Data and Metadata. 2024; 3:277
doi: 10.56294/dm2024277

ORIGINAL

Intelligent Optimization Framework for Future Communication Networks using Machine Learning

Marco de optimización inteligente para las futuras redes de comunicación mediante aprendizaje automático

Vijaya Saradhi Thommandru[1] ✉, T. Suma[2] ✉, Mary Odilya Teena[3] ✉, Muthukrishnan[4] ✉, P Thamaraikannan[5] ✉, S. Manikandan[6] ✉

[1]Department of Computer Science and Engineering, School of Technology ,GITAM (Deemed to be University), Hyderabad, India.
[2]Department of Computer Science and Engineering, Sri Venkateshwara College of Engineering, Bengaluru, India.
[3]PG Department of Computer Applications, St. Joseph's College of Arts and Science (Autonomous), Cuddalore, Tamil Nadu, India.
[4]Department of Computer Science and Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamilnadu, India.
[5]Department of Information Technology, Adithya Institute of Technology, Coimbatore, Tamil Nadu, India.
[6]Department of Information Technology, E.G.S. Pillay Engineering College, Nagapattinam, Tamil Nadu, India.

Cite as: Saradhi Thommandru V, Suma T, Odilya Teena AM, Muthukrishnan A, Thamaraikannan P, Manikandan S. Intelligent Optimization Framework for Future Communication Networks using Machine Learning. Data and Metadata. 2024;3:277.https://doi.org/10.56294/dm2024277

Submitted: 01-10-2023 **Revised:** 10-02-2024 **Accepted:** 28-04-2024 **Published:** 29-04-2024

Editor: Adrian Alejandro Viton Castillo

ABSTRACT

Confronting the undeniably complicated versatile correspondence organization, knowledge is the advancement heading of organization versatile improvement innovation later on. Portable correspondence information is a significant part representing things to come data society. AI calculation is embraced in the versatile improvement plot, which can facilitate different enhancement goals as per the progressions of climate and state and understand the ideal boundary arrangement. Canny portable terminal hardware is turning out to be increasingly well known. The combination and advancement of social, portable and area administrations make the conventional informal organization easily change to versatile correspondence organization. AI is a part of man-made consciousness. Its examination objective is to construct a framework which can advance a few guidelines from information and apply them to the resulting information handling. In light of chart hypothesis, this paper tackles the issue of correspondence network information really, and concentrates on the calculation of huge information examination in view of AI.

Keywords: Mobile Communications; Machine Learning; Graph Theory; Big Data.

RESUMEN

Confrontando la organización de correspondencia versátil innegablemente complicada, el conocimiento es la rúbrica de avance de la innovación de mejora versátil de la organización más adelante. Información de correspondencia portátil es una parte importante que representa las cosas por venir sociedad de datos. AI cálculo se abraza en la parcela de mejora versátil, que puede facilitar diferentes objetivos de mejora según las progresiones del clima y el estado y comprender la disposición límite ideal. El hardware de terminal portátil Canny se está volviendo cada vez más conocido. La combinación y el avance de las administraciones sociales, portátiles y de área hacen que la organización informal convencional cambie fácilmente a una organización de correspondencia versátil. La IA forma parte de la conciencia artificial. Su objetivo de examen es construir un marco que pueda avanzar algunas directrices a partir de la información y aplicarlas al manejo de la información resultante. A la luz de la hipótesis de la carta, este documento aborda la cuestión de la información de la red de correspondencia realmente, y se concentra en el cálculo de examen de información enorme en vista de la IA.

Palabras clave: Comunicaciones Móviles; Aprendizaje Automático; Teoría De Grafos; Big Data.

INTRODUCTION

With the fast improvement of data science, human information has shown touchy development. An enormous number of information are gathered and put away in many fields consistently.[1] Versatile correspondence information is a significant part representing things to come data society. Insightful versatile terminal gadgets are turning out to be increasingly well known. With the approach of the large information period and the incorporation and improvement of social, portable and area administrations, conventional interpersonal organizations have flawlessly changed to versatile correspondence networks.[2] With the fast improvement of data development, enormous information gives a pristine improvement stage and extraordinary open doors for the portable correspondence industry.[3] Versatile correspondence is firmly connected with individuals' work and life, and individuals' interest for better execution portable correspondence networks is likewise expanding. Today, when the Web and versatile Web are in the ascendant, individuals' way of behaving and propensities in human culture are continually affected by portable correspondence.[4] Notwithstanding progressively complex versatile correspondence organizations, existing organization versatile improvement hypotheses and techniques have numerous issues to accomplish the presentation necessities of super high information rates and super low idleness.[5] AI is brought into the world as an instrument that accepts information as the examination item and targets finding regulations and affiliations. AI is a part of computerized reasoning, and its exploration objective is to construct a framework that can independently gain a specific regulation from the information and apply this regulation to resulting information handling.[6]

