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Smart Routing Protocol Algorithm Using Fuzzy Artificial Neural Network OSPF

Sami Hasan*, **Abdulhakeem Amer**
College of Information Engineering, Al-Nahrain University Baghdad, Iraq

Abstract
The OSPF cost is proportionally indicated the transmitting packet overhead through a certain interface and inversely proportional to the interface bandwidth. Thus, this cost may minimized by direct packet transmitting to the other side via various probable paths simultaneously. Logically, the minimum weight path is the optimum path. This paper propose a novel Fuzzy Artificial Neural Network to create Smart Routing Protocol Algorithm. Consequently, the Fuzzy Artificial Neural Network Overlap has been reduced from (0.883 ms) to (0.602 ms) at fuzzy membership 1.5 to 4.5 respectively. This indicated the transmission time is two-fold faster than the standard overlapping time (1.3 ms).

Keywords: Fuzzy Artificial Neural Network, OSPF, Routing Protocol Algorithm.

Introduction:

Successful steering computations utilize one-of-a-kind solutions to determine the best option direction to transfer facts as more humans transmit information with a laptop system, the type of management received through the customers starts off developed to debase. A noteworthy part of personal computers this is paramount to nature of supervision is facts directing. A larger powerful procedure for steering data with a laptop or computer system can help with the new problems being skilled with today's growing structures [1].

Effective steering computations use different systems to look for the most fitting way to transmit records. Identifying the best way thru an enormous territory create (WAN), demands the guidance computation to get facts about the open public of the hubs, contacts, and devices present at these devices. The maximum pertinent directing records involves different measures that are frequently received in an flawed or unsure way, in this manner proposing fuzzy questioning is an attribute method to use in an increased steerage plan [2]. The neural machine turned out as an appropriate go down since it supports up the capacity to finally learn occasions.

When the neural apparatus is before everything arranged, any progressions inside the PC steerage condition without a lot of an extend be learned out by means of this practical manufactured mental aptitude strategy. The capacity to study and control is simple in cutting edge quickly developing and changing portable workstation or PC frameworks. Those methodology, soft thinking and neural structures, when merged commonly convey an exceedingly captivating coordinating calculation for PCs. Pc pastime put on demonstrate the newest fuzzy directing calculation outflanks the OSPF calculation in maximum laptop device situations. The huge benefits increment because the computer arrange activities from a normal machine to extra part one. The upsides of making use of this fuzzy directing computation are evident while deciding the dynamic types of modern day laptop systems[3].
Contributions and Motivation Behind this research is to show the capability of applying OSPF with fuzzy thinking to a system administration method, to be specific, movement administration. This exclude outlining another routing protocol; yet will rather give another algorithm that can without much of a stretch utilized by a current routing protocol. Routing algorithms vary from routing protocols in that a routing protocol executes a specific routing algorithm. Routing protocols portray

* Email: hhksami@yahoo.com

the measurements to use for perfect course figuring by the algorithm. The protocols additionally characterize the size, substance, trade recurrence, and trade example of routing redesigns and different messages. The sole motivation behind the routing algorithm is to execute a particular procedure to decide the fitting course. The activity routing model will created under suppositions normal to a wide range of PC systems. This will likewise take into consideration more accentuation on the fuzzy thinking idea instead of the advancement of a summed up routing reenactment. The nitty gritty depictions of the suspicions will displayed in part four alongside the routing model.

Existing related works

There are plenty of existing research projects in this field of Neural Networks and Fuzzy networks. However, no published paper fond to investigate how to optimize the message propagation in OSPF. The following two are the most relevant exiting works to the proposed algorithm.

Steven and co-researchers[4] created an adaptive algorithm. Two artificial neural networks (ANNs) are exploited using the designed adaptive algorithm. The adaptive algorithm is trained and applied to predict transit arrival times. The results are obtained using microscopic simulation model (CORSIM) that is calibrated and validated with real-time data to improve prediction accuracy. The paper demonstration the enhanced ANNs adaptive algorithm outperform the ANNs algorithm.

Justin A. Boyan , Michael L. Littman ,1994) [5] embedded a reinforcement-learning module per node in a switching network. The resultant is a Q-routing adaptive algorithm for packet routing where each node keeps accurate statistics that leads to minimal delivery time with only local communication. The paper conducted a 36-node experiments that is irregularly comprising network with dynamically-varied load. Q-routing outperforms a non-adaptive algorithm and capable to route efficiently.

The method

Setting up the neural framework will be the most monotonous time of the audit and will require that a proliferation show first illustrated. The data layer involved fifteen centers identifying with twelve information sources, two new data sources and one slant input center point. Despite the way that the interest audit information sources were all in the region of zero and one, the new data sources kept running from 0 to 1500, obliging them to be scaled to fall in the region of zero and one going before get ready. An n-dimensional capacity may break down into a straight blend of various sub-functions frequently called sub networks.

