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Enhanced Controller for Evaluating Intranet Performance Using Deep Generated Firewalls and Neuro-Fuzzy Technique

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ABSTRACT: The need to evolve a vibrant and cost-effective Intranet that will help in conserving the expensive Internet Bandwidth becomes inevitable. The Intranet which uses the World-Wide Web technologies to manage and deliver information locally in an efficient manner can now be improved. In addition, Models such Fuzzy Probabilistic, Neural Network, Heuristic Models, Logistic Regression Ensemble, Multi-Gene Genetic Programming Application, Fuzzy Logic, Neuro-Fuzzy, Rules Optimization Based Fuzzy Models and so many more have been used for the management and optimization of Intranet Services. The effectiveness of intranet usage for academic purposes also gives different effectiveness in their academic achievement due to many other external factors such as socio-economic, study habit and facilities resources. In this work, an enhanced controller for evaluating intranet performance using deep generated firewalls and Neuro-fuzzy technique was developed. The Object-Oriented Analysis and Design Methodology was adopted and implementation was done with Java programming language and MySQL as the backend. In addition, the datasets used were trained with Python programming language and Artificial Neural Network. The Enhanced Controller detects and prevents malicious intranet access/usage through a deep generated firewall. The generated firewall of the designed system is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules Neuro Fuzzy Model will be beneficial to the management of the institution as it will serve as a model evaluator, capable of optimizing the routing process of the Campus Intranet. evaluated parameters and technological areas are as a result of the end-users' feedback survey of the existing and proposed systems. The obtained results of the Proposed System performed better than the existing system when compared in terms of Accuracy, Classification Error, Processing Speed, and Area Under Curve.

KEYWORDS: Controller, intranet, deep generated firewalls, neuro-fuzzy

1. INTRODUCTION

The concept of internet and intranet bare similarities and characterization. However, for the purpose of introduction, definition would be limited in scale.

Internet: The Internet is a global network of interconnected networks, connecting private, public, and university networks in one cohesive unit.

Intranet: is the miniature version of the Internet, it is a private enterprise network used by organizations to distribute communications and promote collaboration among the task force and it uses Internet and Web technologies for information gathering and distribution within an organization.

The early adopters of intranet used the newfound technology to: Provide easy access to internal data by publishing the information on departmental intranets; Set up employee self-service Web sites for human resources, payroll, sales, marketing, and training. As the understanding of the new technology progressed, the adopters have used the technology for more complex

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applications like: Collaborative workflow managers, scheduling, messaging, and discussion groups; Inventory and logistic management systems; Customer help desk and knowledge management systems. The successful intranets have allowed organizations to: Save money; Increase employee productivity and employee retention; Empower the customer help desk personnel with intranet knowledge management systems, resulting in increased customer satisfaction and retention; Provide competitive advantage by making the product information, production schedules, and the product competitive analysis only a click away. This empowers the sales, marketing, and support group, resulting in increased sales, added revenue, and customer retention. In most organizations, intranets have started as small departmental efforts. An enterprise intranet may be based on Internet and Web technologies in combination with vendor proprietary technologies.

A routing controller supports flexible network activities in a routing model. The routers in an Autonomous System (AS) must distribute the information they learn about how to reach ex- ternal destinations. Unfortunately, today's internal Border Gateway Protocol (iBGP) architectures have serious problems: a "full mesh" iBGP configuration does not scale to large networks and "route reflection" can introduce problems such as protocol oscillations and persistent loops. Instead, we argue that a Routing Control Platform (RCP) should collect information about ex- ternal destinations and internal topology and select the BGP routes for each router in an AS. RCP is a logically centralized platform, separate from the IP forwarding plane, that performs route selection on behalf of routers and communicates selected routes to the routers using the unmodified iBGP protocol. RCP provides scalability without sacrificing correctness. In addition, RCP provides both the intrinsic correctness of a full- mesh iBGP configuration and the scalability benefits of route reflectors.