Existing organization versatile streamlining speculations and techniques are a significant piece of organization self-association, which alludes to the change of base stations and other organization hardware by checking the progressions of significant execution marks of the organization after some time during the activity of the organization. Boundary arrangement or related asset the executives systems.[7] Later on, versatile correspondence organizations will actually want to give information transmission rates equivalent to those of optical filaments, and will accomplish the degree of "non-discernment" in start to finish delay.[8] Customary straightforward factual techniques are feeble while handling these information. They are hard to track down the profound relationship between's such information, and they can't deal with information in that frame of mind in a designated way. Subsequently, conventional straightforward factual strategies have been not able to fulfill individuals' Need.[9] Most steering conventions in versatile informal communities utilize the technique of duplicating messages to accomplish the objective of further developing the achievement pace of message conveyance. Be that as it may, numerous duplicates possess superfluous organization assets.[10] Customary AI depends on information climate, which can't concentrate on huge information. As a part of science, diagram hypothesis has grown quickly as of late. [11] AI calculation in view of diagram hypothesis is a sort of learning calculation which can lessen the issue of AI to the issue of chart hypothesis, and afterward use chart hypothesis to dissect and tackle it.[12] Focusing on this issue, this paper takes care of the enormous information issue in view of chart hypothesis, and studies the huge information examination calculation in light of AI.

Existing Network Adaptive Optimization Technology

With the advancement of clever correspondence and 5G, the mix of AI and remote correspondence likewise invites new improvement open doors. The conventional credit assessment model is basically subjective and depends intensely on private emotional thoughts and experience .[13] Pertinent investigates on AI, particularly the blend of profound learning and remote transmission layer, have arisen, and another correspondence framework model in light of AI, particularly profound learning, has been proposed. An organization model in view of adjoining hubs can be laid out by interfacing a line between two stations as the edge of the organization. Because of the distinctions in correspondence administrations between stations, a complex weighted organization can be built. The heaviness of the edge addresses the traffic volume and the significance of the help between two contiguous stations, and the more prominent the weight is.[14] A regular organization the executives framework interfaces all organization components and sub-network components, and might arrive at the single leading group of the base station. With the mediation and order of the activity and support work force, the organization issues and blames are tackled in a designated way. While assessing a portable correspondence organization, a specific file can't be chosen as the assessment standard. The correspondence network should be viewed as all in all to completely consider different unwavering quality records.[15] To completely and totally mirror the running condition of the correspondence organization.

https://doi.org/10.56294/dm2024277

Use of AI In view of Chart Hypothesis in Remote Correspondence Framework

Channel Assessment In light of EM Calculation

There is no semi-directed AI in the conventional hypothetical system of AI, however semi-regulated AI has step by step become an examination area of interest as of late. The customary correspondence framework ordinarily isolates the sending end and the less than desirable end into a majority of handling modules to improve each part to make the general presentation roughly ideal. In the calculation in view of chart hypothesis, the calculation of complex arranging network possesses the primary calculation measure of the proposed calculation, and the principal bottleneck lies in the capacity and calculation of enormous lattices, which isn't helpful for the use of the calculation in numerous functional issues. The fresh out of the box new information besides the fact that the information created in have the course of information activity in the data framework, the perspectives on understudies on different items during the time spent interpersonal organization, and the logs during the time spent school server activity.[18] Subsequently, in reality, the quantity of unidentified information is a lot bigger than the quantity of recognized information. The single duplicate steering calculation in view of the trademark information of organization association data considers the organization association structure in directing, and the directing above isn't huge, yet the conveyance achievement rate isn't sufficiently high.

To put it plainly, chart hypothesis is the hypothesis of concentrating on diagram models. Diagram model is a numerical model that portrays the connection between at least two things. It contains three fundamental components: vertex, edge and weight. In this paper, we just consider that the hubs are genuine vectors or extricated featurevector, and the loads of the edges are non-negative genuine loads. The versatile correspondence network contains a lot of information. To genuinely take advantage of these information assets later on network self-enhancement innovation and plan a more clever organization self-improvement innovation system, we should initially figure out exhaustively which information assets really exist in the organization. After the design is finished, run four information investigations. The quantity of data hubs utilized for every investigation is unique, and the comparing handling time is additionally unique. For instance, table 1 shows the quantity of hubs and handling time for every investigation. The connection between the quantity of hubs and handling time is displayed in figure 1.