Pseudocode

Each plan requires a one of a kind modeling approach with respect to the information and the reason we might want to accomplish, yet as a rule, modeling process took after the following steps:

Step 1 Building the database for learning and testing the model

Step 2 Building the models, count of inner consistency (Learning Error (LE %))

Step 3 Testing the models, count of test Predictability (PE%), where relevant

Step 4 Selection of the vigorous model with the base of blunder

Step 5 Simulation with new information, forecast of BE study result

Step 6 Validation of the model in view of the consequences of the BE study, computation of outer Predictability (PE%)

The above method for developing a novel Smart Routing Protocol Network may formulated in the following Pseudocode

```
% Number of steps in matrix
NumM=length(yn121);
yyn121 = NumM;
Loop i=1: NumM,
z(i)=0.15*(rand-g)*2;
if yn121(i) >= 0
PART121(i)
=PART121(i)+0.1*(yn121(i)-2)^2-0.4;
end
PART121n (i) =PART121(i)+z(i);
End loop
% Smart Routing computation
Loop i=1: NumM,
Tpoly(i)=0.6+0.035*(yn121(i)+6)^2;
```

```
End loop
Loop i=1: NumM,
phi1=inv(1+exp(-b1-w1*yn121(i)));
phi=[phi1]';
Tmlp(i)=b+w'* Ø ;
End loop
Loop i=1: NumM,
Ø1=inv(1+exp(-b1-w1*yn121(i)));
Ø2=inv(1+exp(-b2-w2*yn121(i)));
Ø=[Ø1  Ø2]';
Tmlp(i)=b+w'*Ø;
End loop
Loop i=1: N,
µ1(i)=exp(-0.5*((yn121(i)-c11)/sigma11)^2);
µ 2(i)=exp(-0.5*((yn121(i)-c12)/sigma12)^2);
µ 3(i)=exp(-0.5*((yn121(i)-c13)/sigma13)^2);
µ 4(i)=exp(-0.5*((yn121(i)-c14)/sigma14)^2);
denominator(i)= µ 1(i)+ µ 2(i)+ µ 3(i)+ µ 4(i);
```

End loop

The layer was incorporated a lone center points addressing the ordinary rounds to accomplish the objective. Scaling, in perspective of the trade limit, suggested for the yield center point as well. The trade work used was the sigmoid limit.

Result analysis

The results of this research are presented in Table-1 and four figures; Figure-(1, 2, 3 and 4).

Table 1-Performance Prediction of the fuzzy network Model

	Formulation no.	Particle size d(0.5)	Cmax ratio% measured	Cmax ratio% predicted	Cmax LE%	AUC ratio% measured	AUC ratio% predicted	AUC LE%
Training data	1m	4.9	115.0	109.1	5.1	107.9	103.2	4.4
	2c	6.4	107.7	105.4	2.2	97.8	96.7	1.1
	3m	8	78.4	79.5	1.4	80.7	81.8	1.4
	3m	6.3	103.8	110.1	6.0	95.5	100.0	4.7
	4c	4.9	106.7	116.1	8.8	99.1	106.1	7.0
	4c	4.9	119.9	115.5	3.6	104.2	100.7	3.4
	6c	7.8	90.2	89.0	1.4	87.4	85.8	1.9
	6c	5.4	104.3	100.6	3.5	94.2	92.2	2.1
	Average learning error				4.0			3.3

	Formulation no.	Particle size d(0.5)	Cmax ratio% measured	Cmax ratio% predicted	Cmax LE%	AUC ratio% measured	AUC ratio% predicted	AUC LE%
Validation data	3m	6.3	111.8	107.1	4.2	103.3	97.6	5.3
	4c	4.9	111.2	114.8	3.2	101.5	106.4	4.8
	Average validation error				3.7			5.1
Predictions	5m	6.8	99.6	94.5	5.1	96.1	95.3	0.7

A simulation model planned after the improvement of the new algorithm that connected fuzzy thinking upgraded by a neural network. The premise of the simulation was for contrasting the new algorithm with a current steering algorithm in light of the most limited course strategy. Simulations could utilized; a configuration having two elements built up. These two components, clog level and disappointment rate, chosen as essential figures the test outline because of their high relationship to steering level accomplished. The level of shut present in the PC arrange uncommonly impacts the information time to travel for an extensive variety of data. Additionally, disappointment in the PC network can postpone or totally stop the transmission of information. Each neural was isolated two levels, low level and high level along these lines, prompting to an exploratory plan having four examining units. Every unit spoke to a diverse network circumstance under which an examination test performed between the two algorithms.

