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Integrating Artificial Neural Networks with QFD to Provide Customer Satisfaction Ratings for Different Competitive Firms

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Abstract. An Artificial Network consists of a pool of simple processing units which communicate by sending signals to each other over a large number of weighted connections.In this paper we will Integrate the ANN with QFD.The myriad solutions provided by different firms are input nodes which are connected further to customer aspects through links which represents the relationship between them consisting of weights.So,abiding this methodology we can provide the customer satisfaction ratings to different firms in comparison which will lead to the completion of customer evaluation house in HOQ.

Keywords: QFD, ANN, HOQ.

1. Introduction

QFD has large amount of data which also incorporate imprecise and ill defined data based on customer perception which is not precise.Moreover we cannot compare different firms from customer's oral imprecise and vague data.In order to compare them we have to provide precise ratings to firms.So,In this paper author and co-author achieve this objective through Artificial Neural Network computational model.Artificial Neural Networks are parallel computational models comprised of densly interconnected adaptive processing units.A very unique feature of these networks is their adaptive and learning nature which get exploited in QFD.The artificial neuron model considered here is closely related to an early model used in threshold logic(Winder,1962;Brown,1964;Cover,1964;Dertouzous,1965;Hu,1965;Lewis and Coates,1967;Sheng,1969; Muruga,1971).Here,a approximation to the function of a biologic neuron is captured by the linear threshold Gate(McCulloch and pitts,1943).So,by using ANN[2] we will provide precise ratings to different firms fullfiling customer needs on different levels.In HOQ shown below ANN technique is used in ROOM 6.

2. Description of Problem and Methodology

2.1. Description of Problem

A simple case is taken here in which we will compare four job firms J_1,J_2,J_3,J_4 providing different facilities and opportunities to a job seeker whose preferences are considered while providing ratings.Facilities and opportunities provided by firms are inputs and job seeker expectations are nodes which are linked to facilities through relationship weights.McCulloch Pitts model[2,8,9] is uses here.Relationships are established according to the mindset of the job seeker.Weights assigned to relationships through Fuzzy sets as Relationships are vague and not precise.

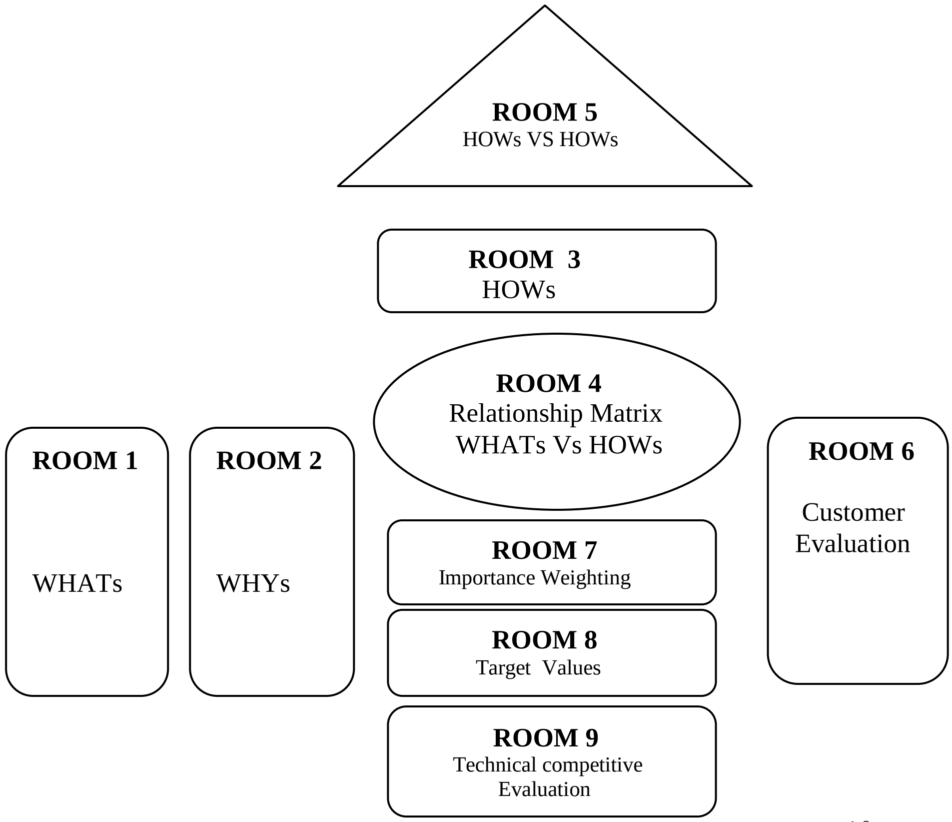


Fig 1: Showing Different Rooms in HOQ[1,6]

2.2. Methodology

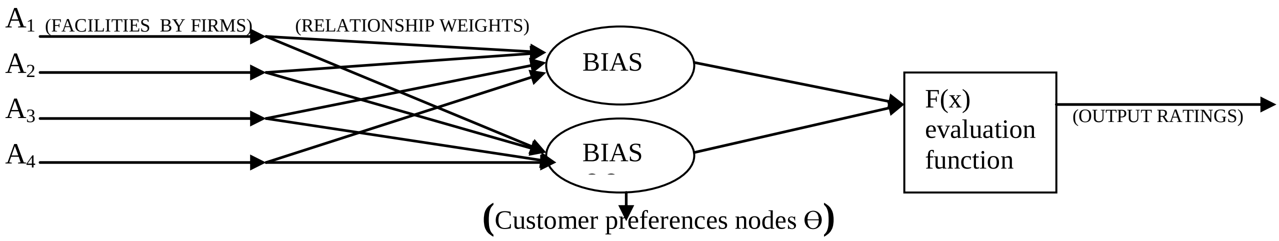


Fig 2: ANN Computational Alogrithm[1,4,5]

$X = {}_{I}\Sigma^{N} W_I A_I - \Theta_I$

$$F(X) = \frac{1}{1+e^{-x}} \quad \text{(sigmoid function)}$$ [2,8]

Bias Weights tells us about the amount of importance given by a job seeker to a particular Preference.