Table 1. Number of nodes and processing time

Serial number	Number of nodes	Processing time
1	3 000	150 000
2	4 500	320 000
3	6 000	760 000

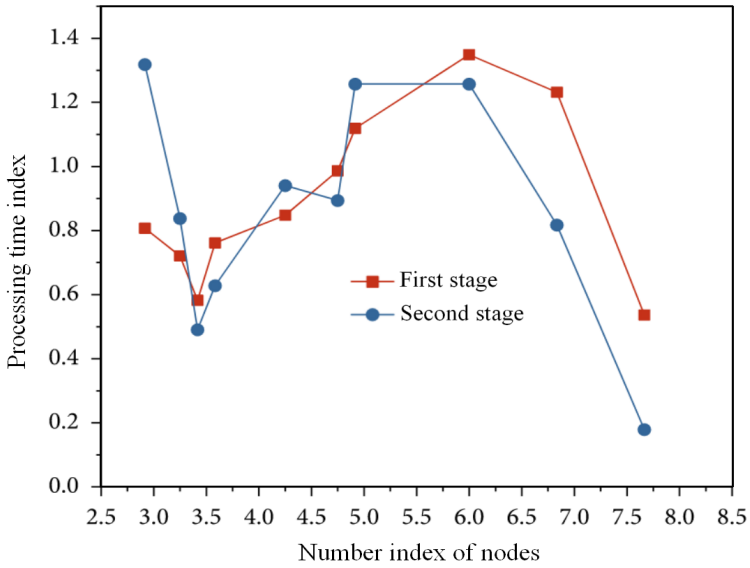

Figure 1. Number of nodes and processing time

As a commonly used machine learning method, EM algorithm is an iterative method for maximum likelihood estimation of probability models containing hidden variables. In a wireless communication system, the received signal can be expressed as:

https://doi.org/10.56294/dm2024277

$$y(i) = hx(i) + w(i), i = 1,2,\ldots,N \quad (1)$$

In this probability model, the channel h is the quantity to be estimated, the received signal y (i) is observable data, and x (i) can be regarded as an implicit variable. Take the received signal vector $Y = [y(1), y(2), \ldots, y(N)]^T$ and the transmitted signal vector is $X = [x(1), x(2), \ldots x(N)]^T$. Based on the characteristics of the modulated signal, a channel estimator with the help of EM algorithm is proposed.

The EM algorithm can realize the maximum likelihood estimation of the observation data, and its goal is to maximize the log likelihood function of the observation data with respect to unknown parameters, that is, to maximize:¨

$$L(h) = \log P(Y|h) = \log \sum_X P(Y, X|h)$$
$$= \log\left(\sum_X P(Y|X, h) P(X|h) \right) \quad (2)$$

The communication transmission system based on deep learning can simultaneously optimize the sending end, channel transmission and receiving end by means of an automatic encoder. This end-to-end communication realizes a new architecture with optimal overall performance. For example, table 2 shows the name node size and data node size obtained from four operations. Figure 2 shows the relationship between name node size and data node size.