The need to optimized the network signals cannot be over emphasized as Signal Optimization encompasses the complete set of technologies and strategies a business deploys to improve its network domain functionality. Network and network domain refer to your organization's set of hardware devices, plus the software and supportive technology allowing those devices to connect and communicate with one another. One of the primary goals of network signal optimization is to provide the best possible network experience for users. It enhances the speed, security and reliability of your company's IT ecosystem. Improving that ecosystem seems intuitive in theory, yet it is challenging to master. Signal optimization is essential for business activities that require 24/7 access and real-time usage of digital technology. IT teams use several key metrics to track a successful optimization scheme. These metrics are most effective when viewed together to provide a holistic picture of your network's strengths and weaknesses.

II. RELATED WORKS

According to [1], successful Intranet sites assemble useful information, organize it into logical systems and deliver the information locally in an efficient manner. The Internet on the other hand is a global computer network that links computer networks all over the world by satellite (a machine that is launched into space and moves around earth or another body in space) and telephone (an instrument designed for the simultaneous transmission and reception of the human voice), connecting users with service networks such as email and World Wide Web. The most obvious difference between an Intranet and the Internet is that the Intranet users are workforce of same organization or institution that share information and resources among themselves to facilitate and improve the overall internal communications efforts and strengthens core company values while the internet is a network that connects computer networks around the world to exchange the vast amount of data and information between connected users. (The reverse seems to be the case in many academic institutions in Nigeria as at the time of this study). Intranet designs can assume a less diversified environment than Internet designs.

Routing is accomplished by means of routing protocols that establish mutually consistent routing tables in the router (or switch controller) in the network. Routing protocol is more of a standard method of implementing a particular routing algorithm. Pertinent to routing protocols are routing tables. Whenever a call-setup packet or any packet arrives at router, the router or switch controller consults the routing table to decide the next hop for the packet. This essentially expresses the significance of routing tables and ultimately the essence of routing protocols [2].

A routing controller supports flexible network activities in a routing model. The routers in an Autonomous System (AS) must distribute the information they learn about how to reach ex- ternal destinations. Unfortunately, today's internal Border Gateway Protocol (iBGP) architectures have serious problems: a "full mesh" iBGP configuration does not scale to large networks and "route reflection" can introduce problems such as protocol oscillations and persistent loops. Instead, we argue that a Routing Control Platform (RCP) should collect information about ex- ternal destinations and internal topology and

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select the BGP routes for each router in an AS. RCP is a logically centralized platform, separate from the IP forwarding plane, that performs route selection on behalf of routers and communicates selected routes to the routers using the unmodified iBGP protocol. RCP provides scalability without sacrificing correctness. In addition, RCP provides both the intrinsic correctness of a full- mesh iBGP configuration and the scalability benefits of route reflectors.
RCP selects BGP routes on behalf of the routers in an AS using a complete view of the available routes and IGP topology by [3], as shown in Figure 1, RCP has iBGP sessions with each of the routers; these sessions allow RCP to learn BGP routes and to send each router a routing decision for each destination prefix. Un- like a route reflector, RCP may send a different BGP route to each router. This flexibility allows RCP to as- sign each router the route that it would have selected in a full-mesh configuration, while making the number of iBGP sessions at each router independent of the size of the network. We envision that RCP may ultimately ex- change interdomain routing information with neighbouring domains, while still using iBGP to communicate with its own routers.

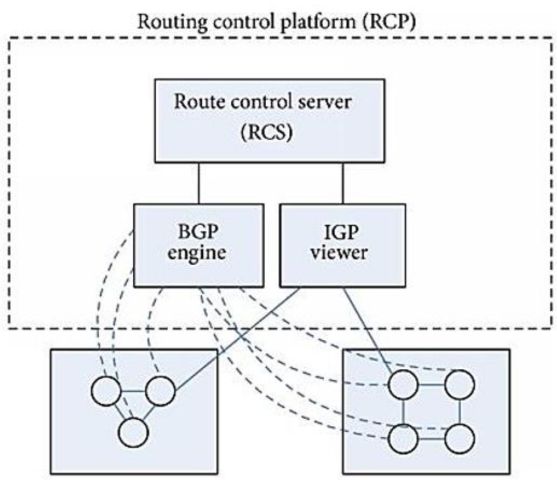

Figure 1: Schematic Diagram of a Routing Controller (Source: [3])

