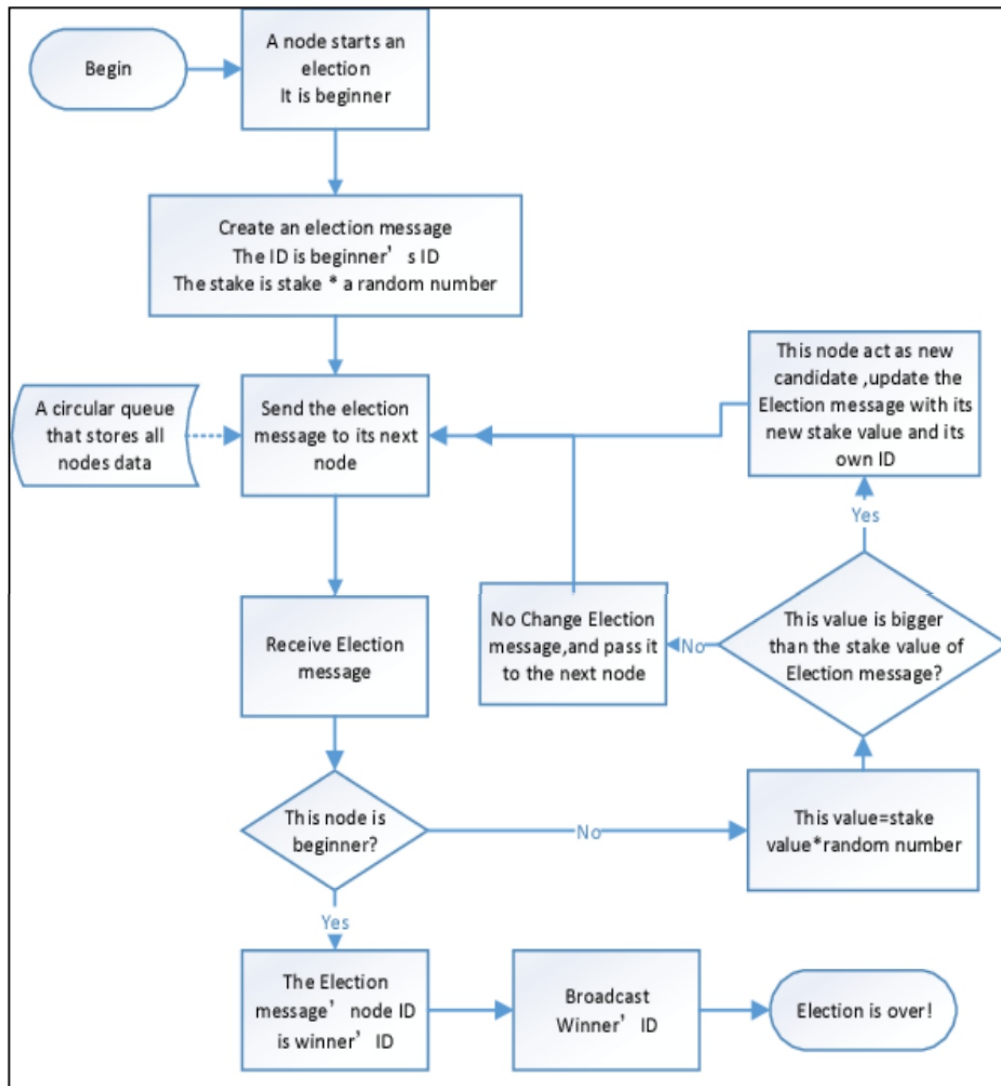
Figure 5: Algorithm Flowchart of Blockchain Implementation
(Source: [15])

As per the above algorithm flowchart, in the block chain implementation process, the user needs to create an Id in the block chain based data storage. Therefore, the information of the user can be sent in the block chain data storage process [15]. After sending data in this process, the data is sent to the nodes from the queue of information. The node of the block chain updates the information of the user and saves the document securely
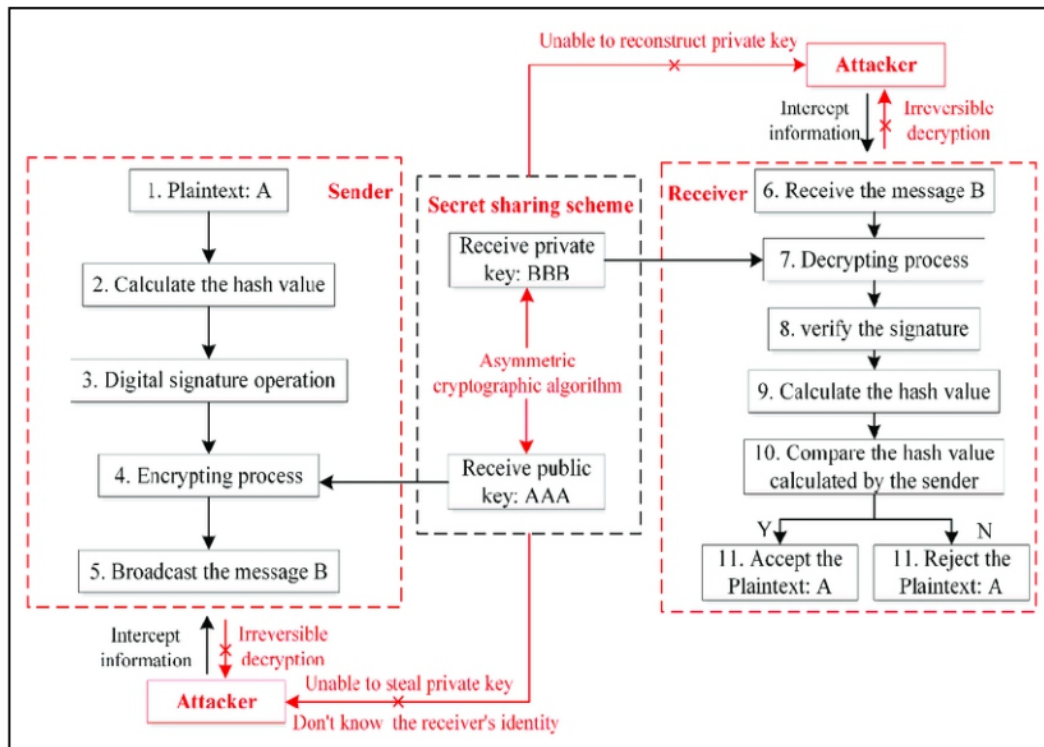
Figure 6: Algorithm Flowchart of verification of access
(Source: [16])

The above algorithm flowchart is related to the verification process usability and checking process of the security by simulating an attacker trying to open the block chain account of a user. Through verifying the signature of the user, the user needs to open the block chain process, therefore the user needs to accept the access process [16]. In this case, the attacker cannot open the file from the block chain because the verification process is strong and the implementation of the block chain can be effective in the business process to secure important information. As a result of the verification process, connecting block chain with the asset of the user is more secure. In this case, the user can access the information when the attacker tries to open the data from the block chain.

7.2 Discussion

As per the above research analysis and result, it can be stated that the block chain process is more effective to store information. In addition to that, it is valuable in the business process and banking sector. The users trust on block chain based data storage due to its verification and security process. Blockchain has a great verification process that helps to secure confidential data of a company or user [17]. It is discussed in this research that the users get benefits from the block chain through creating an account on the block chain database and the users can implement this in software to use this.

There are some kinds of verification processes that help to secure information of the users of block chain. In this case, as per the result of the research, the users prefer SMS based authentication process and biometric authentication that pin or traditional pass codes. In this case, the verification process is too strong that cannot be easily accessed by any attacker and the attacker will fail in the fraud process. FMS model verification helps to simulate the verification implementation process in the organization to check the effectiveness [18].

Implementing block chain in the business procedures or any other sectors get the benefit of increasing

efficiency, speed, and traceability.

CONCLUSION

The above research has focused on the block chain based data storage and verification process. As per this research information, the block chain stores information of the user in the account. In this case, a user needs to create an account in the software to implement the block chain and then can upload the information in this process. In CSE, the block chain based data storage has been introduced to secure the crucial information of users appropriately in digital format. It can be used in banking, healthcare, software and real estate. In this case, the main attraction in block chain is verification of access. The above research specifies different kinds of verification processes and it helps to increase trust of users in the block chain process. This process helps users to manage and balance between security and usability through the use of single sign-on, risk-based access, identity federation, integrated access management control, and mobile multi-factor authentication.

REFERENCE

[1] Bandara, E., Shetty, S., Mukkamala, R., Liang, X., Foytik, P., Ranasinghe, N. and De Zoysa, K., 2022. Casper: a blockchain-based system for efficient and secure customer credential verification. Journal of Banking and Financial Technology, 6(1), pp.43-62.

[2] Chen, W., Botchie, D., Braganza, A. and Han, H., 2022. A transaction cost perspective on blockchain governance in global value chains. Strategic Change, 31(1), pp.75-87.

[3] Sanni, M.I. and Apriliasari, D., 2021. Blockchain Technology Application: Authentication System in Digital Education. Aptisi Transactions on Technopreneurship (ATT), 3(2), pp.151-163.

[4] Li, F., Yu, X., Ge, R., Wang, Y., Cui, Y. and Zhou, H., 2021. BCSE: Blockchain-based trusted service evaluation model over big data. Big Data Mining and Analytics, 5(1), pp.1-14.

[5] Liu, S., Dai, Y., Cai, Z., Pan, X. and Li, C., 2021. Construction of double-precision wisdom teaching framework based on blockchain technology in cloud platform. Ieee Access, 9, pp.11823-11834.

[6] Khanfar, A.A., Iranmanesh, M., Ghobakhloo, M., Senali, M.G. and Fathi, M., 2021. Applications of blockchain technology in sustainable manufacturing and supply chain management: A systematic review. Sustainability, 13(14), p.7870.

[7] Kumatongo, B. and Muzata, K.K., 2021. Research paradigms and designs with their application in education. Journal of Lexicography and Terminology (Online ISSN 2664-0899. Print ISSN 2517-9306)., 5(1), pp.16-32.

[8] Hiver, P., Al-Hoorie, A.H., Vitta, J.P. and Wu, J., 2021. Engagement in language learning: A systematic review of 20 years of research methods and definitions. Language Teaching Research, p.13621688211001289.

[9] McCain, A. 2022. 23 BLOCKCHAIN STATISTICS [2022]: MARKET SIZE + TRENDS. Zippia the Career Expert. Available at: zippia.com/advice/blockchain-statistics/ [accessed on 7th September 2022]

[10] Majeed, U., Khan, L.U., Yaqoob, I., Kazmi, S.A., Salah, K. and Hong, C.S., 2021. Blockchain for IoT-based smart cities: Recent advances, requirements, and future challenges. Journal of Network and Computer Applications, 181, p.103007.

[11] Zhang, M., Eliassen, F., Taherkordi, A., Jacobsen, H.A., Chung, H.M. and Zhang, Y., 2021. Demand–Response Games for Peer-to-Peer Energy Trading With the Hyperledger Blockchain. IEEE Transactions on Systems, Man, and Cybernetics: Systems, 52(1), pp.19-31.

[12] Kim, S., Mun, H.J. and Hong, S., 2022. Multi-Factor Authentication with Randomly Selected Authentication Methods with DID on a Random Terminal. Applied Sciences, 12(5), p.2301.

[13] Mordorintelligence.com. 2022. Mobile Devices User Authentication Services Market | 2022 - 27 | Industry Share, Size, Growth - Mordor Intelligence. [online] Available at:

[14] https://www.mordorintelligence.com/industry-reports/mobile -devices-user-authentication-services-market# [Accessed 7th September 2022].

[15] Faruk, M.J.H., Shahriar, H., Valero, M., Sneha, S., Ahamed, S.I. and Rahman, M., 2021, September. Towards blockchain-based secure data management for remote patient monitoring. In 2021 IEEE International Conference on Digital Health (ICDH) (pp. 299-308). IEEE.

[16] Zhang, L., Peng, M., Wang, W., Jin, Z., Su, Y. and Chen, H., 2021. Secure and efficient data storage and sharing scheme for blockchain-based mobile-edge computing. Transactions on Emerging Telecommunications Technologies, 32(10), p.e4315.

[17] Wu, H., Dwivedi, A.D. and Srivastava, G., 2021. Security and privacy of patient information in medical systems based on blockchain technology. ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM), 17(2s), pp.1-17.