Table 2. Name node size and data node size

Serial number	Name node size	Data node size
1	36	1 500
2	59	2 400
3	64	4 700

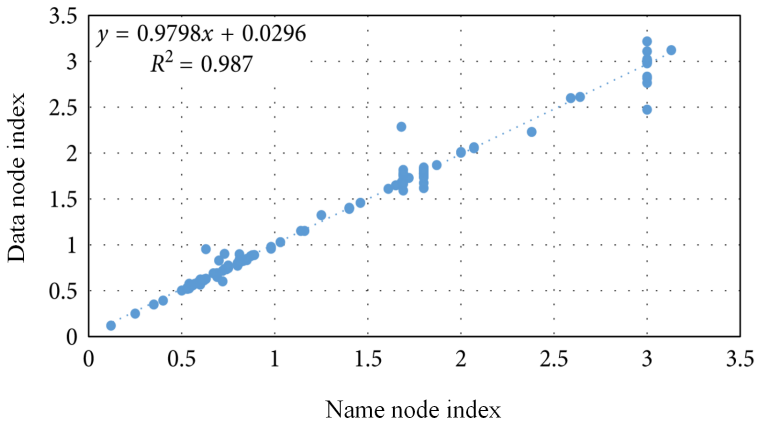

Figure 2. Relationship between name node size and data node size

For various clients, the important elements and qualities are not uniform, so the assessment results are additionally exceptionally emotional. The credit scoring strategy is to find the primary driver of the default time, and afterward relegate a weighted weight or extensive assessment to get a computerized score, and utilize this score to evaluate credit risk. The snugness of a hub is utilized to portray the trouble of a hub to arrive at different hubs through the organization, and is the backhanded impact of a hub. Characterize it as the corresponding of the amount of the separation from this hub to any remaining hubs.[16,17] Precision implies that the information dependably mirrors the first information created by the client. In the cycle interaction, every emphasis should enter designated information. During the preparation interaction, accomplishing information prediction is especially significant. It very well may be consequently changed when there is an issue with the forecast results, until the information in the preparation set can address the issues, and the exactness of the information closes.

Keen Enhancement System for Future Portable Correspondence Organizations

Significant joints in a versatile correspondence network decide the security and soundness of the organization. The significance of a hub shows the impact of the hub on the organization execution under conceivable disappointment conditions. Recoil the edge associated with the hub and utilize the level of

organization attachment acquired after shrinkage as the assessment premise. The more prominent the level of organization union, the more noteworthy the hub's weight. At the point when the errand tracker gets the undertaking, it will be relegated to the neighborhood work tracker, hence acknowledging information age and revealing the advancement of the work tracker. Because of the range of information, the connection between them is convoluted.[18] Most importantly, there is definitely not a coordinated connection between execution pointers and organization setup boundaries. An exhibition mark of the organization can come by comparable outcomes by changing various boundaries, and the change of certain boundaries will likewise influence different execution pointers. We must dominate the direct relationship between's factors by the best straight fitting of connection results. Through connection activity, we can get which factors have common impact relationship, and measure the level of these shared impact.

Most steering convention analysts set the weight boundaries physically. For the most part, they haphazardly give the boundary size or set the boundary to the default esteem, which doesn't change with time. The exploration of organization geography unwavering quality necessities a far reaching, complete and sensible examination from the two parts of organization gadgets and traffic limit. The calculation stream is displayed in figure 3.

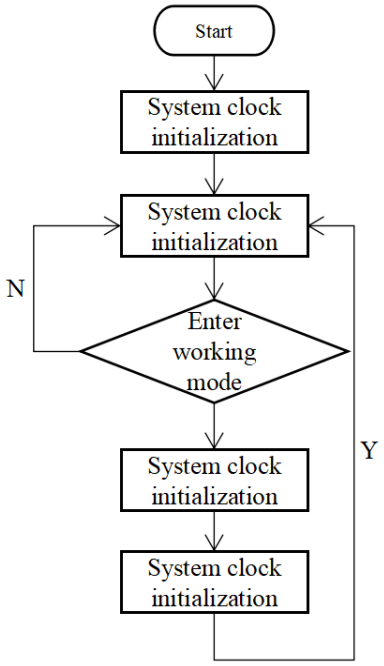

Figure 3. Algorithm flow

Due to the relatively closed network and centralized management of data centers, the actual deployment process is driven by different performance requirements, showing the coexistence of multiple network forms. Meet the premise of cointegration test. Test whether there is a long-term equilibrium relationship between related variables. The test results are shown in table 3.

Table 3. Results of cointegration test

Characteristic value	Trace estimation	Critical value
0,842	1 108	139,8
0,715	965	142,1
0,963	1 271	159,4
0,347	946	188,5

Suppose it is necessary to judge which of the two candidate targets f and j is more in line with the requirements, and its characteristic representations are n-dimensional vectors Vi and Vj, respectively. If linear regression is used for prediction, the probability that i is better than j can be expressed as:

$$p(i \ \square \ j) = g\left(W^T V_i - W^T V_j\right) \qquad (3)$$

https://doi.org/10.56294/dm2024277

Where W is a weight vector of n dimensions, and the g (·) nonlinear function is generally selected as the Sigmod function:

$$g(x)=\frac{1}{1+e^{-x}} \qquad (4)$$

Then Bayesian personalized sorting needs to maximize the probability that i is better than J. The objective function is expressed as:

$$\begin{aligned}\max_{x} J &= p(i \ \square \ j)\\ &= g\left[W^{T}\left(V_{t}-V_{j}\right)\right]\\ &= \frac{1}{1+e^{-w^{T}\left(V_{i}-V_{j}\right)}}\end{aligned} \qquad (5)$$

A node with a large compactness may not have a large value, but this point plays an important role in data transmission. The degree value of some nodes is not very large, but their parameters are relatively large. It reflects the core degree of these nodes in the network. If these nodes are deliberately attacked, the whole network may be paralyzed. For example, table 4 shows the data of node degree, compactness and parameters. Figure 4 shows the relationship among node degree, compactness and parameters.