[4] proposed a Neuro-Fuzzy-based Dynamic Secure Routing Protocol for QoS Frameworks of MANET. The study proposed a routing algorithm "neuro fuzzy based dynamic secure routing (NFBDSR)", in which routing is performed by using Fuzzy Logic Controller (FLC) with neural network. The proposed routing protocol calculated route metric value using four crisp input variables, Processing Capability (PC) of node, Available Bandwidth (AB), Node Mobility (NM), and Node Trust Value (NTV). To calculate the node trust value the authors used Neighbour node Surveillance method. The real-world applications of our algorithm is that it consider MANET environment applications such as multimedia, audio/video, images, animations, graphics, video conferencing, VOIP and webcasting need uninterrupted, rigorous and inflexible Quality of Service (QoS). The NFBDSR routing algorithm detects malicious node that intends to attack the network.
In analysing their results, the authors found out that NFBDSR routing protocol achieves better performance compared to FBRP routing protocol in metrics of throughput, PDR, end-to-end delay, and average jitter, link establishment time and hop count per route in both conditions when malicious node existing and not existing in the network.
The authors did a good job. However, performance evaluation carried out on their study showed latency in the routing process of the current Neuro-fuzzy system due to the absence of an adaptive fire-fly algorithm that would enhance the evaluation process. Secondly, their developed NFBDSR routing algorithm is only limited to the detection of malicious threat to the network and fails to provide deep generative firewalls which will also prevent the detected threat to the network in the long-run.
[5] looked at Fuzzy Deep Generative Design: Integration of Topology Optimization and Generative Models. The study proposed an artificial intelligent (AI)-based deep generative design framework that is capable of generating numerous design

options which are not only aesthetic but also optimized for engineering performance. The proposed framework integrates topology optimization and generative models (e.g., generative adversarial networks (GANs)) in an iterative manner to explore new design options, thus generating a large number of designs starting from limited previous design data. In addition, anomaly detection can evaluate the novelty of generated designs, thus helping designers choose among design options. The authors did a good job but failed to illustrate the drawbacks of software intelligence that could be capitalized by hackers.

III. MATERIAL AND METHODS

A. Methodology

The study adopted the Object-Oriented Analysis and Design (OOAD) Methodology for analyzing the Existing System and also designing the New System. The Object-Oriented Analysis and Design Methodology is a software engineering approach that models a system as a group of interacting objects. Analysis involves understanding, finding and describing concepts in the problem domain while design has to do with understanding and defining software solution/objects that represent the analysis concepts and will be implanted in code.

The OOAD paradigm emphasizes modularity and re-usability. Its goal is to satisfy ''Open- closed principles'', as it supports extension or its module provides standardized ways to add new behaviours or describe new states. Object-oriented modelling typically divides into two aspects of work: the modelling of dynamic behaviours like business processes and use cases, and the modelling of static structures like classes and components. OOA and OOD are the two distinct abstract levels (i.e. the analysis level and the design level) during OOM. The Unified Modelling Language (UML) and SysML are the two popular international standard languages used for object-oriented modelling.

B. Proposed System

The Enhanced Neuro-Fuzzy Model of the study encompasses the design of a Controller for optimizing intranet performance using Deep Generated Firewalls and Adaptive Firefly Algorithm as shown in the architecture figure 2. The design of a Controller for optimizing intranet performance using Deep Generated Firewalls, Adaptive Firefly Algorithm and Artificial Neural Network as depicted in figure 3. The Controller enabled robust evaluation of intranet performance through fuzzy-based rules such as if-then. The designed Controller was initialized to process the inputted datasets. The system user views the displayed results on the routing metrics which also illustrates the intranet performance. The designed process consists of an input stage, a processing stage, and an output stage as shown in the data flow diagram in figure 4. Furthermore, the Controller can also be utilized in the controlling of machines as shown in the block diagram in figure 5.