[18] Hassija, V., Zeadally, S., Jain, I., Tahiliani, A., Chamola, V. and Gupta, S., 2021. Framework for determining the suitability of blockchain: Criteria and issues to consider. Transactions on Emerging Telecommunications Technologies, 32(10), p.e4334.

[19] Leng, J., Wang, D., Shen, W., Li, X., Liu, Q. and Chen, X., 2021. Digital twins-based smart manufacturing system design in Industry 4.0: A review. Journal of manufacturing systems, 60, pp.119-137

The Importance of Text Mining for Services Management

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A B S T R A C T

The present investigative study is a systematic as well as scientific endeavor to understand the beneficial effect of the text mining approach for the service management of the organization. This stud uses secondary qualitative data for gaining accurate insight into the present research study. Thematic analysis is done on the collected data set for gaining accurate insight into the present study. Interpretive research philosophy is chosen for this study along with the inductive research approach. This study also uses an explanatory research design for effective insight into the beneficial effect of the text mining process for the service management of the organization. The study focuses on the process of text mining which is used for analysing the client forums, call logs, tickets of customer service, and platforms of social media, news feeds, tweets and many others. It also focuses on the business that have better insights based on client expectations and it requires the areas that focus on overall improvements. The study integrates the customer communications and reviews that can identify the new features for strengthening the product offerings. It focuses on the latest technologies that provide several opportunities for improving the customer experience those results in increased profits and revenue.

KeywordsCustomer, management, Text mining.

INTRODUCTION

Text mining is an effective transforming method that deals with the modification of unstructured text documents into systemic structural text. The data text mining technique is essential for the identification of a meaningful pattern of the information. The natural language processing technique is used for the automatic procession of unstructured text into the structural format. Transformation of data into meaningful information is essential for service management within the organizational setup. **Service management** is essential for providing a valuable customer relationship approach. It provides a systematic framework for the effective management of the potential customer of the organization.

Objectives

The major objectives of the present investigative research study are
● To understand the concept of text mining within the business organization
● To evaluate the effect of service management within the organization
● To identify the benefits of the text mining approach for effective service management within the organization.
● To detect the importance of text mining for the effective customer retention of an organization

The major purpose of the present study is to analyze the beneficial effect of the text mining approach for effective service management within the organizational setup. Text mining is an essential gateway for managing the customer relationship with the organization. Service strategy and offerings of an organization became easier by implementing a text-mining approach within the organizational setup. Service management is believed to be a set of specialized activities that deals with effective customer

service management within the organizational setup.

Natural language processing (NLP) techniques are majorly used for the transformation of the data into meaningful text based on the machine learning algorithm. Text mining helps to analyze a large amount of information quickly as well as efficiently within the organizational setup. Apart from that, the text-mining approach helps in decoding the expectation of the customer towards a particular organization. It also improves the overall quality of the business organization by utilizing the comment of the customer towards the organization.

MATERIAL AND METHODS

The research study is based on the beneficial effect of the text mining approach within the organizational setup for effective service management. Service management is essential for the customer need-based growth of the business organization. The entire research focused on the philosophical assumption of Interpretive for enhancing the knowledge regarding the benefits of the text-mining approach for the growth of the organization. Identification of research philosophy is an essential criterion for controlling the data collection as well as the data analysis process of the study. *Interpretive* research philosophy is a renowned philosophy that is mainly used in social science research. It directly focused on situational analysis by using the qualitative data set rather than the quantitative data [1]. This research philosophy believed in situational truth rather than the universal truth. This research deals with the *explanatory research design* for scientifically exploring the effect of text mining on the service management of an organization. Explanatory research design is used within the research realm when the available information is significantly scanty in the amount [2]. This research design wanted to explore the causes of a particular phenomenon for gaining in-depth insight into the beneficial effect of the text-mining approach within the organizational setup.

The inductive approach is chosen for identifying the benefits of text mining within the business organization. The inductive research approach deals with the understanding of the phenomenon of specific scenarios to the general conclusion of a fact [3]. It relies on the collection of a large amount of data from the different situations of a particular problem for delivering an effective conclusion from it. Apart from that the present investigative study uses secondary qualitative data for continuing the entire study in a systematic manner. Secondary data are collected from different scholarly articles as well as high-impact journals for evaluating the background of the aforementioned topic [4]. As the present study deals with the collection of secondary qualitative data, no sample size is denoted for the data set. Rather a set of inclusion and exclusion criteria are set for the effective collection of the data set

Table 1: Inclusion and Exclusion criteria

Inclusion criteria	Exclusion criteria
- Data after the year 2019 - Peer-reviewed journals - Scholarly articles - Journal which only used the English language - Keyword-specific search of the information	- Data before the year 2019 - Journal with another unknown language - Journal with restricted access

Above table denoted the inclusion and exclusion criteria for the collection of secondary qualitative data which are particularly set for the identification of the resourceful journals for the collection of information. The present study used the Google scholar platform for collecting secondary qualitative data for gaining effective insight into the benefits of the text-mining approach within the organizational setup [5].

Using secondary qualitative data is cost-effective as well as less time-consuming for the entire study. The collected secondary data set are analyzed by using thematic analysis of the data seat. Thematic analysis is one of the essential qualitative data analysis methods that helps in the effective identification of codes based on the repetition of the keywords within the previous research work. It is a cost-effective method for the authentic analysis of the benefits of text mining within an organizational setup. On the other hand, the thematic analysis needs more time for the accurate analysis of the collected data set [6]. In the case of the present study, a total of 6 months is allocated for the effective completion of the research study based on the benefits of the text mining approach for effective service management within the organization.

RESULTS

Text mining is used for improving the provision regarding service to the potential and existing customers of business.The text mining is used for the overall improvement regarding provision of service for potential and existing customer's communications. Furthermore, it also includes the reviews that can identify the new features for strengthening the product offerings. Apart from that, the technology also provides the main opportunity for improving the customer experience that will result in increasing the profits and revenue [7]. The text mining is considered to be the act of taking vast volumes based on raw text data and it also performs the analysis for producing the structured results. On the other hand, the process of text mining is often delegated for AI-powered mining tools which are due to all the benefits regarding machine learning and automation regarding the mining process. Within the business processes, the data mining process is used for discovering the relationship and several patterns within the data which help in making better business decisions. Moreover, the data mining process can help in spotting the sales trends, help in predicting the customer loyalty and help in developing smarter campaigns of marketing.

Figure 1: Components of Text data mining

The above figure illustrates about the main components of Text data mining includes incorporating results, applications, processes, numerating the texts, areas, pros and cons and other approaches. Apart from that, the process of text mining is analysed through the automatic process with the help of advanced technology and it is the reason for which larger amount of information within e-commerce [8]. It also includes digging out the potential models, helping the makers of business decisions, predicting total customer behaviour, making right decisions and reducing overall risks. Text mining is also known to be the process of data mining and it is the actual process that demonstrates the transforming of unstructured texts into a structure format. It is used for identifying the meaningful patterns and other new insights and

one of the main popular decisions includes the appropriate applications of text mining which is Information Retrieval.

The main benefits of using the process of data mining includes that it helps the companies that gather reliable information. Furthermore, it is also considered to be the efficient and cost-effective solution that is compared with other data applications. Apart from that, it also helps the business more profitable production and other operational adjustments. The data mining processes also uses both the legacy and new systems and also help the overall business in making the informed decisions.

Text mining is considered to be the critical way of processing and analysing the unstructured data. The process of text mining includes in analysing and exploring larger amounts regarding unstructured text data that are aided by particular software which can identify several concepts, keywords and topics. On the other hand, it also focuses on text analytics and some people also draw the distinctions between two terms. The main technique that is used within text mining includes in identifying the intrinsic structures within the textual information and it organise into the relevant subgroups for the further analysis [9]. The text analytics also refers to the applications that includes in using the techniques of text mining for the sort out through all the data sets. On the other hand, the process of text mining is much more practical for all the data scientists and it also includes other users according to the development of big data platforms and it also uses the deep learning algorithm which can help to analyse several sets of unstructured data.
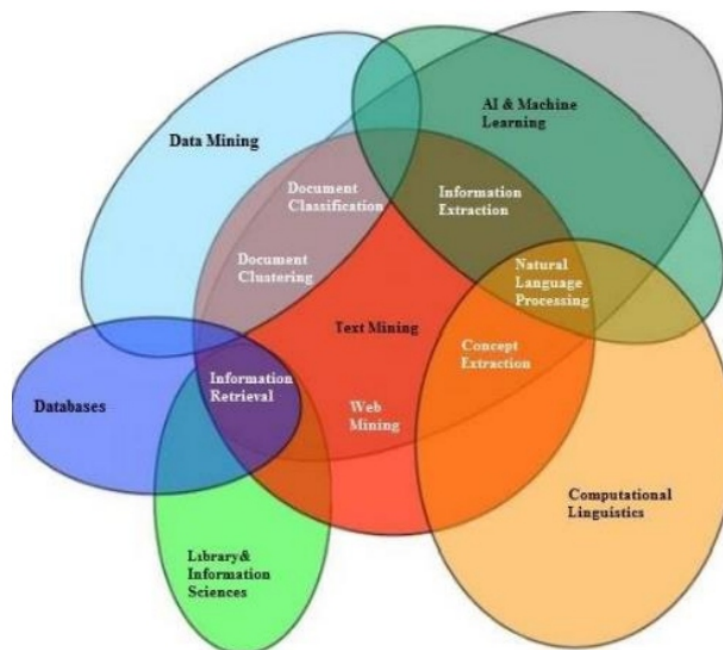
Figure 2: Venn diagram of test mining

Analysing the data mining process help several organisations in finding valuable business insights within the corporate documents, call centre logs, posts of social network and several other resources based on text data. The capabilities of the process of data mining are corporate into virtual agents and AI chat bots where a company can easily deploy in providing the automated responses. It is for all the customers as the main part of marketing, operations of customer services and sales. The overall process of text mining also includes the conventional process which focuses on gathering the unstructured information from several sources that are accessible within the document organisation. It also focuses on data cleansing and pre-processing tasks that are performed for eliminating and distinguishing the inconsistency from all the data variables.

The data mining process is totally focused on the process of document clustering and document classification. It also focuses on other process such as machine learning and AI, computational linguistics, library and information science, several databases and others [10]. Power BI is also considered to be the powered self-service BI tool which can be performed the unstructured data analytics and it is well-suited for both the business audiences and analysts as per the initiative dashboard features and other visualisation features. Therefore, text analytics is considered to be the concept which includes the information retrieval and process of information extraction process with web mining and data mining process.

Importance of Text mining includes in huge collection regarding collection of documents. The main importance of text mining includes in using the processing of natural language and also for processing AI for uncovering the relationships and patterns within unstructured texts. On the other hand, it also enables the business for automatically identifying the useful information within emails, tickets for customer service, Chabot, posts within social media and several other texts. The larger collection of the text data within the text analytics process that includes in the extraction process of interesting patterns and information'sfrom several data within larger database [11]. It is the process that helps to extract several useful information and the nontrivial patterns form the larger amount of text database. The IR systems also make the use of different algorithm for monitoring and tracking the user behaviour and it also discover the relevant data. The main features of this process include text clustering process, text categorisation process, sentiment analysis, entity-relation modelling and document summarisation.

Figure 3: Steps of text analytics

The process of text analytics includes transforming the unstructured text data within the machine-process ablestructured form that form in discovering the hidden patterns. On the other hand, it also deals with machine learning that are focused on the supported analysis regarding text data [12]. The main process of text mining includes pre-processing operations, analysing the patterns through management information systems, information extraction, categorisation, clustering and summarisation. It also includes in identifying the file systems for collecting data and also for retrieval of data. Therefore, within the overall file systems, the stored information cannot be isolated in individual files and it can be much more difficult to retrieve and identify. The main factors that are linked with the process of text analytics includes text features, text content, text organisation and several other processes.

The process includes in transforming overall information based on the data variables. Furthermore, the

machines can easily understand and the process of text analytics also automates the overall process that classifies the texts by intent, topic and sentiments. Data cleansing is also considered to be the important step as it holds the total importance of dirty data if they are used within the mining process directly and it can also causes much confusion withinseveral procedures and it also produces the inaccurate results. Therefore, the importance regarding file information and document information help to be much more organised, transparent, efficient and systematic. Hence, it also helps several people that can be capable to access overall information which can be much easier for implementing the process.

