SIMATS ENGINEERING

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TECH STAR SUMMIT 2024

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Improving the Efficiency of 5G Network Services with Artificial Neural Network (ANN) Algorithm in comparison with Linear Regression Algorithm.

INTRODUCTION

- Investigating the efficiency of 5G network services is crucial for shaping digital experiences and interactions in today's connected world.
- This study focuses on using Artificial Neural Network (ANN) algorithms and comparing their performance with traditional methods like linear regression to optimize 5G network functions.
- The effectiveness of 5G network services has profound implications across various domains, including human-computer interaction, emotional analysis, mental health monitoring, and customer service enhancement.
- The aim is to build robust models capable of interpreting and responding to the complex demands of modern network dynamics.
- Despite progress in sentiment analysis, there's still a research gap in understanding the nuances of network performance, especially in the dynamic environment of 5G technology.
- Traditional methods may not meet dynamic 5G network needs, prompting exploration of cutting-edge machine learning techniques.
- Importance of ANN algorithms for simulating complex brain functions and maximizing network performance adaptively.

5G Network Services

MATERIALS AND METHODS

DATA COLLECTION
Improving the Efficiency of 5G Network Services has various sources 5G Network Performance Metrics, Network Parameters, User Behavior Data, Environmental Factors, Algorithm Training Data, Baseline Data, Feedback Mechanism Data, Comparative Analysis Metrics.

DATA PREPROCESSING
Gather and Preprocess the dataset(E.g., handling missing values encode categorical, scale features)

Linear Regression
Using the Linear Regression involves collecting and preprocessing 5G networks data, training the classifier, and evaluating its performance.

Artificial Neural Network(ANN)
Applying ANN algorithm to anticipate Improving the Efficiency of 5G Network Services encompasses initial data collection and preprocessing steps.

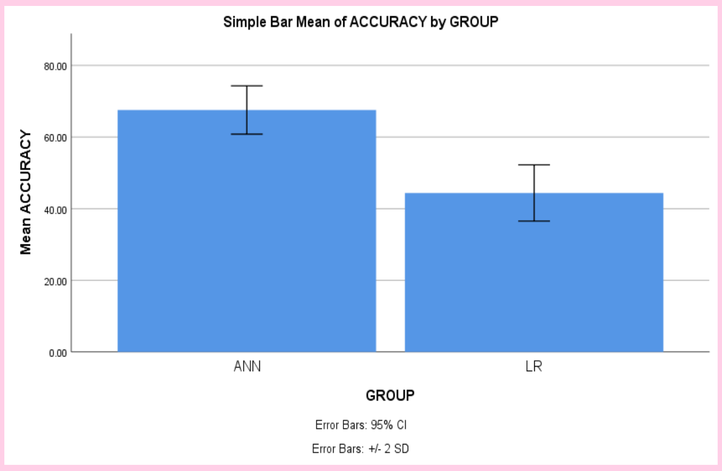
MODEL ASSESSMENT
The efficacy of both the ANN and LR models was assessed on the testing set using suitable metrics to ascertain Improving the Efficiency of 5G Network Services.

COMPARISON OF THE MODELS
The ANN and Linear regression model performances were compared based on the chosen assessment metrics to ascertain which model generated superiority in predicting the Improving the Efficiency of 5G Network Services.

MODEL INCORPORATION
The incorporation of ANN and LR for a combined detection was considered, along with enriching LR using external data sources to improve the detecting Efficiency.

5G Network Services

RESULTS



ANN AND LR

S. No	Test Size	ACCURACY RATE	
		Artificial Neural Networks	Linear regression
1	Test 1	69.75	44.97
2	Test 2	63.52	42.29
3	Test 3	64.56	40.15
4	Test 4	72.18	48.69
5	Test 5	67.39	43.62
6	Test 6	72.38	51.87
7	Test 7	69.27	46.32
8	Test 8	68.23	45.41
9	Test 9	63.75	41.23
10	Test 10	64.75	39.30
Average Test Results		71.40	45.35

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Accuracy	Artificial Neural Networks	10	67.5500	3.36913	1.06541
	Linear Regression	10	44.3850	3.92168	1.24014

- Mean, Standard Deviation, and Standard error mean with an accuracy rate comparison of Artificial Neural Network over Linear Regression

Independent Variables

		Levene's test for equality of variances		T-test for equality means with 95% confidence interval						
		f	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std.Error difference	Lower	Upper
Accuracy	Equal variances assumed	0.087	0.772	14.169	18	0.002	23.16500	1.63495	19.73010	26.59990
	Equal Variances not assumed			14.169	17.600	0.003	23.16500	1.63495	19.72450	26.60550

- A significant Threshold value of an Accuracy rate comparison of Artificial Neural Network, and Linear Regression Algorithm

In the present work Artificial Neural Network is compared with Linear Regression and it depicts that the proposed algorithm gives more accuracy when compared with the rest.

DISCUSSION AND CONCLUSION

- Based on T-test Statistical analysis, the significance value of p=0.001 (independent sample T - test p<0.05) is obtained and shows that there is a statistical significant difference between the group 1 and group 2.
- Overall , the accuracy of the Artificial Neural Network (ANN) and it is better than the other algorithms.

  Artificial Neural Network (ANN) - 71.40%
  Linear Regression(LR) - 45.35%
- From the work , it is concluded that the Artificial Neural Network attains the high accuracy when comparing with other Machine Learning Algorithms in 5G Network Services.
- 5G networks will drive the proliferation of innovative applications like AR, VR, IoT, and autonomous vehicles, revolutionizing industries while fostering economic growth through increased productivity and creating new business opportunities.
- The rise of 5G heralds a transformative era, promising revolutionary advancements across industries. AR, VR, IoT, and autonomous vehicles are set to thrive, reshaping sectors from healthcare to entertainment. Beyond connectivity, 5G unlocks immense potential, boosting efficiency, productivity, and fostering new business opportunities. This leap forward will drive economic growth, ushering in a future defined by digital transformation and global competitiveness.

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