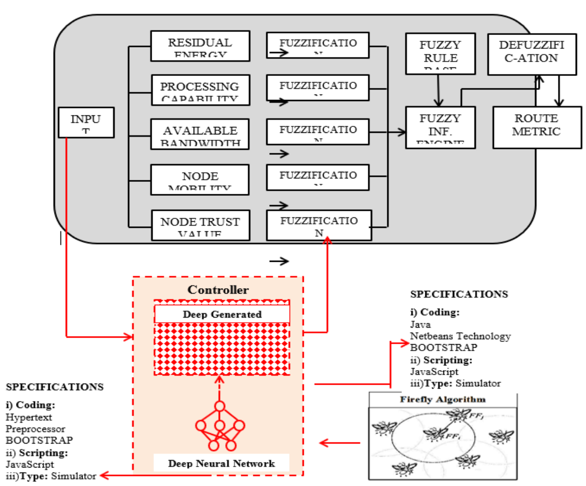

Figure 2: Proposed System Architecture

Step 1:	Start
Step 2:	Initialize input and output layers of Neural Networks for training Models
	Input = 0
Step 3:	Increment Input
	Input = Input + 1
Step 4:	Access Learning Rate of Model Weight
	$W_i^{n+1} = w_i^n + n(y_i - y_1)x_i$
Step5:	Test Learning Rate of Model Weight
Step 6:	Transfer learned model to output layer of Neural Networks
Step 7:	End

Figure 3: Artificial Neural Network Algorithm for training the Proposed System

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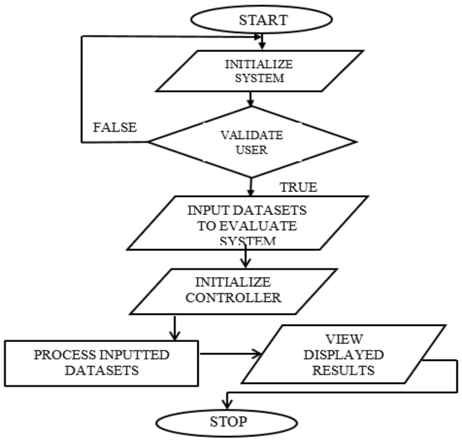

Figure 4: Proposed System Flowchart

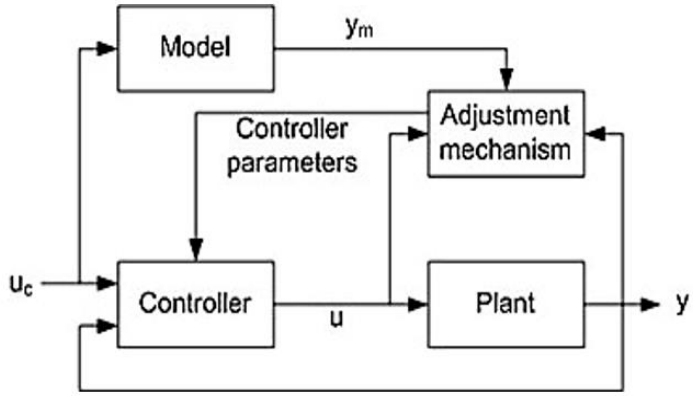

Figure 5: block diagram illustration of the Proposed System Design

C. Advantages of the Proposed System

The designed Controller detects and prevents malicious intranet access/usage through a deep generated firewall. The generated firewall of the designed system is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. The firewall typically establishes a barrier between a trusted internal network and untrusted external network, such as the Internet. Furthermore, the deep generated firewall of the designed system works on the application layer of the Internet protocol suite (e.g., browser, telnet or FTP traffic), and may intercept all packets traveling to or from an application. The deep generated firewall functions by determining whether a process should accept any given connection, and also filter connections by examining the process ID of data packets against a rule set for the local process involved in the data transmission.