The process of Text mining can assist in interpretation and tracking the texts created by blogs, news and emails. The process of text mining includes in assisting the interpretation and tracking process regarding the texts that are created by blogs, news and emails. The organisation might use the technologies that are based on the process of data mining and it is used for assessing the visibility of the brands, likes,followers and posts. It also provides the organisation with the clear picture of customers that react to several contents and brands. It is considered as the main act that takes vast volumes regarding raw data texts and analyse in producing structured results [13]. In addition, it also delegates the mining tools that are AI-powered which benefits the automation process of mining. The first step within the process of text mining is information retrieval and it help retrieve several information based on data variables. Furthermore, it might require by using the search engine for identifying the coups regarding texts which are digitised and may necessitate digitisation of the physical texts within publications.
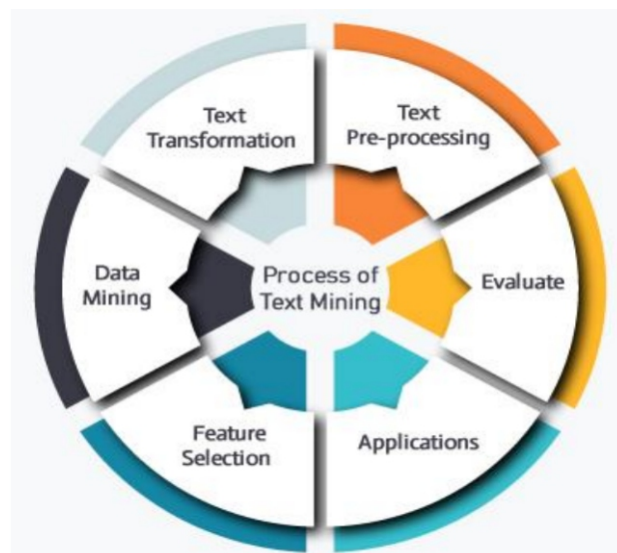
Figure 4: Important phases of text mining process

The above figures about the phases of test mining process and it focuses on text transformation, text pre-processing, data mining, evaluation, feature selection and applications. On the other hand, information extraction is one of the main techniques of text mining and information exchange also refers to the process. It also extracts some meaningful information which is having vast chunks of the textual data [14]. The process of data mining includes in handling the structured data that have highly formatted data within the database and with ERP systems. Apart from that, it deals with the unstructured textual data that are not pre-defined and it integrates the text mining and data mining approaches based on the analytics. Therefore, it also focuses on the mining techniques such as process discovery, process enhancements and conformance checking.

DISCUSSION

Present an investigative study that deals with the understanding of the beneficial effect of the text mining approach for effective service management within the organizational setup. Thematic analysis is done on the collected secondary qualitative data for gaining effective insight into the positive effect of the text-mining approach within the organizational setup. It is evident from the result of the thematic analysis that text mining deals with a large number of data set that effectively enable the analytical processing of the data set in an accurate manner. The text mining process is also utilized in the service management approach of an organization [15]. In the case of social media analysis, text mining is believed to be one of the essential processes that quickly transform the unstructured data of the social media handles into a systematic as well as a structured manner for gaining effective insight from the social media users. Apart from that, the feedback response of the customers is also analyzed by using a text-mining process for improving the customer-based approach of the organization.

It is also stated that the text mining process is effectively used in social media analysis for the strategic improvement of the organization. Social media analysis is believed to be one of the essential methods for analyzing the target market of the organization [16]. Text mining is an approach that enhances data transformation in a quick as well as accurate manner. On the other hand, the capacity of handling large amounts of data set is essential for the effective growth as well as the profitability of the organization. It is stated that utilization of the text mining approach enhances the customer relationship with the organization [17]. Text mining is a beneficial tool for effective communication of the organization with potential customer. Maintenance of appropriate customer relationship management is essential for the effective growth and development of the organization.

It is evident from the present analysis that text mining enhances the report generation process of the organization in an effective manner that impacted the service management approach of the organization. In the era of globalization, people are more interested to go in intellectual investment. In the case of business organizations, intellectual investment is to invest a large amount towards the repairing as well as maintenance of a good relationship with potential customers. It is evident from the analysis that the text-mining approach enhances the provision of organizational service for the effective retention of customers [18]. Natural language processing techniques are used in the text mining approach for the growth and development of the organization. Coding of the structured data set along with the sentimental analysis has been done in the text mining approach for gaining effective insight into the customer's perspective regarding the quality of a particular organization.

The present study suggested that the incorporation of automatic techniques enhances the profitability as well as productivity of the organization. Incorporation of a text mining approach within the organizational process leads towards automation and increased productivity of the organization. The automatic data translating process enhances the systematic processing of the structured data for quick understanding and effective decision-making processes within the organization. Incorporation of a text mining approach enhances the chances of establishing new market opportunities along with the innovative marketing approach for a particular product. The study indicated that the incorporation of text mining enhances the effective relationship of the company with its effective stakeholders. On the other hand, it emphasizes the effective decision-making process of the organization that in turn helps in the customer-centric growth of the organization in an effective manner [19]. Depending on the need of the specific business firm the form of text mining is applied for the betterment of the organization. Testing the social media handles of the target group of customers is essential for the incorporation of customer-specific policies of the organization.

It is evident from this study that social media analysis deals with a large number of potential customers which is analyzed for tracking the current perspective of the customer towards purchasing a particular

product. Apart from that, sentiment analysis, measuring the satisfaction rate of the customer, customer voice analysis, and more are effectively handled by the text mining approach within the organization [20]. Sometimes analyzing the feedback response is another important criterion that is used for the implication customer-centric approach within the organization. Open-ended survey questions are also analyzed by the implication of the text-mining approach within the organization. Text mining enhances the overall service management approach within the organizational setup.

CONCLUSION

The present investigative study is an endeavor to understand the beneficial effect of the text mining approach for the effective service management of the organization. The present study uses secondary qualitative data for gaining effective insight into the aforementioned problem. Interpretive research philosophy is used in the research study along with an inductive research approach for gaining accurate insight into the benefits of the text-mining approach within the organizational setup. Secondary quantitative data is used for quick as well as efficient analysis of the above-mentioned concepts. Particular inclusion and exclusion criteria are set for the effective collection of the data set. It is clear from the result of the thematic analysis that text mining benefited the business organization for the effective service management of the organization. It helps to enhance the customer relationship approach of the organization which in turn positively affected the profitability of the organization. The entire duration of the entire investigative study is 6 months for gaining effective insight into the research problem.

Text mining is used for improving the provision of the service to both existing as well as potential customers of the organization. Apart from that, the text mining act as a critical analytical process for transforming unstructured data into structured information of a particular data set. It helps to analyze a large amount of data in a quick as well as efficient manner. One of the major benefits of the text mining approach is the handling capacity of a large number of datasets in an accurate manner. Apart from that, the result of the thematic analysis suggested that the appropriate interpretation of the data of social media handles is also done by the text mining process for gaining effective insight into the current perspective of the customers regarding a particular product. Effective tracking of the data of online platforms is also done by the text mining approach of the particular business organization.

REFERENCES

[1] Sezgen, Eren, Keith J. Mason, and Robert Mayer. "Voice of airline passenger: A text mining approach to understand customer satisfaction." Journal of Air Transport Management 77 (2019): 65-74.

[2] de Brito, Mariana Madruga, Christian Kuhlicke, and Andreas Marx. "Near-real-time drought impact assessment: a text mining approach on the 2018/19 drought in Germany." Environmental Research Letters 15.10 (2020): 1040a9.

[3] Kutela, Boniphace, et al. "Analysis of residents' stated preferences of shared micro-mobility devices using regression-text mining approach." Transportation Planning and Technology 45.2 (2022): 159-178.

[4] Nishimura, Kiyohiko G., Seisho Sato, and Akihiko Takahashi. "Term structure models during the global financial crisis: A parsimonious text mining approach." Asia-Pacific Financial Markets 26.3 (2019): 297-337.

[5] Pejic-Bach, Mirjana, et al. "Text mining of industry 4.0 job advertisements." International journal of information management 50 (2020): 416-431.

[6] Loureiro, Sandra Maria Correia, et al. "Understanding the use of Virtual Reality in Marketing: A

text mining-based review." *Journal of Business Research* 100 (2019): 514-530.

[7] Kumar, Sunil, Arpan Kumar Kar, and P. Vigneswara Ilavarasan. "Applications of text mining in services management: A systematic literature review." *International Journal of Information Management Data Insights* 1.1 (2021): 100008.

[8] Saura, Jose Ramon, and Dag R. Bennett. "A method for data text mining: Using UGC in business intelligence analysis." *Symmetry* 11.4 (2019): 519.

[9] Antons, David, et al. "The application of text mining methods in innovation research: current state, evolution patterns, and development priorities." *R&D Management* 50.3 (2020): 329-351.

[10] Pejić Bach, Mirjana, et al. "Text mining for big data analysis in financial sector: A literature review." *Sustainability* 11.5 (2019): 1277.

[11] Pejic-Bach, Mirjana, et al. "Text mining of industry 4.0 job advertisements." *International journal of information management* 50 (2020): 416-431.

[12] Zhang, Fan, et al. "Construction site accident analysis using text mining and natural language processing techniques." *Automation in Construction* 99 (2019): 238-248.

[13] Gröndahl, Tommi, and N. Asokan. "Text analysis in adversarial settings: Does deception leave a stylistic trace?." *ACM Computing Surveys (CSUR)* 52.3 (2019): 1-36.

[14] Albalawi, Rania, Tet Hin Yeap, and Morad Benyoucef. "Using topic modeling methods for short-text data: A comparative analysis." *Frontiers in Artificial Intelligence* 3 (2020): 42.

[15] Zhang, Fan, et al. "Construction site accident analysis using text mining and natural language processing techniques." *Automation in Construction* 99 (2019): 238-248.

[16] McColl-Kennedy, Janet R., et al. "Gaining customer experience insights that matter." *Journal of service research* 22.1 (2019): 8-26.

[17] Antons, David, et al. "The application of text mining methods in innovation research: current state, evolution patterns, and development priorities." *R&D Management* 50.3 (2020): 329-351.

[18] Guerreiro, João, and Paulo Rita. "How to predict explicit recommendations in online reviews using text mining and sentiment analysis." *Journal of Hospitality and Tourism Management* 43 (2020): 269-272.

[19] Jung, Yeonjae, and Yongmoo Suh. "Mining the voice of employees: A text mining approach to identifying and analyzing job satisfaction factors from online employee reviews." *Decision Support Systems* 123 (2019): 113074.

[20] Onan, Aytuğ. "Sentiment analysis on massive open online course evaluations: a text mining and deep learning approach." *Computer Applications in Engineering Education* 29.3 (2021): 572-589

Predictive Data Mining in Clinical Medicine: Current Issues and Guidelines

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A B S T R A C T

The following study is based on the predictive data mining in clinical medicine where all data have been selected by focusing on the following topic. At the first the brief introduction of data mining, predictive data mining and its usage on the clinical medicines have been shared. Then the required materials and methods have been furnished up next. After that, the usages of predictive data mining in clinical medicines have been elaborated. The usages have been depicted within several parts of, such the use of predictive data mining in the clinical medicines. Also, the uses of different models of predictive data mining have been illustrated within an extensive manner. Later on, the benefits of predictive data mining for the healthcare sector and its profit making and advantages for using predictive data mining for a medical practitioner have been represented by gathering valid insights. Furthermore, the challenges and issues related to healthcare sectors and clinical medicines have ben flaunted in the following study and the strategies to mitigate the problems by using predictive data mining has been depicted within sheer elaboration.

Keywordsclinical medicines, healthcare sector, predictive data mining

INTRODUCTION

In the era of technology implementation and its expanding services across the world, data mining is an important factor which has been used from the beginning of technology implementation. Data mining is the method of sorting through a large scale of data sets to investigate the paradigms and bonds that can be able to solve issues related to the clinical medicine data analysis. Thus, the data mining techniques and the instruments to activate the enterprise to assume future trends and make more informed decisions which can help a business to be benefited in an extensive manner. Apart from this, there are two major types of data mining and the types are as follows-predictive data mining and descriptive data mining [1] The data mining which is known as predictive data mining, has been used majorly in various kinds of fields. In the field of clinical medicine, predictive data mining has been majorly used by maintaining all the norms of data mining. Predictive data mining has been used for the purpose of implementing business intelligence or other data to predict or assume the trends within the existing marketplace [2]. This type of data mining can help a business and the business leaders to make firm decisions and add several ethical norms to the efforts of the analytical team of clinical medicine.