Table 4. Data between node degree, compactness and parameters

	Node degree	Compactness	Node parameter
Node degree	1	0,86	0,42
Compactness	0,68	1	0,67
Node parameter	0,74	0,69	1

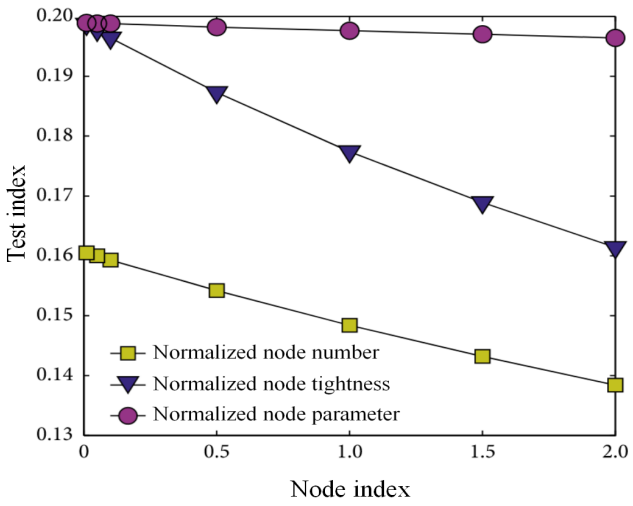

Figure 4. The relationship between node degree, compactness and parameters

In the future, the customer's normal loan repayment behavior or default behavior will be recorded in the business data. Each business circuit set must pass as few communication nodes as possible in order to improve the compactness of the topology. Figure 5 shows the original data and predicted data.

The strategy for assessing the significance of portable correspondence network hubs is fundamentally founded on a solitary association weight. Besides, the assessment of the significance of the hubs of the past versatile correspondence network commonly just purposes a solitary file for assessment, and there is no successful technique to think about the mix of various lists. The focal point of the bunch is encircled by neighbor focuses with lower nearby thickness, and there is a huge span from any point with higher thickness.[19] It is important to sort as per the relationship degree got from the examination, to decide a boundary setup list that improves a specific exhibition file under the ongoing organization state. Furthermore, it is important to examine what is the most streamlined record as of now. The technique for programmed learning is superior to manual setting.

https://doi.org/10.56294/dm2024277

From one perspective, it saves the expense of setting boundaries physically. Then again, with the difference in network structure, the weight boundaries can be changed naturally, so the extent of every part changes continuously.[20] By dissecting the impact of reaction factors and the connection between reaction factors, we can plan the information examination calculation coordinating with it. The security and unwavering quality of the portable correspondence network straightforwardly influence the protected and stable activity of the versatile correspondence organization, and the significance of the hub demonstrates the effect of the hub on the organization execution in the event of conceivable disappointment.

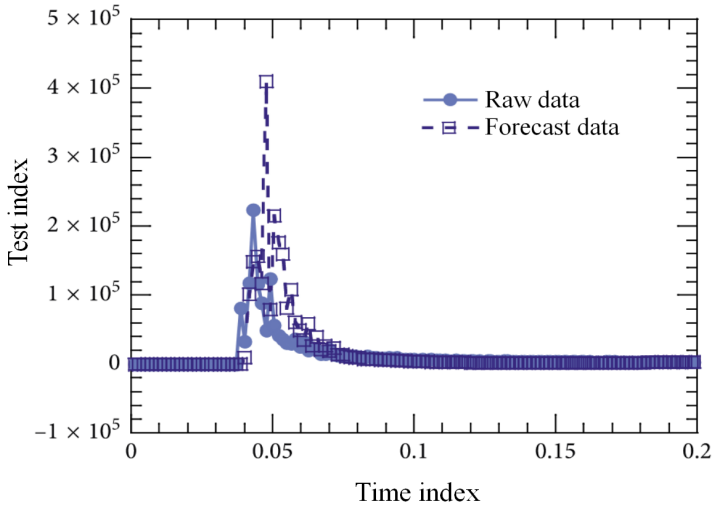

Figure 5. Original data and forecast data

Unstructured Huge Information Investigation Calculation for Correspondence Organizations