IV. SIMULATION & RESULTS

Table 1: Result of the Enhanced Neuro-Fuzzy Model

SN	STUDENT	DEPT.	MATRIC. NO.	IP ADDRESS	NO. OF ASSESSED PARAMETERS	SYSTEM EVALUATION METRICS (%)	FIREFLY MODEL REMARK
1.	User 1	Business Admin.	RSU2019/BM/014	172.16.254.1	4	14	Poor
2.	User 2	Statistics	RSU2019/ST/014	172.17.254.1	4	48	Fair
3.	User 3	Microbiology	RSU2019/MCB/024	172.18.254.1	4	31	Poor
4.	User 4	Linguistics	RSU2019/LING/034	172.19.254.1	4	32	Poor
5.	User 5	Theatre Arts	RSU2019/TA/010	172.20.254.1	4	42	Fair
6.	User 6	Crop Science	RSU2019/CS/005	172.21.254.1	4	16	Poor
7.	User 7	Geology	RSU2019/GE/014	172.22.254.1	4	35	Fair
8.	User 8	Biochemistry	RSU2019/BCH/016	172.23.254.1	4	69	Good
9.	User 9	Theatre Art	RSU2019/TA/012	172.24.254.1	4	81	Excellent
10.	User 10	Computer Science	RSU2019/CSC/042	172.25.254.1	4	21	Poor
11.	User 11	Biochemistry	RSU2019/BCH/041	172.26.254.1	4	52	Fair
12.	User 12	Music	RSU2019/MUS/022	172.27.254.1	4	74	Excellent
13.	User 13	Marketing	RSU2019/MAR/012	172.28.254.1	4	28	Poor
14.	User 14	Computer Science	RSU2019/CSC/033	172.29.254.1	4	19	Poor
15.	User 15	History	RSU2019/HIS/014	172.30.254.1	4	41	Fair
16.	User 16	Mechanical Engineering	RSU2019/MEC/042	172.31.254.1	4	17	Poor
17.	User 17	Philosophy	RSU2019/PHIL/100	172.32.254.1	4	45	Fair
18.	User 18	Geology	RSU2019/GEO/122	172.33.254.1	4	19	Poor

Table 2: Result of the Enhanced Neuro-Fuzzy Model (Contd)

SN	STUDENT	DEPT.	MATRIC. NO.	IP ADDRESS	NO. OF ASSESSED PARAMETERS	SYSTEM EVALUATION METRICS (%)	FIREFLY MODEL REMARK
19.	User 19	Law	RSU2019/LW/009	172.34.254.1	4	34	Poor
20.	User 20	Anatomy	RSU2019/ANT/011	172.35.254.1	4	66	Good
21.	User 21	Food Science and Tech.	RSU2019/FST/034	172.36.254.1	4	49	Fair
22.	User 22	Theatre Arts	RSU2019/TA/022	172.37.254.1	4	62	Good
23.	User 23	Crop Science	RSU2019/CS/014	172.38.254.1	4	60	Good
24.	User 24	Geology	RSU2019/GE/034	172.39.254.1	4	56	Fair
25.	User 25	Microbiology	RSU2019/MCB/020	172.40.254.1	4	71	Excellent
26.	User 26	Statistics	RSU2019/ST/029	172.41.254.1	4	42	Fair
27.	User 27	Computer Science	RSU2019/CSC/017	172.42.254.1	4	67	Good
28.	User 28	Clinical Sciences	RSU2019/CLS/110	172.43.254.1	4	41	Fair
29.	User 29	Nursing	RSU2019/NUR/037	172.44.254.1	4	33	Poor
30.	User 30	Marketing	RSU2019/MAR/012	172.45.254.1	4	47	Fair
31.	User 31	Microbiology	RSU2019/MCB/018	172.46.254.1	4	37	Poor
32.	User 32	Linguistics	RSU2019/LING/017	172.47.254.1	4	52	Fair
33.	User 33	Theatre Arts	RSU2019/TA/020	172.48.254.1	4	62	Good
34.	User 34	Crop Science	RSU2019/CS/015	172.49.254.1	4	60	Good
35.	User 35	Geology	RSU2019/GE/011	172.50.254.1	4	56	Good
36.	User 36	Biochemistry	RSU2019/BCH/026	172.51.254.1	4	71	Excellent

Table 3: Result of the Enhanced Neuro-Fuzzy Model (Contd)