The major goal of predictive data mining in clinical medicine is to derive the models that can implement the information or details which are related to a patient to assume the results of interest and to thereby support clinical decision making in an effective manner. In clinical medicine, the use of predictive data mining helps the doctors to create proven diagnoses and conclusive results which are related to the background of a patient [3]. In other words, when it still takes a well trained clinician to arrive at the final decision making, artificial intelligence software can process and expand vast arrays of data in a matter of seconds.

MATERIALS AND METHODS

In order to fulfil the needs of the data which has been gathered to evaluate this study, there are some crucial types of materials and methods that have been chosen and implemented to execute the subject matter. As the topic is based on the use of predictive data mining in clinical medicine, there are several types of data which have been collected for the study and are also associated with the subject matter directly.

The study has been evaluated by focusing on the depth of the subject matter to collect raw data of predictive data mining from authentic and reliable sources. The study has been served by providing proper research design and research design which has been chosen for this study is cross-sectional research design. Reason for choosing cross sectional research design is to compare several various variables at the same time. Furthermore, the data which have been collected for this study are secondary data by trait and the data have been collected by following qualitative research method. Also, for this study, the inductive research approach has been selected and implemented to bring betterment in the execution process of the research work. Later on in the following study, secondary data are associated with the concept of predictive data mining and serve the processeswhich are related to clinical medicine. Additionally, the data for this study are collected from recent sources and authentic peer reviewed journals which have been published after the year of 2019. Therefore, the study has been evaluated with proper insights and appropriate types of materials and methods which can fit into the study.

RESULTS

Certainly, predictive data mining is becoming an extensive and crucial tool for the researchers and the clinical practitioners in the medical field and medicines. By understanding the core problem which is underlying within implementation of the process and the application of agreed and standardized processes are needed for the deployment and dissemination of the outcomes. The visibility of extension of upgraded computational procedures and instruments for analyzing the data and predictive modellingneeds medical information by assessing which medical practitioners systematically cope up with the clinical predictions issues [4]. Generally predictive data mining hasbeen used in the clinical medicine largely to make proper decisions as per the requirements of the patient and the process of diagnosis as well. Main goal of predictive data mining in clinical medicines is to justify the information and details which are apparently related with a patient. In clinical medicine, predictive data mining method has been implemented to the making of decisions models for processes. The processes are as follows- prognosis, diagnosis and planning for treatment [5]. The decision making models which have been used in clinical medicines are commonly used to give prompt reaction in adverse situations.

Predictive data mining might give to the improvement of clinically impactful predictive models which are interrelated with each other in a comprehensive manner. Also, predictive data mining has been used generally in the process of application of a number of various techniques from different disciplines with the objective to explore innovative paradigms from the collected data. An engineer uses predictive data mining which relies on its association of the decision making models and the models are crucial to the field of clinical medicine which have been regarded with the different standards in a certain manner. There are three major usages of predictive data mining in the clinical medicine and the usages are as follows- assume the similarity that particular treatment plan would be impactful for a patient [6].

Also, with the help of predictive data mining, the chronic situations can be traced within a patient and also, it allows the practitioner to identify the rigorous signs before the conditions go out of the hand. Predictive data mining also fixes whether a patient is at risk for improving certain infections or situations of a patient.

Furthermore, predictive data mining is an immensely impactful process which allows a medical or

clinical practitioner to better anticipate the requirements and gives the permit to identify the crucial paradigms, trends and data. This helps providers to undertake actionable information to develop entire clinical results, construct actionable population initiatives related to health and enhance entire patient involvement and retention of patients in a certain manner [7]. Also, predictive data mining helps to support operational decision making in a successive manner. Healthcare sectors or clinical medicines can implement predictive data mining to derive the information that can help to gain organizational objectives and develop the potentiality of decision making in an effective manner. There are some generic benefits of using predictive data mining within a clinical medicinal organization. Predictive data mining helps to provide opportunities to an organization to develop the internal features properly to diagnose a patient in a successful manner. As it helps in the process of decision making, it can provide a proper type of budgeting plan for an organization.

By using predictive data mining models, a patient's lifetime value can be changed to provide a better segmentation in a certain clinical medicine. The predictive data mining helps to increase the resources to grow the market share at a fast pace within a certain type of clinical organization. A compelling implementation for predictive data mining models is continuously anticipating the requirements for the medical services for a patient. In case a team is making a plan to conduct a promotion campaign to serve the cardiac service line, before making an investment, the team leader needs to find a cardiac specific model in a certain manner [8]. When the team leader would be able to find the model, that individual needed to find an impactful cardiac health campaign which would help to enhance patients demand apart from capability of the service line in that clinical medicine organization.

Predictive data mining is an impactful step to ensure quick cure for a patient. It drives plenty of customized care, quick interventions, activates rapid operations and mitigates cost, in other words, it makes the procedure cost effective for the patients and for the organization as well [9]. There are several benefits of using predictive data mining which can be considered as the impactful model to recognise the issues of the patient and brings sheer amount of profit to the organization. By implementing predictive data mining within the clinical medicine, the valid number of audiences can be found in a certain manner to expand the business of that particular clinical medicine organization. The valid and proper healthcare analytic instruments develop a valid type of straightforward procedure which can provide the clinical medicines a certain type of business deals with patients. Predictive data mining, simply associates the data to the required medical services to let the instruments conduct the analysis and within some moments, the organization would be able to get a sheer number of target audiences within the organization. Also, the models intend to contextualize the target audiences with behavioural clusters with different types of patients' requirements. The clusters elaborate reasons to target audiences and help to design valid information with perfect CTA to make a huge impact on patient's behaviour.

Predictive data mining is a crucial tool for a researcher who is associated with clinical medicine and a clinical medicines practitioner in a certain manner. Certainly, predictive data mining can be able to mitigate issues and challenges which are related to the clinical medicines and the challenges can be raised for a patient and for a practitioner as well. The biggest challenges which are related to clinical medicines are as follows- the high cost health care services. It is an obvious factor that for the upgrade technology implementation, the costs are increasing on a daily basis based on the rate of the new technology which can help the healthcare sector and services with the upgrade technology implementation in a certain manner [10]. Also, another issue can be raised within the healthcare sector in a certain manner. The slower recruitment of patients can happen than needed in a certain healthcare organization to make the services more hectic for the patients and for the practitioner within the organization.

By looking at the vigorous issues over the past few decades of clinical medicines and healthcare sectors,

the industry and political leaders, the clinical practitioners have faced several types of challenges that can make a huge impact on the quality of care and can increase the rate of cost in a certain manner. For example, in the immediate time of the Covid pandemic, it has been highlighted that the issues which have been faced by the hospitals have decayed the patient's retention and care of the patients in a certain manner. Also, in the times of post Covid, the patients got extremely frightened by the strike of global pandemic and for this following reason, the patients refused to go for a check-up [11]. This particular trivia affects the entire workflow of a healthcare sector and increases the issues related to the healthcare organization.

As an illustration of the pandemic, in the aftermath of this vital global pandemic, the clinical medicine and healthcare sector's issues become more thorny and difficult to get mitigated in a certain manner. The practitioners and professionals within clinical medicines who have been drawn to the administration of healthcare face several issues in solving the issues which might be accepted as the core problem within the clinical sector from the past few decades [12]. As the prior problems of the healthcare industry, the higher cost of healthcare services becomes a greatest problem which can affect the entire patient's retention of an organization in a certain manner. Certainly, the most pressing problems in clinical medicines is the high cost of medical services which can decay the entire employee retention in a certain manner and can decrease the demand of that particular organization of clinical medicines for the patients.

There are half of the adults who stated that it is actually immensely difficult to afford the healthcare services which have the high rated Medicare plans to make the patients curable within a certain time span. Additionally, the high courts of clinical medicine changes patients' behaviours towards the medical services and affects the poverty stricken patients who would not afford the plans which are actually needed for the patients for long term cure. It is an immensely obvious factor that the patient who would not be able to afford the medical services which are highly costly to be afforded, they would not recommend the plans to others because of the rated plans and services within that particular organization [13]. These particular issues related to the healthcare sectors and services can leads an complicated challenge which can affects the mental health of the patient and can affect the stability of the healthcare services in a certain pace.

In the clinical medicines and eat care sector, the concerns of health equity can create a huge difficulty within a particular organization for a long period. The healthcare sector or the clinical medicines industry consists of long noted disparities in health care results among various populations. These following disparities are not solely bonded to the revenues, benefits and costs of care within a certain organization. The aspects know the social determinants of health within the healthcare sectors and the clinical medicines in a certain manner [15]. Social determinants can be laid with the code of ethics, race, caste, ethnicity and access to jobs in a successive manner. In addition, the healthcare plans have always been served to the higher castes patients who are actually paying for the luxurious services within a particular organization of the healthcare sector.

Also, there are other challenges which are related to the clinical medicines and healthcare services are the promise and pitfalls of technology implementation within the healthcare sector. The present clinical medicines and healthcare issues have greater challenges but in cases not regulated properly, it can lead to several issues within that particular organization or within the healthcare industry for a long period. The clinical medicines and healthcare services increasingly depend on the data which are related with the patients from all aspects of the healthcare sector. Even before the time of global pandemic, healthcare and clinical service providers have been activating around several amounts of data on patients for each year which were actually helpful to get in the best care of the particular healthcare sector [16]. These which have been used over a patients involves not only the infarct which have been compiled within an

electronic health record hurt also executives data like addressee, demographic details of the patients, insurance policy regarding healthcare, claims, payments records and appointments scheduling as well. By using the predictive data within clinical medicine and healthcare, the following issues related to the healthcare sector and clinical medicines can be mitigated in a certain manner with a proper execution plan. As predictive data mining helps to create a sheer amount of decisions which are actually related with several aspects of a healthcare sector then certainly it has a huge role related to the cost effective process for a medical plan. The predictive data mining helps to create segmentation within making decisions for the medical practitioners and healthcare leaders who are actually related with the process of decision making in the particular healthcare sector in a successive manner. By creating a sheer amount of plans to undertake proper decisions and make appropriate plans to serve the patients in a proper way, the issues related to high budgeting can be reduced at a certain pace which can make a proper amount of profit for the healthcare service providers for a long time span [17]. For future services, the particular can be able to rely on the services which can give the patients proper health care treatments and by getting affordable healthcare services, the patients can be able to recommend the service to other patients which actually need the services.

The predictive data mining helps to create segmentation which are related to the capacity of affording a plan of patients to get sheer amount of medical care within an organization. Also, by segmenting the plans, it becomes immensely easy for the patients to fetch the affordable plans of the clinical medicines at a certain pace. Predictive data mining does the process of segmentation by using the models which belong to the process of data mining in a certain manner. Also, by using the predictive data mining, the equity within the healthcare services can be increased to give an appropriate and proper type of healthcare services which are actually needed by every patient who is in need. Later on, another factor of implementing the predictive data mining in the clinical healthcare is to upgrade the technological implementing and creates proper types of technological balance within the organization which can help the healthcare service provider within the clinical medicines who are actually seeking for the profit making within the organization.
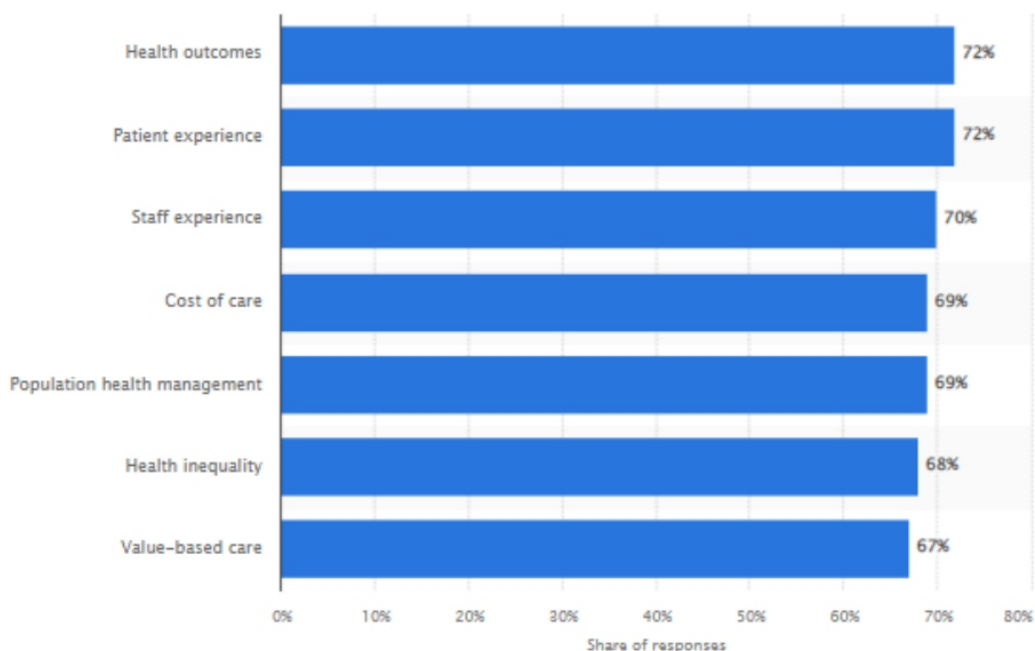
Figure 1: Usages of predictive data mining in the healthcare sector in the year of 2022

The total use of predictive data mining is increasing across the world by the year of 2022, in the healthcare sector and in the clinical medicines as well. In the month of February 2022, 72% of the

healthcare leaders have shown the urge to use the predictive data mining which are actually related with the entire profit making of the healthcare service sector [18]. Additionally, 72% thought that the experiences of the patients would be developed by using predictive data mining in the healthcare organization or in the healthcare sectors to be able to increase the patient's retention in a successive manner. Therefore, depending on the traits and behavioural nature of the patients, the healthcare leaders are increasing the usage of predictive data mining at a maximum rate within the healthcare sector for a long term period.