While managing countless factors, connection activity is done on each sets of factors, lastly as indicated by the got relationship result lattice, the shared impact connection between the entire variable blend can be modified. After the arrangement is executed, the running information is exhaustively broke down, the quantity of data hubs for each run is unique, and the handling time for each run is additionally unique. The correspondence between different organization execution records and organization setup boundaries is typically a complex many-to-numerous correspondence, as opposed to a basic balanced correspondence.[21] Later on network self-improvement plot in view of large information, laying out this complicated correspondence through a few major information examination, bunching and different technologies is fundamental. The straightforward and simple technique is to utilize outside records. The utilization of records is like the world class technique in developmental calculation, which is utilized to keep up with the tracked down non-overwhelmed arrangement, and the documents are utilized to store the universally ideal and locally ideal positions.[22] For the goal capability of every streamlining issue, beginning from the underlying point, the slope plunge calculation progresses a specific distance along the negative inclination heading of the goal capability at the ongoing point at a time, and this interaction repeats to arrive at the last enhancement. The client information will be scored by the model, and afterward the business will be begun by the experience judgment.

Customary correspondence ID IP address not just shows the area data of use administrations, yet additionally demonstrates the character data of use administrations, which makes separation gauges significantly limit the adaptability of asset booking, bringing about commonly low usage pace of organization assets. It needs a course of advancement, application and overhaul. Various voices will surely show up in this cycle, which needs the help of the dynamic level from the development division. Figure 6 is a balancer design model.

When developing a communication network big data information system, it must be based on meeting the actual needs. Extensive research on network architecture of cost-effective data center. Moving its own data center to the cloud has led to an increasing scale of cloud computing data centers. The system delay data of different network parameters are shown in table 5. The relationship between time delay and load is shown in figure 6.

https://doi.org/10.56294/dm2024277

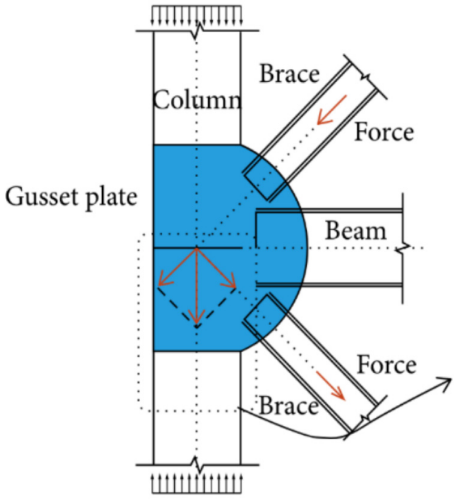

Figure 6. Equalizer architecture model

Table 5. System delay data of different alpha values

Network parameters	Minimum value	Maximum value	Medium number	Average value
0,5	6,24	5,19	4,67	2,59
0,7	3,34	7,11	5,56	3,15
0,9	1,71	6,28	4,44	8,13

In general, it is difficult to calculate the maximum value, so the negative log loss is used to convert the solution to the maximum problem to the solution to the minimum problem, and the objective function becomes:

$$\begin{aligned}\min_{W} J &= -\ln p(i \mid j) \\ &= -\ln \frac{1}{1+e^{-W^T(V_i-V_j)}} \\ &= -\left[0-\ln\left(1+e^{-W^T(V_i-V_j)}\right)\right] \\ &= \ln\left(1+e^{-W^T(V_i-V_j)}\right)\end{aligned} \tag{6}$$

According to the objective function, the derivative of W can be calculated as:

$$\frac{\partial J}{\partial W} = -\frac{e^{-W^T(V_i-V_j)} \times (V_j - V_i)}{1+e^{-W^T(V_i-V_j)}} \tag{7}$$

In big data processing applications, a considerable part of data is scattered data generated by online clients. When the communication network is deliberately attacked, it will affect the quality of service of the mobile communication network, and may even cause very serious consequences to the overall security of the communication network. When evaluating a mobile communication network, it is not possible to select a single index as the evaluation standard, but the communication network should be considered as a whole to comprehensively consider various reliability indexes. With the help of natural language processing feature vector representation, each character string can be regarded as a feature and given a unique code. What is more important is that the unit should plan the safety protection measures of the system in an all-round way at the beginning of the construction of the information system, and on this basis ensure other work to be carried out in an orderly way.

Considering the symmetric demand of big data, when the network capacity is relatively large relative to the bandwidth demand, the symmetric traffic demand will be tree-shaped. When the traffic demand is lower than, the calculated total cost increases linearly, because the routes have not changed for different traffic demands. They are all tree-like routes, and only the reserved bandwidth of each link is changed. Corresponding parameters of different business items are shown in table 6. The network cost of symmetric services is shown in figure 7.