The examinations showed that the new algorithm beat the most limited course algorithm in directing adequacy under all network circumstances aside from a greatly stable one having low blockage and low disappointment rate. Non-parametric tests were associated with set up significance at α = 0.10 centrality level. This was the normal outcome, and besides demonstrates that the new algorithm has extensive potential advantages related with it. The scarcity of supposed stable networks being utilized today underscores the handiness of this new algorithm. Input parameters of models included disintegration information and their mixes in various media,new algorithm. Input parameters of models included disintegration information and their mixes in various media,

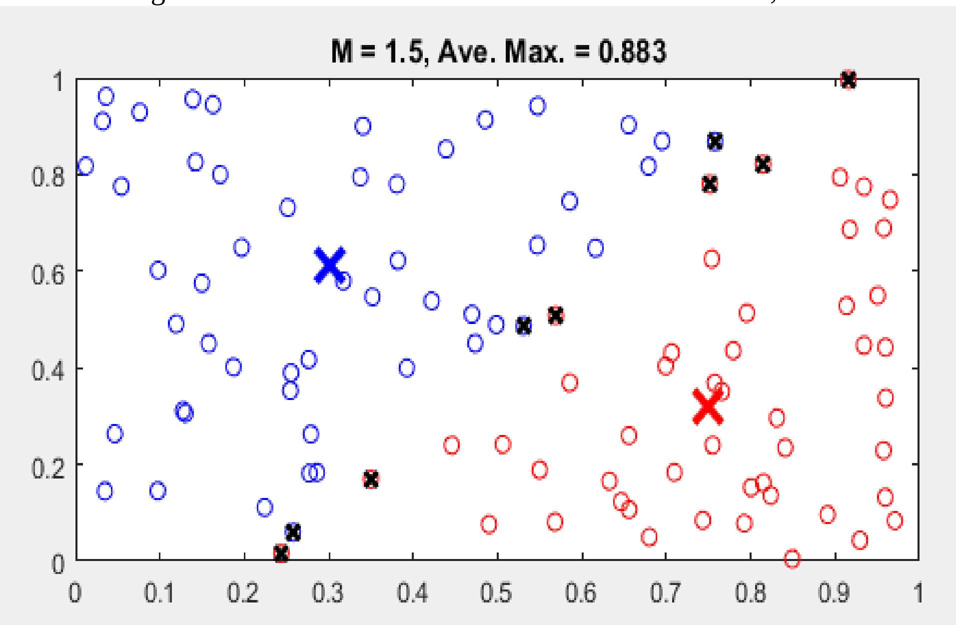

Figure 1-Fuzzy networks Overlap with maximum M=1.5 and an average Max Overlap = 0.883