DISCUSSION

The following study is based on the use of predictive data mining in the clinical medicines and its current usages, problems and limitations and subject matter has been served by using proper data which are related to the use of predictive data mining and its impact from all aspects. At first the concept of predictive data mining has been distinguished for the clinical medicines and in a certain article it can be seen that predictive data mining is different from the actual data mining in the healthcare industry. In the beginning of the study, the study has been served with the help of predictive data mining and its different kinds of models which actually has the huge impact over making decisions and selects the proper types of healthcare plans for the patients in a certain manner. The following predictive data mining models can be used in the process of decision making which can give the health sector and the clinical medicines a certain type of decision making process which can be used within a particular healthcare sector or a healthcare organization.

There are several kinds of usages depicted for using predictive data mining within the healthcare sector in a successive manner. Also, in the crucial process of clinical medicines such as, prognosis and diagnosis have been conducted within the help of predictive data mining with a successive manner of a healthcare industry. Furthermore, with the help of clinical data analysis, the information related to a patient can be justified for the sake of safety of other patients and the organization as well. The patient's details and demographic information can be verified in a certain manner which can give a quick acceleration to the process of clinical medicines for a certain time span. Also, there are several kinds of problems and challenges which have been raised within the clinical medicines and healthcare sector which can be faced by the patients and by that specific healthcare organization as well. Issues which are related to high cost healthcare plans, equal treatments of all patients and equals behavioural changes towards the healthcare organization of the clinical medicines. Lastly, the results have been shown over the usages of predictive data mining to mitigate the issues which are related with the clinical data mining.

CONCLUSION

The following study is based on the implementation of predictive data mining on the clinical medicines and the recent issues and problems related to clinical medicines which have been made from the past few decades of the existing healthcare services. In the introductory part of the following study, the brief introduction over the topic has been represented over the following topic. At the introductory part of the study, the subject matter has been explained with a sheer elaboration and all sorts of insights have been collected by depending on the depth of this subject matter. The insights have been collected from the authentic sources related to clinical medicine and predictive data mining.

Furthermore, after the execution of introduction to the subject matter, the crucial types of materials and methods have been selected and implemented for the execution of the topic. For this following research, the cross sectional research design, inductive research approach and qualitative research method have been followed to evaluate the collected data of this study. Also, the data which have been shortlisted to

execute the study in a successive manner are secondary data by trait and all of the insights have been selected from peer reviewed journals and recent articles which are based on the following subject matter. In the next part, the clear elaboration of predictive data mining and its use in clinical medicines has been represented to showcase benefits of clinical data mining within an extended manner. All types of models, usages of predictive data mining, recent issues related with the clinical medicines and plans for mitigating the issues by implementing predictive data mining have been discussed with elaboration. Lastly, the study has been colluded with sheer discussion over the subject matter.

REFERENCE

[1] Niu, Haifeng, and Elisabete A. Silva. "Crowdsourced data mining for urban activity: Review of data sources, applications, and methods." Journal of Urban Planning and Development 146.2 (2020): 04020007.

[2] Zdravevski, Eftim, et al. "From Big Data to business analytics: The case study of churn prediction." Applied Soft Computing 90 (2020): 106164.

[3] Devi, R. Delshi Howsalya, Anita Bai, and N. Nagarajan. "A novel hybrid approach for diagnosing diabetes mellitus using farthest first and support vector machine algorithms." Obesity Medicine 17 (2020): 100152.

[4] Zhang, Zhongheng, et al. "Predictive analytics with gradient boosting in clinical medicine." Annals of translational medicine 7.7 (2019).

[5] Yahaya, Lamido, N. David Oye, and Etemi Joshua Garba. "A comprehensive review on heart disease prediction using data mining and machine learning techniques." American Journal of Artificial Intelligence 4.1 (2020): 20-29.

[6] Bou Rjeily, Carine, et al. "Medical data mining for heart diseases and the future of sequential mining in medical field." Machine Learning Paradigms. Springer, Cham, 2019. 71-99.

[7] Itani, Sarah, Fabian Lecron, and Philippe Fortemps. "Specifics of medical data mining for diagnosis aid: A survey." Expert systems with applications 118 (2019): 300-314.

[8] Ghorbani, Ramin, and Rouzbeh Ghousi. "Predictive data mining approaches in medical diagnosis: A review of some diseases prediction." International Journal of Data and Network Science 3.2 (2019): 47-70.

[9] Vougas, Konstantinos, et al. "Machine learning and data mining frameworks for predicting drug response in cancer: An overview and a novel in silico screening process based on association rule mining." Pharmacology & therapeutics 203 (2019): 107395.

[10] Rady, El-Houssainy A., and Ayman S. Anwar. "Prediction of kidney disease stages using data mining algorithms." Informatics in Medicine Unlocked 15 (2019): 100178.

[11] Ghosh, Sanjib, and Lipon Chandra Das. "Using Data Mining Techniques for COVID-19: A Systematic." Science and Technology 8.2 (2022): 36-42.

[12] Yang, Hui, et al. "Risk prediction of diabetes: big data mining with fusion of multifarious physical examination indicators." Information Fusion 75 (2021): 140-149.

[13] Ageed, Zainab Salih, et al. "A survey of data mining implementation in smart city applications." Qubahan Academic Journal 1.2 (2021): 91-99.

[14] Yang, Jin, et al. "Brief introduction of medical database and data mining technology in big data era." Journal of Evidence-Based Medicine 13.1 (2020): 57-69.

[15] Sornalakshmi, M., et al. "Hybrid method for mining rules based on enhanced Apriori algorithm with sequential minimal optimization in healthcare industry." Neural Computing and Applications (2020): 1-14.

[16] Cabitza, Federico, and Andrea Campagner. "The need to separate the wheat from the chaff in

medical informatics: Introducing a comprehensive checklist for the (self)-assessment of medical AI studies." International Journal of Medical Informatics 153 (2021): 104510.

[17] Flesia, Luca, et al. "Predicting perceived stress related to the Covid-19 outbreak through stable psychological traits and machine learning models." Journal of clinical medicine 9.10 (2020): 3350.

[18] Stewart, Cornor. "Share of healthcare leaders who believed the following areas will be improved due to predictive analytics in clinical settings worldwide in 2022", Statista, 9th January, 2023,https://www.statista.com/statistics/1316681/benefits-of-predictive-analytics-in-healthcare-worldwide

Role of Data Mining in Education Sector

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A B S T R A C T

Data mining is a method used for categorizing and predicting the performance of a student and a teacher as well. It helps both student and teacher in developing the teaching method and the entire system. Every student who uses this method get a huge favor from this. This helps students to choose the right career option. Currently, the tendency of providing immense importance to data mining techniques in the educational sector is increasing as these procedures have a huge necessity in bringing efficiency in both learning and teaching procedures. Each and every person is gathering a large amount of data every day, in case these data are not further examined; only the large amount of data will remain. With the latest systems and technologies, people can utilise these data and examine those and benefit from it. The best technique for this issue is the data mining process. Data mining is a method of bringing out the useful and disclosed data and information from big data sets. Educational data mining is a process from which teachers and students get a lot of help. Teachers are able to observe every student's performance. On the other hand, students can choose a perfect and accurate career option by this process. This process utilises several techniques and methods such as statistics, machine learning, data analysis and data mining. Educational data mining is a method of raw information converting from a huge educational database to meaningful and effective information.

KeywordsData mining, education, students.

INTRODUCTION

Educational data mining is utilized for predicting and categorizing performance and dropouts of the students and the performance of teachers as well. It may assist teachers to trace academic advancement to develop the method of teaching. On the other hand, it assists students in education management and course choosing to be more systematic and successful [1]. This is a method of taking out the pattern and some other functional information from a big data set. Data mining is an action of searching heavy capacity of data to discover patterns, find trends and increase perception into the usage of the data. Then the data miners may use those searching to guess the result and make decisions. This has the ability to convert unprocessed data into high level information that always assists businesses increase by taking the best decisions.

There are some different types of data mining such as social media mining, video and audio mining, text mining and pictorial data mining. The function of data mining in education is to develop learning results by mining and examining the data. Teachers can understand the interest of every student and can do a better job on developing the experience of learning for students by using data collected from the behavior investigation and several evaluations. Generally, the basic function of data mining is prediction function which is the method of searching patterns from data that uses many variables to discover parallel variables of undecided value [2]. Data analytics can help students in finding correct and genuine answers to difficult questions. It may save money and it is super easy and quick. This is extremely approachable, understandable, easily reachable and immensely convenient. This assists a student to

adapt.

MATERIALS AND METHODS

This study has been conducted on the basis of particular research design, approach, data collection procedure, and research method. In this study, cross-sectional research design has been chosen as this specific design helps to portray different aspects of the study in an explicit way. Inductive research approach has been followed in present study; reason behind it is that certain interpretations related to the study can be developed based on this approach. Apart from this an appropriate conclusion is derived by the researcher with the help of an inductive approach. Secondary data has been collected in the study to develop knowledge about the importance of data mining in educational institutions.

In this particular case, the researcher has gathered secondary data by following a qualitative method. This specific method has a huge necessity in helping researchers to find the reason rather than the fact [3]. Secondary data in the present case has been collected from various peer-reviewed journals and articles. All journals and articles from which information and data have been gathered are published after the year 2019. Articles and peer-reviewed journals that have been published before 2019 have been excluded from this study. Despite this, any kind of irrelevant information that has no connection with this study is excluded.

RESULTS

Data mining has started global possibilities for several businesses around the world. This calculation statistical field contrasts billions of segregated pieces of data and utilized by organizations to predict and detect the behavior of customers.

The objective of data mining is to give rise to new market opportunities. This process transforms data into terrific good knowledge. Data mining in education can be utilized for a good understanding of students and the conditions of learning of the students [4]. It also helps in developing teaching support and the educational system as well. Educational data mining sector is utilizing a huge amount of information to authenticate the investigated findings. This also assists guesses on student dropout, knowledge and the inspirational state becomes more faults-less with the additional data. The benefits of data mining in educational places are countless [5]. There are several and numerous studies and research papers concerning the applications and usage of data mining process in education.

One of the most regular usage of data mining is developing the procedure of study, upgrading execution of course, helping students in find the correct course for own self, creating the best profile of a student, finding the main issue regarding the dropouts, aim and motto of every students, improving not only the study but also giving attention to extracurricular activities, forecasting the performance of a student and plays an extremely important role in helping a student as a support for taking a good decision of student enrolment. The benefits of data mining involve helping organizations to collect some information that is trustworthy. Compared to several data applications, data mining applications are quite well organized and low cost, time saving, flexible and extremely user friendly. This application helps organizations produce more beneficial production and functional adjustments. Data mining system in education utilizes both inheritance and new systems.

On the other hand, data mining techniques have some challenges and issues as well. Some frequently faced data mining challenges are - social and security challenges. Particular and private data about every person and sensitive information is collected for buyer's profiles, buyer standard of behavior appreciation - illegal access to data and the private plan of information transforming into a big problem.

Incomplete and obstreperous data

Data mining is a method to acquire data from extreme big sizes of information. This living truth of data is quite incomplete, noisy and miscellaneous. Information in big amounts frequently will be incorrect and untrustworthy [6]. These problems, errors and blunders happen because of humans only in the devices that estimate the data.