SN	STUDENT	DEPT.	MATRIC. NO.	IP ADDRESS	NO. OF ASSESSED PARAMETERS	SYSTEM EVALUATION METRICS (%)	FIREFLY MODEL REMARK
37.	User 37	Theatre Art	RSU2019/TA/022	172.52.254.1	4	74	Excellent
38.	User 38	Computer Science	RSU2019/CSC/011	172.53.254.1	4	61	Good
39.	User 39	Biochemistry	RSU2019/BCH/021	172.54.254.1	4	19	Poor
40.	User 40	Music	RSU2019/MUS/101	172.55.254.1	4	15	Poor
41.	User 41	Marketing	RSU2019/MAR/112	172.56.254.1	4	70	Excellent
42.	User 42	Computer Science	RSU2019/CSC/023	172.57.254.1	4	24	Poor
43.	User 43	History	RSU2019/HIS/019	172.58.254.1	4	14	Poor
44.	User 44	Mechanical Engineering	RSU2019/MEC/022	172.59.254.1	4	23	Poor
45.	User 45	Philosophy	RSU2019/PHIL/107	172.60.254.1	4	22	Poor
46.	User 46	Physics	RSU2019/PHY/017	172.61.254.1	4	84	Excellent
47.	User 47	Zoology	RSU2019/ZOO/110	172.62.254.1	4	42	Fair
48.	User 48	Chemistry	RSU2019/CHM/037	172.63.254.1	4	52	Good
49.	User 49	Education Psy.	RSU2019/EDP/012	172.64.254.1	4	50	Good
50.	User 50	Economics	RSU2019/ECO/018	172.65.254.1	4	12	Poor
51.	User 51	ECPE	IAUE/2019/PES/0011	172.66.254.1	4	60	Good
52.	User 52	ECPE	IAUE/2019/PES/0021	172.67.254.1	4	19	Poor
53.	User 53	ECPE	IAUE/2019/PES/005	172.68.254.1	4	14	Poor
54.	User 54	ECPE	IAUE/2019/PES/0012	172.69.254.1	4	42	Fair

Table 4: Result of the Enhanced Neuro-Fuzzy Model (Contd)

SN	STUDENT	DEPT.	MATRIC. NO.	IP ADDRESS	NO. OF ASSESSED PARAMETERS	SYSTEM EVALUATION METRICS (%)	FIREFLY MODEL REMARK
55.	User 55	ECPE	IAUE/2019/PES/0013	172.70.254.1	4	71	Excellent
56.	User 56	ECPE	IAUE2019/PES/006	172.71.254.1	4	62	Good
57.	User 57	ECPE	IAUE2019/PES/017	172.72.254.1	4	60	Good
58.	User 58	ECPE	IAUE2019/PES/127	172.73.254.1	4	56	Fair
59.	User 59	ECPE	IAUE/2019/PES/003	172.74.254.1	4	71	Excellent
60.	User 60	ECPE	IAUE/2019/PES/004	172.75.254.1	4	42	Fair
61.	User 61	ECPE	IAUE/2019/PES/001	172.76.254.1	4	67	Good
62.	User 62	ECPE	IAUE/2019/PES/001	172.77.254.1	4	41	Fair
63.	User 63	ECPE	IAUE/2019/PES/007	172.78.254.1	4	33	Poor
64.	User 64	ECPE	IAUE2019/PES/008	172.79.254.1	4	47	Fair
65.	User 65	ECPE	IAUE/2019/PES/0010	172.80.254.1	4	37	Poor
66.	User 66	ECPE	IAUE2019/PES/020	172.81.254.1	4	52	Good
67.	User 67	ECPE	IAUE2019/PES/025	172.82.254.1	4	62	Good
68.	User 68	ECPE	IAUE2019/PES/033	172.83.254.1	4	60	Good
69.	User 69	ECPE	IAUE/2019/PES/029	172.84.254.1	4	67	Good
70.	User 70	ECPE	IAUE2019/PES/0016	172.85.254.1	4	41	Fair
71.	User 71	ECPE	IAUE/2019/ECE/037	172.86.254.1	4	33	Poor
72.	User 72	ECPE	IAUE/2019/ECE/012	172.87.254.1	4	47	Fair
73.	User 73	ECPE	IAUE2019/E	172.88.254.1	4	37	Poor

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Table 5: Result of the Enhanced Neuro-Fuzzy Model (Contd)