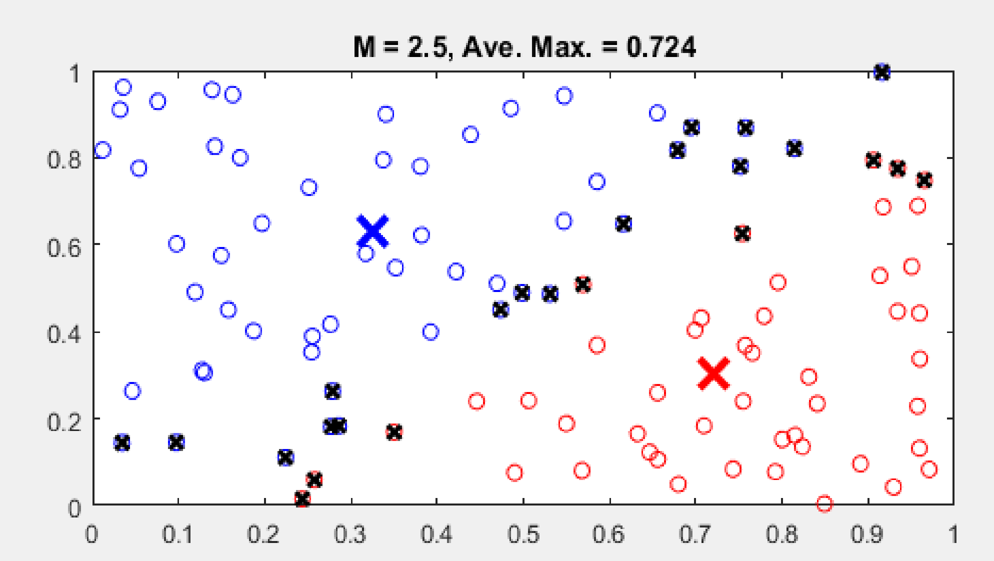

Figure 2-Fuzzy networks Overlap with maximum M=2.5 and Av. Max Overlap = 0.724

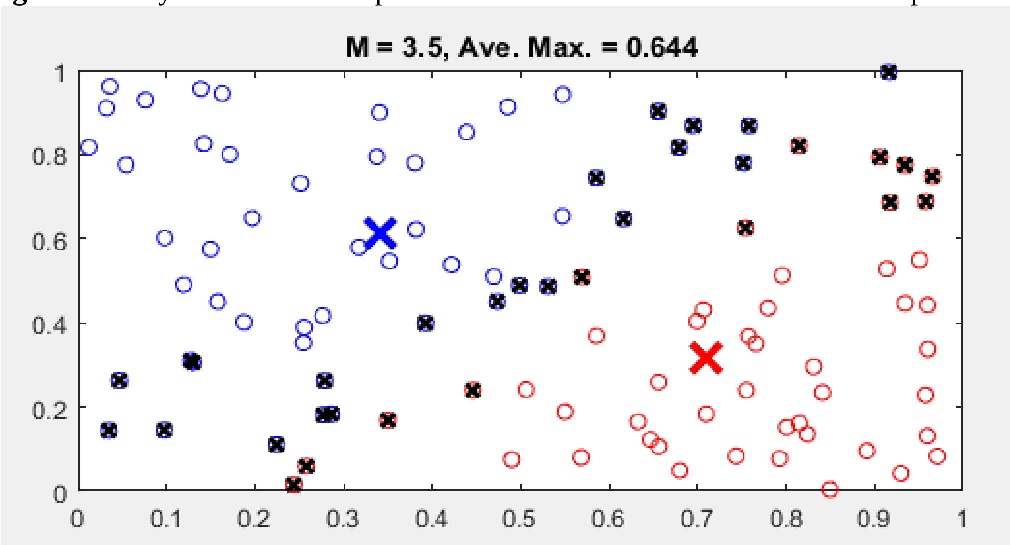

Figure 3-Fuzzy networks Overlap with maximum M=3.5 and Av. Max Overlap = 0.644

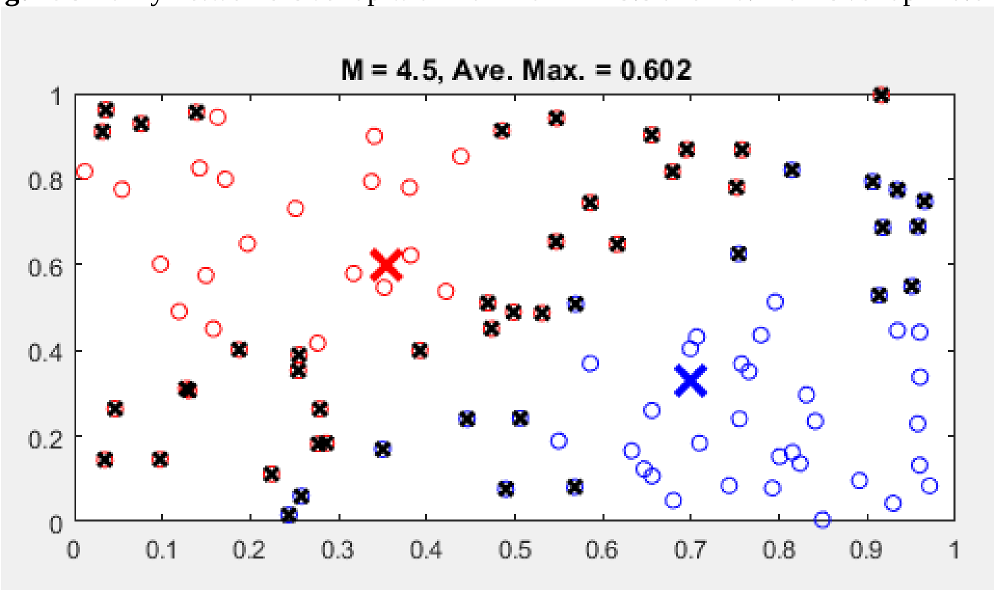

Figure 4- Fuzzy networks Overlap with maximum M=4.5 and Av. Max Overlap = 0.602

Nearness of nourishment, definition quality, innovation sort, molecule size, and splash design for nasal showers. Proportions of PK parameters Cmax or AUC utilized as yield factors of Table-1.

Conclusion

A novel smart OSPF algorithm has been created to optimize the shortest possible path. The New algorithm has a two-fold quicker response compared to the traditional OSPF. A simulation benchmark has been utilized using MATLAB software as a tool of implementation.

FUTURE WORK

The foreseen Future work of this research is to implement the developed algorithm in a reconfigurable hardware [6-9] for real time applications. A breakthrough approach for the development of Smart Routing Protocol Algorithm may be via fuzzy entropy which provides a measure of the amount of information in a certain path [10] or Fuzzy OSPF [11].

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