Compound data
Real data is diversified, and it can be data from media, adding common language text, specific data, material data, video and audio data, image data, time series data and many more. It is extremely difficult to work with these different types of data to focus on the essential information [7]. New systems and equipment will surely need to be made to detach information that is important and more private.

Disseminated data
Real and original data is generally reserved at numerous stages in spreaded processing state. Data mining can be on separate systems, database and internet [8]. It is extremely difficult to convey all the information to a merged data archive supremely because of organizational and technical reasons.

Performance
The demonstration of the data mining substructure normally depends on the capacity of algorithms and techniques. On the little chance that the algorithms and technique plan are not enough at that time, which will inspire the demonstration of the data mining estimate unfortunately.

Development of mining design
Matters of the struggling of data mining approaches, the huge size of the database and the whole flow of data influence the creation and distribution of aligned data mining development.

Incorporable of framework knowledge
In the matter that framework knowledge may be combined, more actual, exact and well-founded data mining positioning might be established. Forecasting tasks might create more exact predictions while illustrative tasks might come up with more fruitful and effective searching.

Data security and privacy
Data mining commonly gives rise to importance governance, data security, privacy, and data challenges related issues. For example, when a dealer examines the details of the purchase, it reveals every detailed information about purchasing tendencies and consumer's exact choice without their consent. In every educational institution, it is necessary to predict the performance of students; right prediction plays an important role in classifying performance levels of students.

Data mining has a great necessity in aiding educational sector to get an understanding of learners' performance [9]. In case teachers of educational institutions can be capable of comprehending progression of students, it becomes easy for these individuals to ameliorate their overall teaching process. A number of students are enrolled into several programs and courses by private and public universities and colleges each year. These institutions gather essential information of students during admissions and this data is stored in computers. Universities and colleges are helped by data mining in the field of keeping a track of students' behavioural patterns and teaching procedures of teachers. Data mining consists of a huge importance in aiding educational sector to recognise different choices of students [10]. Students' requirements towards course selection of specialisation can be identified by universities based on data mining techniques.

In many cases, different pattern trends can be noticed in students which are recognised with the help of data mining. Mining technique of data is a necessity in making universities efficient in the field of assuming final results, grades, and knowledge of students. In recent days, competition between different educational institutions is increasing and each institution is endeavouring to provide the best learning facilities to students. In this case, the role of data mining in helping the educational sector to bring effectiveness in both learning and teaching procedures of learners and educators respectively cannot be denied. Profiles of students can be predicted through following data mining procedure [11]. Psychographic, geographic, and demographic traits of students are comprehended by educational institutions by including data mining techniques in all sorts of work.

Data mining helps teachers to keep the record of attendance of learners; apart from this feedback of students can be understood by teachers through data mining procedures. Students' feedback is necessary for teachers in the field of getting an idea about issues that are faced by learners [12]. Subsequently, educators can modify their teaching methods and bring improvement in the overall learning procedure of students. However, institutions are capable of observing the attitude of instructors with the help of several procedures related to data mining. Understanding of students' requirements based on data mining provides a huge opportunity to educators in the field of establishing a robust relationship with students [13]. Good relationships motivate learners to strengthen their learning procedures and achieve outstanding results. Hence, it is clear that data mining not only helps students and teachers to ameliorate learning and teaching methods but also it plays an essential part in intensifying the reputation of educational institutions.

Data usage is important because this system enables more fruitful assessment of programs, interference to to ease students resources and the success of the entire district. Integrated and state systems are also taking help from data to make codification which concentrates on the achievements of every student, progress and connecting the particular needs of the district and state [14]. An amalgamation of several types of information or data is more fruitful in causing strong proof to evaluate the performance of the school and develop practice.

Types of data

Data is generally the information, specifically the numbers and facts that are gathered to be considered, inspected, and used to help the process of making decisions, or information in electrical way, which can be kept and utilised by a computer. Data mining has some different types such as text mining, social media mining, video and audio mining, pictorial data mining and web mining. In recent days, universities work in a hugely complex and competitive environment [15]. With highly frequent technology improvement and low cost IT tools, the huge amount of data kept in educational databases grows frequently, in case this data is not examined further, it endures a high amount of data only. Data mining equipment, techniques and methods permit users to examine data and discover information and concealed patterns. Data mining is utilised to find relationships and patterns in data to develop the process of making decisions. This is an integrative place which gathers techniques from demography, fake intelligence, audio-visual networks, systems of database, process of learning, pattern identification, data measurements, knowledge accession and the theory of information.

The quantity of data gathered and kept in several educational institutions increased huge and educational data examination could not be functioned dynamically. Educational data mining is a proportionately new regulation which appeared from the data mining application on educational data [16]. Educational data mining keeps increasing from several research locations such as machine learning and data mining, pattern identification, neurometrics and other places of statistics, and fake intelligence, data contrivance and mathematical modelling. The main motto of educational data mining is to develop the process of education and to clarify the strategies of education for making decisions better [17]. There are several

descriptions of educational data mining. This is an incorporative research place that utilises several techniques and methods from data analysis, data mining, machine learning and statistics, to examine data gathered while learning and teaching in order to find earlier disclosed data, patterns in huge data depositories and relationships.

The educational data mining process has four most important stages. The first phase is known as "problem definition" in which a particular problem is interpreted into the problem of data mining. In this stage, the project objectives and aims are put together, and also the questions of research are also put together. The most time devouring stage is the second stage, data collecting and preparation phase. It may take most of the examination time. A major issue in data mining is data quality. Source data must be recognised, formatted and cleaned in pre-defined format in this stage. Next, there is an evaluating and modelling stage in which the parameters are settled to proper worth and several modelling methods are chosen and applied. The last stage or phase is the "deployment phase" in which the final outcomes of data mining are arranged and introduced by reports and graphs [18]. It is extremely important to indicate that the data mining method is a repeated method that means the method never stops while a specific solution is placed. This may be a new insert for the latest data mining method.

Educational data mining is a new age research place that is being hugely known due to its prospective. Educational data mining data might be used to help teachers or any other instructors, to develop modules and curriculums. Apart from this to know the behaviour of students, to develop the process of teaching and to develop the process of e-learning, to find out the actual reasons behind drop-outs which is excessively important, to support the procedure of making decisions [19]. Educational data mining research is divided in two key categories; first one regards the examination of learning the proper behaviour and assigns which work on a successful study, and the second one of the category works on searching an anticipating model for making better performance of students.

Educator, academic, details of students from childhood to human resources, demographic, these are known as educational data. Educational data are assembled from several sources in different formats, in spite of the fact that the data type and the person that can access it, varies. Applications and advantages of data mining in education are countless [20]. The most general use of educational data mining systems is developing the procedure of study, upgrading completion of every course, helping learners to find the perfect course, making the appropriate profile of students, finding out the actual reason behind dropouts, target of students, curriculum improvement and many more.

On the other hand, data mining equipment is extremely complicated and needs proper training and lessons to use. Data logic is an extremely complex procedure and rapidly needs users with appropriate training to use the equipment. Data mining processes are not an error free and perfect process all the time as this system does not give correct, accurate and faultless information every time. One of the worst disadvantages of data mining are privacy and data issues [21]. Generally, organisations only share personal information while providing a service.

In recent days, people are getting tensed that the personal data is going to be sold to third parties even without their concern. Some users will not feel good and comfortable to know that the government of the country can always trace some specific information about the users and know everything about how a user is using the device. Data mining is one of the strongest instruments in the market; on the other hand it has its own flaws. One major fault is, data mining always needs databases that are large to be more successful. It usually does not accept small databases. Data mining does not provide genuine and correct information every time [22]. There are several methods to examine data and few of them are more correct than the others. Another major problem is when there is some lost data in a database that requires to be considered to develop a complete investigation. Data mining systems can be immensely high cost procedures. It is obvious that schools, colleges or universities have to hire extra technology

professionals and workers to make sure that the data mining is done accurately. Many businesses need to put money into developed and advanced data mining software that can be extremely expensive.

DISCUSSION

Educational data mining can be described as the process for searching the particular types of information or data which come from the system of education and implements those methods to understand the system and the students as well in a better way. Educational data mining is a method of converting raw information or data acquired from educational systems into functional data which can be utilised to create data related decisions. The improvement of data mining and logical in the field of education was knowingly late as compared to any other fields. Though, it is quite challenging for data that are related to the educational field by the web because of the data mining system's particular functions on data. At the time when several types of data have consecutive characteristics, the dispensation of information that is related to education over time has been exceptionally ascribed. Educational data mining methods have been effectual and make a scale of occurrence concerning learner absorbing on the online area, and fulfilling better correctness continuously. There are notable features which need to be surveyed to explain the extreme advancement for educational data that is improving acceptance which is not all the major data kept in one data brook. Educational research has consequences in several new educational increments. Innovations that are computer based have transformed extremely that everyone knows. Data mining utilises its tools to search the previously disclosed relationships and patterns in a large data set. These tools can include analytical models, numerical algorithms and techniques that can be learned by machines. These methods are capable of finding the information within the data which reports and queries cannot productively disclose.

Data mining system makes sure that the information or data are properly secured and cannot get hacked by hackers easily. Proper security is an extremely important factor in every place. Every system or technology gets considered as a good one by seeing the security system first and a system such as data mining where several data or information of many users has been kept has to be properly secured. This technology helps to work with the events that happened in schools and calendars as well. Data mining process assists in automating the generation of timetables, this is an important part as it will be extremely problematic if one has to change the timetable every time or every day. This process permits a well organised management of every assignment. Data mining process guides one to observe the performance of students. Observing the performance of every student manually is quite difficult for a person. When the observation is done by a system, it gets easier. This technology records each and every data on exams, classes, library and demographic data. This type of data management system gives important inputs from which school management and teachers can get help to observe a student's everyday performance. Schools, colleges and universities have a huge number of resources at the ejection. To make sure resources such as classrooms, libraries, laboratories and every workspace are kept in use, a fruitful database management process is immensely important. This system keeps updated data and information on every resource that is available and assists the school authority to make sure the allotment is accurate. System workers need to frequently back up the data with normal and regular file processing systems to make sure that the data are accessible and safe. It is a quiet time taking process as every educational place has lots of big files in the system. In case the organisations have a good database management system such as a data mining system, workers will not have to do the same job or back up every data every day.

CONCLUSION

Educational data mining method is a new age regulation with a big future for each and every candidate of

the educational process. Data mining methods were improved to find the disclosed knowledge and identify patterns from data on its own. Educational data mining might be utilised for distinguishing and forecasting the performance of each and every student, teachers and the dropouts as well. This system can help teachers to trace the progress of academics to develop the method of teaching. It can also assist learners to choose the perfect and correct career and educational management as well to be more successful and efficient. Educational data mining can be utilised to maintain, retain and attract the learners to accomplish the revenue of university.

Inspecting learners' data is important for detecting, finding and knowing about the perfect and genuine instructional practices that are fruitful. It is obvious that people always want new methods and love to work with new processes, data mining systems are one of them. Data mining system is really important in education because it helps students and the teachers to find the data in new ways or find patterns the users even did not know existed. This process has several plus points such as decreasing the chances of fraud and making businesses more successful. On the other hand, it is quite obvious that it will have some issues like any other technical process would have such as inaccurate and unreal information or data and false inputs.

REFERENCE

[1] Hasan, Raza, et al. "Predicting student performance in higher educational institutions using video learning analytics and data mining techniques." Applied Sciences 10.11 (2020): 3894.

[2] Sathishkumar, V. E., Jangwoo Park, and Yongyun Cho. "Using data mining techniques for bike sharing demand prediction in metropolitan city." Computer Communications153 (2020): 353-366.

[3] Yang, Jin, et al. "Brief introduction of medical database and data mining technology in big data era." Journal of Evidence-Based Medicine 13.1 (2020): 57-69.

[4] Romero, Cristobal, and Sebastian Ventura. "Educational data mining and learning analytics: An updated survey." Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery 10.3 (2020): e1355.

[5] Jones, Kyle ML, Alan Rubel, and Ellen LeClere. "A matter of trust: Higher education institutions as information fiduciaries in an age of educational data mining and learning analytics." Journal of the Association for Information Science and Technology 71.10 (2020): 1227-1241.

[6] Janssen, Marijn, et al. "Data governance: Organizing data for trustworthy Artificial Intelligence." Government Information Quarterly 37.3 (2020): 101493.

[7] Kiger, Michelle E., and Lara Varpio. "Thematic analysis of qualitative data: AMEE Guide No. 131." Medical teacher 42.8 (2020): 846-854.