Table 6. Network costs of symmetric services

Business type	1	2	3	4	5
TDR	25,007	34,386	26,842	18,556	25,007
Single Domain	36,318	35,278	23,876	22,374	26,316
Hubrid	21,505	43,609	15,619	25,824	31,504

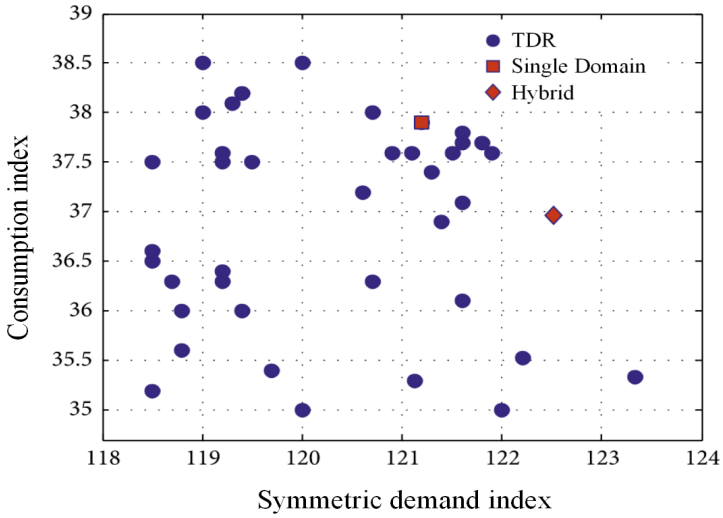

Figure 7. Network cost of symmetric services

In the versatile correspondence network geography, the base repetitive correspondence capacity of all hubs should be as extensive as possible conceivable, with the goal that it can hold a specific vigor and work out the update worth of the weight vector as per the misfortune, and update the weight vector. For most enhancement issues, we really want to set a reasonable improvement step size, with the goal that inclination plunge can track down a neighborhood ideal arrangement. For curved streamlining issues, or at least, the issue that the goal capability is a raised capability, inclination drop can get the worldwide ideal Arrangement.[23] To guarantee the nature of organization administrations, it is important to make a sensible forecast of the transmission capacity of the portable correspondence network arranging stage. The emphasis of the organization is many times ended when it arrives at a specific preparation exactness or a specific number of cycles.[24] Through the administrator's correspondence trait information and client conduct information, top to bottom assortment and mining investigation of it, to shape a full scope of representation information. Through AI innovation and large information related advancements, clients are evaluated for default risk concerning personality qualities, special interactions, utilization capacities and different aspects. These element data are removed as character strings, and they should be communicated as component vectors.

CONCLUSION

We are in a computerized period, and during the time spent information gathering, the issues in large information are turning out to be increasingly noticeable. The dissemination of various classes in genuine informational collections frequently has direct cross-over or impedance of commotion focuses, which has extraordinary effect on numerous arrangement or bunching calculations. In this paper, every hardware and line of portable correspondence network are disconnected into hubs and edges, an organization geography model is laid out, and its boundaries are determined. The dependability of organization geography is broke down, and the choice guideline and estimation list of unwavering quality file framework are given. Later on, portable correspondence frameworks will have all the more remarkable capabilities and more intricate organization structures. Existing speculations and strategies for network versatile enhancement need to work on their insight and drive while confronting progressively complex portable correspondence organizations.

Ethical Approval : Not Applicable

Consent to Participate: Not Applicable

Consent for Publication: Not Applicable

Availability of Data and Material: Available in Paper itself

Funding: Not Applicable

Author Contribution:

S.Manikandan – Corresponding, paper writing, result, experiments and conclusion

Acknowledgement: Not Applicable

REFERENCES

1. Gu Xinyu. Research on Intelligent Optimization Technology of Future Mobile Communication Network. Information Communication Technology and Policy, 2018, 000(011): 20-25.

2. Ma Xiaoqin. Application of Machine Learning in Agricultural Internet of Things. Scientific Consulting, 2017, 000(036): 45-46.

3. Liu Sanwei. An application study based on machine learning and precise business recognition. Communication World, 2018, (7): 88-89.

4. Jiang Shaojun. Machine learning algorithms supported by big data. Computer Knowledge and Technology: Academic Exchange, 2018, 14(3): 164-165.

5. Chen Zhenzhen. Research on encrypted traffic type recognition based on DPI and machine learning. Information Communication, 2018, 184(04): 263-265.

6. Zhang Zhijun, Liu Hong. Research on context-aware mobile social network recommendation algorithm. Pattern Recognition and Artificial Intelligence, 2015, 28(5): 404-410.