	STUDENT	DEPT.	MATRIC. NO.	IP ADDRESS	NO. OF ASSESSED PARAMETERS	SYSTEM EVALUATION METRICS (%)	FIREFLY MODEL REMARK
74.	User 74	Curriculum	IAUE2019/CU/017	172.89.254.1	4	52	Good
75.	User 75	Management	IAUE2019/MGT/020	172.90.254.1	4	62	Good
76.	User 76	Management	IAUE2019/MGT/015	172.91.254.1	4	60	Good
77.	User 77	Curriculum	IAUE2019/ACU/011	172.92.254.1	4	56	Fair
78.	User 78	Curriculum	IAUE2019/CU/014	172.93.254.1	4	44	Fair
79.	User 79	Curriculum	IAUE2019/CU/014	172.94.254.1	4	51	Fair
80.	User 80	Curriculum	IAUE2019/CU/024	172.95.254.1	4	37	Poor
81.	User 81	Microbiology	IAUE2019/MCB/012	116.17/254.1	4	67	Good
82.	User 82	History	IAUE2019/HIS/022	116.18/254.1	4	69	Good
83.	User 83	Music	IAUE2019/MUS/007	116.19/254.1	4	61	Good
84.	User 84	Chemistry	IAUE2019/CHEM/014	116.20/254.1	4	47	Fair
85.	User 85	Crop Science	IAUE2019/CS/008	116.21/254.1	4	33	Fair
86.	User 86	Maths	IAUE2019/MTH/031	116.22/254.1	4	42	Fair
87.	User 87	Fine Art	IAUE2019/FA/002	116.23/254.1	4	44	Fair
88.	User 88	English Studies	IAUE2019/ES/011	116.24/254.1	4	70	Excellent
89.	User 89	Library and Info. Sci	IAUE2019/LIB/003	116.25/254.1	4	63	Good
90.	User 90	History	IAUE2019/HIS	116.26/254.1	4	32	Fair
91.	User 91	Integrated Science	IAUE2019/ISC/022	116.27/254.1	4	41	Fair

Table 6: Result of the Enhanced Neuro-Fuzzy Model

SN	STUDENT	DEPT.	MATRIC. NO.	IP ADDRESS	NO. OF ASSESSED PARAMETERS	SYSTEM EVALUATION METRICS (%)	FIREFLY MODEL REMARK
92.	User 92	Music	IAUE2019/MUS/013	116.28/254.1	4	55	Good
93.	User 93	Microbiology	IAUE2019/MCB/112	116.29/254.1	4	67	Good
94.	User 94	History	IAUE2019/HIS/122	116.30/254.1	4	69	Good
95.	User 95	Music	IAUE2019/MUS/047	116.31/254.1	4	61	Good
96.	User 96	Chemistry	IAUE2019/CHEM/114	116.32/254.1	4	47	Fair
97	User 97	Crop Science	IAUE2019/CS/078	116.33/254.1	4	33	Fair
98	User 98	Music	IAUE2019/MUS/078	116.34/254.1	4	75	Excellent
99	User 99	Physics	IAUE2019/PHY/078	116.35/254.1	4	34	Fair
100	User 100	Music	IAUE2019/MUS/078	116.36/254.1	4	41	Fair

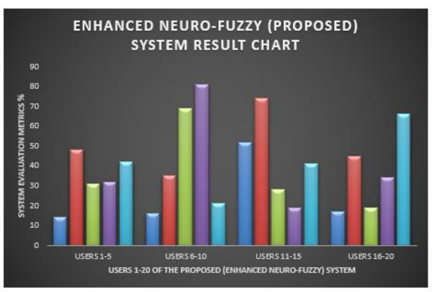

Figure 6: Enhanced Neuro-Fuzzy Model Result Chart (Users: 1 - 20)

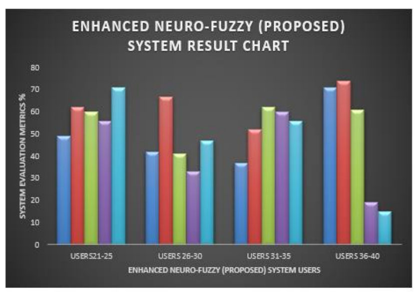

Figure 7: Enhanced Neuro-Fuzzy Model Result Chart (Users: 21-40)