[8] Guo, Yuan, et al. "The internet of things-based decision support system for information processing in intelligent manufacturing using data mining technology." Mechanical Systems and Signal Processing 142 (2020): 106630.

[9] Shin, Dongjo, and Jaekwoun Shim. "A systematic review on data mining for mathematics and science education." International Journal of Science and Mathematics Education19.4 (2021): 639-659.

[10] Xiao, Wen, Ping Ji, and Juan Hu. "A survey on educational data mining methods used for predicting students' performance." Engineering Reports 4.5 (2022): e12482.

[11] Tomasevic, Nikola, Nikola Gvozdenovic, and Sanja Vranes. "An overview and comparison of supervised data mining techniques for student exam performance prediction." Computers & education 143 (2020): 103676.

[12] Muñoz, Jorge Leoncio Rivera, et al. "Systematic Review of Adaptive Learning Technology for Learning in Higher Education." Eurasian Journal of Educational Research 98.98 (2022): 221-233.

[13] Khan, Anupam, and Soumya K. Ghosh. "Student performance analysis and prediction in classroom

learning: A review of educational data mining studies." *Education and information technologies* 26.1 (2021): 205-240.

[14] Barksdale, Christopher, Michelle L. Peters, and Antonio Corrales. "Middle school students' perceptions of classroom climate and its relationship to achievement." *Educational Studies* 47.1 (2021): 84-107.

[15] Hamadamin, Halbast Hussein, and Tarik Atan. "The impact of strategic human resource management practices on competitive advantage sustainability: The mediation of human capital development and employee commitment." *Sustainability* 11.20 (2019): 5782.

[16] Ashraf, Mudasir, Majid Zaman, and Muheet Ahmed. "An intelligent prediction system for educational data mining based on ensemble and filtering approaches." *Procedia Computer Science* 167 (2020): 1471-1483.

[17] Abu Saa, Amjed, Mostafa Al-Emran, and Khaled Shaalan. "Factors affecting students' performance in higher education: a systematic review of predictive data mining techniques." *Technology, Knowledge and Learning* 24.4 (2019): 567-598.

[18] Irawan, Yuda. "Implementation Of Data Mining For Determining Majors Using K-Means Algorithm In Students Of SMA Negeri 1 Pangkalan Kerinci." *Journal of Applied Engineering and Technological Science (JAETS)* 1.1 (2019): 17-29.

[19] Marlina, Evi, Bambang Tjahjadi, and Sri Ningsih. "Factors affecting student performance in e-learning: A case study of higher educational institutions in Indonesia." *The Journal of Asian Finance, Economics and Business* 8.4 (2021): 993-1001.

[20] Jones, Kyle ML, Alan Rubel, and Ellen LeClere. "A matter of trust: Higher education institutions as information fiduciaries in an age of educational data mining and learning analytics." *Journal of the Association for Information Science and Technology* 71.10 (2020): 1227-1241.

[21] Zhao, Ping, et al. "A survey of local differential privacy for securing internet of vehicles." *The Journal of Supercomputing* 76.11 (2020): 8391-8412.

[22] Francis, Bindhia K., and Suvanam Sasidhar Babu. "Predicting academic performance of students using a hybrid data mining approach." *Journal of medical systems* 43.6 (2019): 1-15.

Techniques and Softwares for Social Media Data Mining

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ABSTRACT

Data mining refers to a framework by which a company can easily enhance their performance. In this study, social media data mining process is critically evaluated with help of several types of data sets. Techniques and software's are also mentioned in this study, by which a firm maintains this data mining process in a significant way. Importance of social media data mining is to attract more customers. Every company has a goal and objective in global market to enhance their performance. Social media data mining process helps a company to achieve those objectives and goals. Predictive analysis, improved revenue, lower costs and creating awareness are essential benefits of this particular process related to a company. Privacy and security related issues of data are faced by a firm with help of this data mining process. This process requires more amount of money initially, for this reason, small organisations cannot be able to maintain this social media data mining process. Association, clustering, classification, machine learning process, data cleaning and data visualisation are unique and relevant techniques of data mining. Usage of these techniques are briefly discussed in this study..

KeywordsData mining, social media, clustering, association..

INTRODUCTION

Process of obtaining big data from user generated content on social media sites is known as social media data mining. A process of extracting useful information from huge volumes of data is also referred to as a data mining process. This process helps to enhance cost cutting, revenues and improve customer relationships. Two types of data mining process are available such as: predictive and descriptive data mining analysis. Predictive data mining analysis helps users to predict future trends of a business activity [1]. In order to find numerical output, prediction data mining analysis is used to gather relevant and authentic data related to work process. A model helps to predict continuous valued function to maintain a proper business activity. Several types of predictive data mining processes are available such as: classification, regression, prediction and time serious analysis.

Descriptive data mining process refers to summarising several types of data into relevant information. Proper description of work process is gained with help of this descriptive data mining process. Frequency, correlation and cross tabulation are used to maintain descriptive data mining analysis. Customer preference plays a positive impact on economic growth of a business activity. This particular data mining analysis helps to identify those customer preferences in a significant way. In case a company identifies demand of customers and markets, this firm can easily earn high profit. Several types of descriptive data mining are available such as: sequence discovery, summarisation, clustering and association rules analysis [2]. These should be helpful for a company to maintain their organisational and financial performance. In order to create meaningful objectives this particular analysis is helpful. Objectives into predefined classes are mentioned with help of this clustering data mining analysis. Several types of data related to work are available, company management team has a responsibility to summarise all data and provide a concussion related to work.

MATERIALS AND METHODS

Entire process of a project work is maintained with help of this materials and methods segment. This chapter plays an essential role to gather, interpret and summarise all gathered data in a simple way. Several types of steps are followed by a researcher for this study to finish their work within a given deadline. Research design, type, philosophy and data collection methods are followed by a researcher for this study. Overall process of a research work is maintained by this research design [3]. Several types of questions related to a project work are available, researcher can easily answer all questions with help of this research design. In this study, researcher uses "cross sectional" research design to maintain a proper process and strategy of work. Observational study design mainly refers to this cross-sectional research design. Several types of variables are available related to this research topic, this particular design helps researcher to compare different types of variables at same time.

Different meanings of a research work are gained by a researcher with help of this research approach. Researcher can easily maintain proper methods to collect and analyse all gathered data by this research approach. Several types of research approaches are available such as: "inductive", "deductive" and "abductive". In this study, researcher uses an "inductive" research approach to generate conclusions of thisstudy. Logical way of a research work is maintained by a researcher with help of this "inductive" research approach.

Every research work has aims and objectives and these are advantageous for a research work to maintain proper work strategy. "Inductive" research approach helps researcher to achieve several types of goals of this particular research work [4]. In order to gather several types of information related to a research work, research type helps researcher to investigate research problems and questions to gain new knowledge related to a research work.

Scientific advancement of a research work is maintained with help of this research type. In this study, researcher uses "qualitative" research types to gather clear ideas about this study. Logical and coherent way of research work is maintained by researcher with help of this particular research type [5]. Researcher collects secondary data related to this particular study. These individuals mainly gather existing data from online journals, books, websites and peer reviewed journals, which are published after 2019. This data collection process is advantageous for this particular study. Theoretical analysis of a research work is maintained properly with help of this methodological view of a research work.

RESULTS

A concept about social media data mining process

Social media is a useful tool to share and gather several types of information related to a study. In recent days, everyone uses social media platforms to communicate and maintain a strong relationship with each other. Several types of information are gathered by everyone by this social media platform. Up to date information is collected by a person by this social media platform. Aggregate data and uncover trends are known to everyone by this social media data mining process [6]. Wild language landscape related to this particular research work is maintained with help of this data mining process. Social media data mining process helps to spot trends of a business activity. This social media is effectively beneficial to gather information related to domestic demands of markets and customers. In case an organisation understands demand of local customers and markets, this should be beneficial for a firm to maintain their economical functionality.

Social media data mining process helps to spot trends and techniques of a business activity in an organised manner. Social listening plays a positive impact on market demand and customer demand of an organisation. Topics and keywords related to this study are maintained with help of this social media

data mining process. This particular data mining process is helpful for a company to identify proper context related to work. More accurate prediction of work is gained with help of this social media data mining process. Traditional methods of work are maintained by a firm in global market to earn more profit [7]. These traditional methods are known to each and every customer. These individuals are attracted by this traditional method in a significant way. Relevant and accurate prediction of outcomes of an organisation is effectively beneficial to maintain their organisational culture. Every company always tries to achieve aims and objectives to enhance engagement of employees. This social media data mining concept helps every firm to maintain work process in a simple way.

Social media data mining helps to watch several types of events unfold in real time. Another excellent reason to use this particular technique is offered with help of an event detection process. Emerging situations and context of a business activity are maintained properly by this social media data mining process [8]. Social media data mining process helps to maintain traditional sensor methods in an organised way. For this reason, work process is maintained properly by these concepts. This social media data mining process helps to provide relevant content related to this particular study. An annoying reality of an online presence is boosted with help of this social media data mining. Social media platforms are helpful for an organisation to interact with customers, employees and other stakeholders in a significant way. Spam activity of a company is mitigated with help of this social media data mining. Social media data mining process helps a company to maintain their work timing and process. Several types of micro trends are available in global market, every company has a responsibility to understand work process of those micro trends.

Social media heat map is leveraged with help of these social media data mining processes. A firm always tries to identify their target markets and customers by using social media platforms. Potential customers are gathered by a company to enhance their financial health. Data mining process helps a company to support research process related to work. Every firm always tries to enhance their economic growth. For this reason, a company produces several types of products to enhance engagement of customers. Every feature of a new product is known to every customer with help of this social media data mining process [9]. In case customers are easily attracted by these new products, this company can produce new products in a huge amount globally. For this reason, profitability of an organisation is also enhanced with help of this social media data mining process.

Brief idea about data mining techniques
Process of analysing dense volumes of data to identify accurate patterns. Data techniques are helpful for a company to discover modern trends of new markets. This particular process helps to gain insights related to usage of data. Decision making process of a person is enhanced by this social media data mining process. Large blocks of information are explored and analysed with help of these data mining processes [10]. Exploration process of data mining techniques is immensely helpful for an organisation to maintain their economic growth. Several types of data techniques are available in global market such as: data visualisation, clustering, data cleaning, association, classification, prediction, machine learning, neural networks, outlier detection and data warehousing. Visual presentation of data related to work is maintained properly with help of this clustering process of data mining. Buying trends and demographic sales of a company are represented in a graph by this clustering process [11]. Processes of making groups of different data points based on their characteristics are referred to as clustering concepts.

Several groups refer to several types of characteristics related to data. Data miners help to divide data into subsets with help of clustering data mining techniques. Several types of data clustering methods are available such as: model-based method, partitioning, density based, grid based, hierarchical method. The types of data are used to make different types of models in workplace to identify target markets and

customers. Model-based method mainly refers to creating several models for each data cluster. Involvement process of data into a group is referred to as the partitioning method [12]. Specific cluster is used for this particular study to fulfil criteria of each individual cluster. Data points belong to just one cluster or group for this specific method of data cluster. Data points are collected and analysed with help of this density-based method. Density based method helps a company to enhance machine learning process. Several types of data related to work are gathered in workplace to maintain a smooth process [13]. Those data are divided into some cells on a grid. An individual cell is clustered by this grid-based method.

Overall database process is managed by this particular cluster process. Grid based method helps to maintain fast processing time of work within a company. Data points are referred to as a single cluster globally. Hierarchical method of data clustering helps to make a group of similar data points [14]. These data points are analysed separately from each other by this hierarchical method. This method helps a company to identify necessary characteristics of products, by which customers are easily attracted by this company. Sales of graphs of an organisation is also maintained by this clustering data mining process. In order to find correlations among data points in a data set, association rules are immensely helpful for an organisation. Data miners use association to discover interesting relationships among variables in database. Marketing strategy and research is maintained by a firm with help of rules and regulations related to association [15]. In this process two types of methods are available such as: multidimensional association single dimensional association.

Single dimensional association involves looking for one instance of a data point. In case a company focuses on only one product, this firm may not be able to earn high profit from global market. Single dimensional association creates a negative impact on economic growth of a company in global market [16]. Company management team has a responsibility to focus on every product and service, which are provided by a firm. Multidimensional association helps an organisation to manage all products and services. Several types of data points are available within a data set. All data points are critically evaluated with help of this multidimensional association. Economic stability of an organisation is managed with help of this association data cluster.