7. Jiang Hui, Li Fei. Future mobile communication network architecture based on SDN technology. Telecommunication Technology, 2018, 530(05): 67-72.

8. Gu Na. The development status and prospect of 4G mobile communication network technology. Digital Communication World, 2018, 161(05): 131 + 143.

9. Zhao Yifei, Meng Linghang, Li Kenan. Intelligent civil air transportation system based on artificial intelligence. Command Information System and Technology, 2019 (6): 1-7.

10. Manikandan, S, Chinnadurai, M, "Effective Energy Adaptive and Consumption in Wireless Sensor Network Using Distributed Source Coding and Sampling Techniques",. Wireless Personal Communication (2021), 118, 1393–1404 (2021)

11. Zhang Xiaoyan, Zhang Bin. Discussion on the application of artificial intelligence in wireless network maintenance management. Jiangsu Communications, 2018, 34(06): 32-33 + 36.

12. Manikanda Kumaran K, , Kalaiselvi S, Anitha Elavarasi S, “An IoT based environment conscious green score meter towards smart sustainable cities”, Sustainable Computing: Informatics and Systems, Volume 37, January 2023, 100839

13. Manivannan R, “Research on IoT-based hybrid electrical vehicles energy management systems using machine learning-based algorithm”, Sustainable Computing: Informatics and Systems, Volume 41, January 2024, 100943

14. Qian M, Wang Y, Zhou Y. A super base station based centralized network architecture for 5G mobile communication systems. Digital Communications & Networks, 2015, 1(2): 152-159.

15. Joshi P, Agrawal M, Thors B. Power Level Distributions of Radio Base Station Equipment and User Devices in a 3G Mobile Communication Network in India and the Impact on Assessments of Realistic RF EMF Exposure. IEEE Access , 2015, 3:1051-1059.

16. Hu Wanli [1]. Analysis of 5G mobile communication technology characteristics and application scenarios. Security Science and Technology, 2019, 000(001): 12-15.

17. You Mingxi. Application of machine learning in automatic placement of room antennas. Telecommunications Science, 2018, (S1): 59-64.

18. Amp S F, Pribyl B. Long-Term Spectrum Monitoring with Big Data Analysis and Machine Learning for Cloud-Based Radio Access Networks. Wireless Personal Communications, 2016, 87(3): 815-835.

https://doi.org/10.56294/dm2024277

19. Hu H, Liu Y, Zhang H. Security Metric Methods for Network Multistep Attacks Using AMC and Big Data Correlation Analysis. Security and Communication Networks, 2018, 2018: 1-14.

20. Han Q, Liang S, Zhang H. Mobile cloud sensing, big data, and 5G networks make an intelligent and smart world. IEEE Network, 2015, 29(2): 40-45.

21. Paul A, Ahmad A, Rathore M M. Smartbuddy: defining human behaviors using big data analytics in social internet of things. IEEE Wireless Communications, 2016, 23(5): 68-74.

22. Chen K C, Huang S L, Zheng L. Communication Theoretic Data Analytics. IEEE Journal on Selected Areas in Communications, 2015, 33(4): 663-675.

23. Chaudhary R, Aujla GS, Kumar N. Optimized Big Data Management across Multi-Cloud Data Centers: Software-Defined-Network-Based Analysis. IEEE Communications Magazine, 2018, 56(2): 118 -126.

24. Meerja K A, Naidu P V, Kalva S R K. Price Versus Performance of Big Data Analysis for Cloud Based Internet of Things Networks. Mobile Networks & Applications, 2018, (9): 1-17.

FINANCING

No external financing.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Vijaya Saradhi Thommandru, T. Suma, A. Mary Odilya Teena, A. Muthukrishnan, P Thamaraikannan, S. Manikandan.

Research: Vijaya Saradhi Thommandru, T. Suma, A. Mary Odilya Teena, A. Muthukrishnan, P Thamaraikannan, S. Manikandan.

Methodology: Vijaya Saradhi Thommandru, T. Suma, A. Mary Odilya Teena, A. Muthukrishnan, P Thamaraikannan, S. Manikandan.

Writing - original draft: Vijaya Saradhi Thommandru, T. Suma, A. Mary Odilya Teena, A. Muthukrishnan, P Thamaraikannan, S. Manikandan.

Writing - revision and editing: Vijaya Saradhi Thommandru, T. Suma, A. Mary Odilya Teena, A. Muthukrishnan, P Thamaraikannan, S. Manikandan.