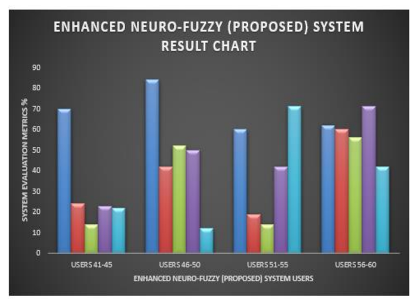

Figure 8: Enhanced Neuro-Fuzzy Model Result Chart (Users: 41-60)

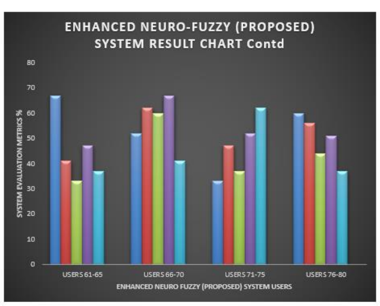

Figure 9: Enhanced Neuro-Fuzzy Model Result Chart (Users: 61-80)

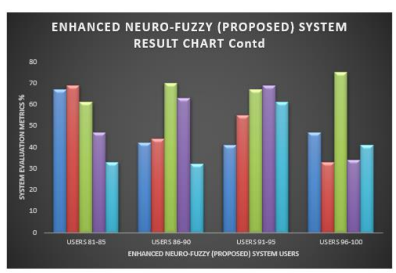

Figure 10: Enhanced Neuro-Fuzzy Model Result Chart (Users: 81-100)

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V. DISCUSSIONS

The Enhanced Neuro-Fuzzy Model of the study encompasses the design of a Controller for optimizing intranet performance using Deep Generated Firewalls and Adaptive Firefly Algorithm as shown in the architecture figure 1. The Controller enabled robust evaluation of intranet performance through fuzzy-based rules such as if-then. The designed Controller was initialized to process the inputted datasets. The system user views the displayed results on the routing metrics which also illustrates the intranet performance.

The datasets were trained with Artificial Neural Network and Python programming language. The Test sets result of the enhanced model is displayed in table 1, table 2, table 3, table 4, table 5, and table 6 respectively. which was tested with structured data sets and used to assess or evaluate the performance of the Enhanced Neuro-Fuzzy Model. Figure 6 to figure 10 respectively show the charts of the Enhance Neuro-Fuzzy Model.

VI. CONCLUSION

The designed Controller detects and prevents malicious intranet access/usage through a deep generated firewall. The generated firewall of the designed system is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. The firewall typically establishes a barrier between a trusted internal network and untrusted external network, such as the Internet. Furthermore, the deep generated firewall of the designed system works on the application layer of the Internet protocol suite (e.g., browser, telnet or FTP traffic), and may intercept all packets traveling to or from an application. The deep generated firewall functions by determining whether a process should accept any given connection, and also filter connections by examining the process ID of data packets against a rule set for the local process involved in the data transmission.

REFERENCES

[1] Hildebrand, C. “Face facts: designing a corporate Intranet”. Webmaster, Vol. 1, no 8, pp. 34 – 32, 2017.

[2] Yashpaul, E.R., & Swarup, A. “Analysis of Equal Cost Adaptive Routing Algorithms Using Connection-Oriented & Connectionless Protocols”. World Academy of Science Engineering & Technology, Volume 51, pp. 299 – 302, 2009.

[3] Viharos, J.Z., & Kis, K.B., “Survey on Neuro-Fuzzy Systems & their applications in Technical Diagnostics & Measurement”. Volume 67, pp. 126 – 136, doi:http://dx.doi.org/10.1016/j.measurement.2015.02.001, SCI, Impact Factor: 1.526, 2015.

[4] Santosh, S, & Sanjeev, S. “ Neuro-Fuzzy based dynamic secure routing protocol for QoS Frameworks of MANET”, International Journal of Emerging Technologies, Vol. 10, no 3, pp.286 – 295, 2019.

[5] Sangeun, O., Yongsu, J., Seongsin, K., & Ikjn, L. “Fuzzy Deep Generative Design: Integration of Topology Optimization & Generative Models”. Journal of Mechanical Design, Vol. 141, no 405, pp. 1 – 13, 2019.