Usage of software's and techniques for social media data mining

Data mining applications are immensely useful for each and every company in global market. Several types of data mining areas are available such as: retail industry, financial data analysis, biological data analysis, telecommunication industry, intrusion industry and other scientific applications [17]. High quality data analysis is done in banking and financial industry with help of this financial data analysis in an organised manner. Financial data analysis process helps to maintain a systematic data analysis framework. Multidimensional data analysis and data mining processes are maintained with help of this design and construction of data warehouses. Prediction related to loan payment is managed by a company by this particular analysis. Financial data analysis helps to maintain customer credit policy analysis. Target markets and customers are maintained properly by a company to enhance their economic growth. Financial condition of an organisation is managed by this financial data analysis. In recent days, everyone uses social media on a daily basis to be up to date on a daily basis. Social media analytics market value is expected to grow 8.5 billion in the year of 2022 [18]. Usage of social media is increasing on a daily basis. This value will increase 26 billion dollars within the year of 2028. This creates a positive impact on economic growth of an organisation.
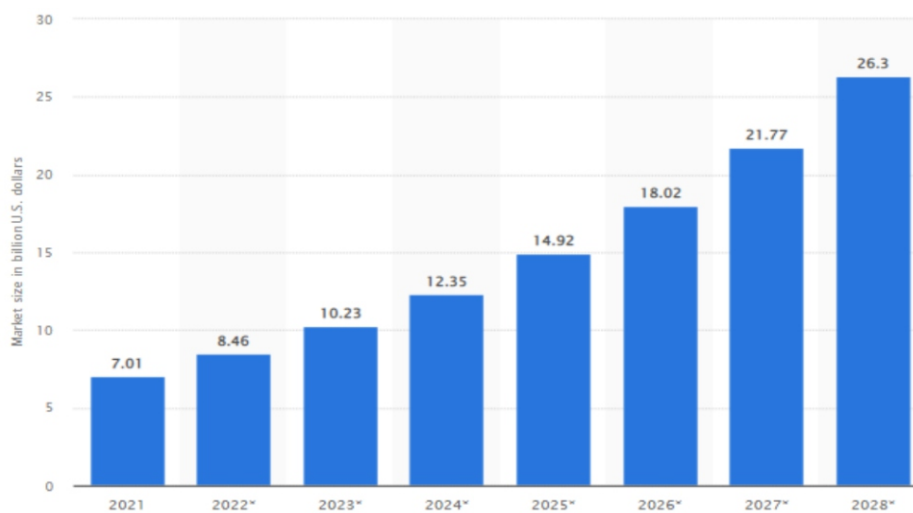
Figure 1: Social media data analytics market size

Great application of retail industry is also managed with help of this data mining process. This particular industry collects large amounts of data from sales, goods transportation, customer purchasing history and services with help of this data mining process. Quality and quantity of data are measured by a company to maintain their work process and strategy [19]. Every firm always wants to expand their business in different countries to enhance their financial condition. Availability and popularity of a firm is enhanced with help of this data mining process. Data mining process of retail industry helps to identify patterns and trends of loyal customers. In order to improve quality of customer services, retention and satisfaction of customers are maintained properly by a company with help of this data mining process. Telecommunication industry helps to provide various types of services such as: fax, pager, cellular phone and internet messenger. New computer and communication technology are also enhanced with help of modern technology and software's.

Issues and mitigation process related to social media data mining process
Security and social challenges are faced by an organisation in global market to maintain data mining processes in a significant way. Critical innovations for researchers and businesses in numerous spaces are managed with help of these data mining concepts [20]. A new database of a company is maintained properly with help of this particular data mining process. Impressive security of data is managed by a firm with help of these dynamic techniques in an organised manner. Private information's of about people is gathered by an organisation to maintain a strong security base and social challenges. Secrete data related to customers of a company is managed properly. Relevant and authentic tools are used by a company to maintain their security in a significant way. Process of obtaining huge volumes of data related to this study is managed with help of this noisy and incomplete data [21]. This process mainly refers to noisy, incompleteness and heterogeneity in global market. Several types of data are available in global market, and the company management team has a responsibility to identify their relevant and authentic data related to work process.

True data is normally put away at different stages of data mining process. Several types of data are collected from individual systems, internet and data databases. This data process is effectively beneficial for a company to maintain their financial growth. Complex data creates a negative impact on performance of an organisation. Natural language text, spatial data, temporal data and time series are included in this complex data analysis method [22]. Various data and necessary information related to data mining process are collected by a company management team to maintain their process of work.

Improvement of mining algorithms plays an essential role to maintain organisational performance. Incorporation of background knowledge is not gathered properly with help of this data mining process. Data visualisation process is also hampered due to lack of knowledge and skills related to data mining process.

DISCUSSION

Social media data mining process refers to a framework by which a company can easily communicate with their employees, customers and other stakeholders. Personalised interactions among stakeholders and employees are enhanced with help of this social media data mining process. Company management team always tries to fulfil demand of markets and customers to enhance their performance. This particular data mining process helps to support several types of research work in an organised manner. A large volume of public data is collected by a company to maintain quality and quantity of products. This process is immensely beneficial to maintain security of data related to public data globally.

Technological, healthcare and social science related data magnitude are applied with help of this social media data mining process [23]. Trends of a business activity are maintained properly by this social media data mining process. Accuracy and authenticity of work is managed by an organisation with help of this data mining process. Social media platforms are used by everyone on a daily basis. In case a company provides their advertisements related to their products in social media platforms. Customers can easily know about internal and external characteristics of a product with help of this advertisement policy. Every company has an aim and objective to enhance their financial growth. Hence social media data miningprocess helps an organisation for maintaining economic condition. Prediction of outcomes of an organisation is managed by this particular method of data mining. This process of social media data mining helps to maintain a traditional method of work, by which every employee can easily provide their better performance in workplace. A firm can provide better quality products and services in global market to attract more customers. Profitability and productivity of this company are increased by this process. Behaviour of a customer plays an important role to fulfil demand of customers and markets. A firm always tries to predict market and customer segmentation. Social media data mining process helps to predict those characteristics.

Several types of data mining techniques are mentioned in this study. Data cleaning process is included in this data mining technique. Data cleaning process involves to organise data, eliminate duplicate data and filling in null values. Useful and relevant information related to work is gathered by a company with help of this data cleaning process [24]. This process follows several steps such as: verifying data, converting data type, removing unnecessary data, eliminating errors and completing missing values. Each and every data point is gathered and verified by an organisation with help of this data mining process. Uniform data sets must be managed by a company globally to maintain their work process. Irrelevant data are eradicated by a firm to prepare a fresh data set in an organised way. Company management team has a duty to fulfil missing values for all relevant and authentic data.

Data visualisation process is referred to as a data mining process within a company. Several types of methods are available in this data visualisation such as: maps, heat maps, histograms, comparison chats, network diagram, density plots and scatter plots. These visualisation processes are immensely helpful to understand visualisation concepts of data. This creates a positive impact on financial and organisational culture of an organisation. Classification and machine learning process are included in this data mining framework. Logistic regression, decision trees, naive bayes and support vector machines are used as methods of data mining classification. Semi supervised, supervised, unsupervised learning is referred to as machine learning processes. A business activity is enhanced with help of this machine learning process.

CONCLUSION

Social media data mining process helps a company to maintain their performance globally. For this reason, a company can easily enhance their rate of production and profitability with help of this process. Social media platforms are immensely helpful for each and every form to identify their target market and customers. In case a firm produces better quality products in market, this company can easily enhance their brand value and brand equity in an organised manner. Frequency, correlation and cross turbulence is managed by an organisation with help of this social media data mining process. Social media platforms are used by each and every customer on a daily basis. For this reason, a company can easily provide their discounts, offers related advertisements on this particular platform. Cross sectional" research design is followed by researcher in this study. Secondary data are collected by researcher with help of qualitative data analysis.

 "Inductive" research approach is maintained by a researcher to gather several types of data related to this study. Theoretical analysis of a study is also managed by this particular approach in global market. In this study, social media data mining process of a research work is critically evaluated. Several types of data mining techniques are also mentioned here. Model based, grid based, density based and hierarchical methods are critically evaluated in this study. This creates a positive impact on economic growth and financial condition of an organisation.

REFERENCE

[1] Fedushko, Solomia, Taras Ustyianovych, and Michal Gregus. "Real-time high-load infrastructure transaction status output prediction using operational intelligence and big data technologies." Electronics 9.4 (2020): 668.

[2] Aljawarneh, Shadi, et al. "Particularities of data mining in medicine: lessons learned from patient medical time series data analysis." EURASIP Journal on Wireless Communications and Networking 2019.1 (2019): 1-29.

[3] Rashid, Yasir, et al. "Case study method: A step-by-step guide for business researchers." International journal of qualitative methods 18 (2019): 1609406919862424.

[4] Patel, Mimansha, and Nitin Patel. "Exploring Research Methodology." International Journal of Research and Review 6.3 (2019): 48-55.

[5] Ronkainen, Noora J., and Gareth Wiltshire. "Rethinking validity in qualitative sport and exercise psychology research: A realist perspective." International Journal of Sport and Exercise Psychology 19.1 (2021): 13-28.

[6] Belcastro, Loris, et al. "ParSoDA: high-level parallel programming for social data mining." Social Network Analysis and Mining 9.1 (2019): 1-19.

[7] Tien, Nguyen Hoang. "Customization and Standardization of the Business Strategy of Foreign Enterprises in Vietnam–the McDonald's Case and the Fast Food Sector."." International journal of research in marketing management and sales 1.2 (2019): 44-50.

[8] Sivarajah, Uthayasankar, et al. "Role of big data and social media analytics for business to business sustainability: A participatory web context." Industrial Marketing Management 86 (2020): 163-179.

[9] Abkenar, Sepideh Bazzaz, et al. "Big data analytics social media: A systematic review of techniques, open issues, and future directions." Telematics and Informatics 57 (2021): 101517.

[10] Ageed, Zainab Salih, et al. "Comprehensive survey of big data mining approaches in cloud systems." Qubahan Academic Journal 1.2 (2021): 29-38.

[11] Yoseph, Fahed, et al. "The impact of big data market segmentation using data mining and clustering techniques." Journal of Intelligent & Fuzzy Systems 38.5 (2020): 6159-6173.

[12] Schleder, Gabriel R., et al. "From DFT to machine learning: recent approaches to materials

2.3 (2019): 032001.

[13] Kaasinen, Eija, et al. "Empowering and engaging industrial workers with Operator 4.0 solutions." Computers & Industrial Engineering 139 (2020): 105678.

[14] He, Li, Bruno Agard, and Martin Trépanier. "A classification of public transit users with smart card data based on time series distance metrics and a hierarchical clustering method." Transportmetrica A: Transport Science 16.1 (2020): 56-75.

[15] Donthu, Naveen, and Anders Gustafsson. "Effects of COVID-19 on business and research." Journal of business research 117 (2020): 284-289.

[16] Streimikiene, Dalia, et al. "Sustainable tourism development and competitiveness: The systematic literature review." Sustainable development 29.1 (2021): 259-271.

[17] Priyanka, E. B., and S. Thangavel. "Influence of Internet of Things (IoT) In Association of Data Mining Towards the Development Smart Cities-A Review Analysis." Journal of Engineering Science & Technology Review 13.4 (2020).

[18] Statista Research Department.Social media analytics market size worldwide from 2021 to 2028. Statista. (2023) https://www.statista.com/statistics/1330450/global-social-media-analytics-market-size/. Accessed 9th January, 2023.

[19] Abbas, Jawad. "Impact of total quality management on corporate green performance through the mediating role of corporate social responsibility." Journal of Cleaner Production 242 (2020): 118458.

[20] Williamson, Ben, Felicitas Macgilchrist, and John Potter. "Covid-19 controversies and critical research in digital education." Learning, Media and Technology 46.2 (2021): 117-127.

[21] Li, Chunquan, Yaqiong Chen, and Yuling Shang. "A review of industrial big data for decision making in intelligent manufacturing." Engineering Science and Technology, an International Journal 29 (2022): 101021.

[22] Dagaeva, Maria, et al. "Big spatio-temporal data mining for emergency management information systems." IET Intelligent Transport Systems 13.11 (2019): 1649-1657.

[23] Yang, Jin, et al. "Brief introduction of medical database and data mining technology in big data era." Journal of Evidence-Based Medicine 13.1 (2020): 57-69.

[24] Pejic-Bach, Mirjana, et al. "Text mining of industry 4.0 job advertisements." International journal of information management 50 (2020): 416-431.

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