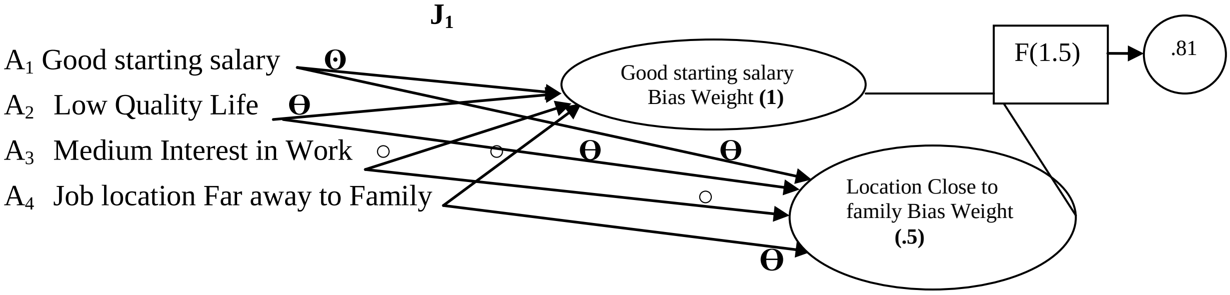
Relationships	Fuzzy Sets	Average weights
Strong ʘ	[.8,1.2]	1
Medium ○	[.4,.8]	.6
Weak Θ	[0,.4]	.2

Table 1:Table showing weights assigned to Relationships[1,7,8]

3. Solution of Problem

We will give ratings to all four firms using above methodology:

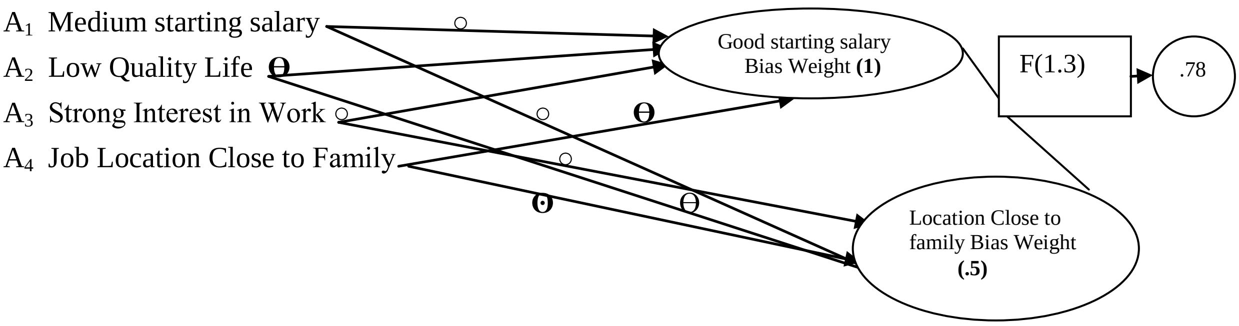
J_1



X= 1×1+.2×.5+1×.2+.5×.2+.6×1+.6×.5+.2×.5+.6×1-1.5=1.5

F(X)=.81

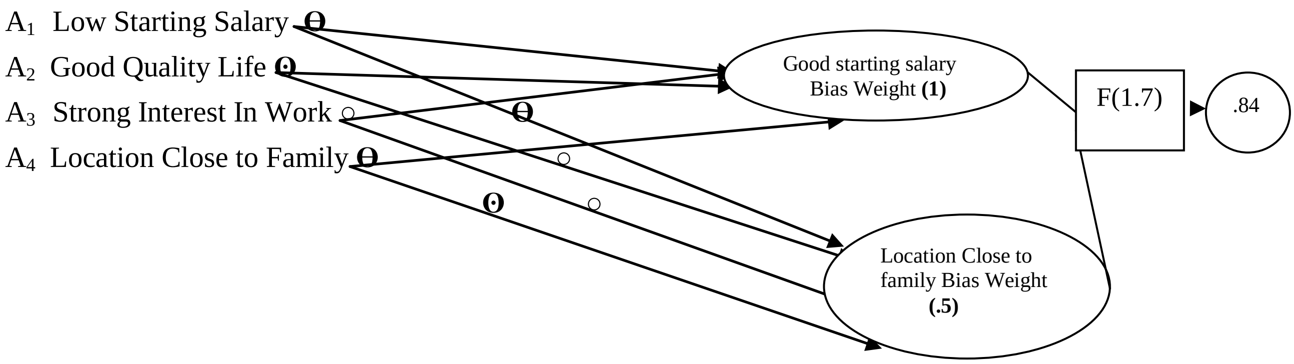
J_2



X= .6×1+.6×.5+.2×1+.2×.5+.6×1+.6×.5+.2×1+.5×1-1.5=1.3

F(X)= .78

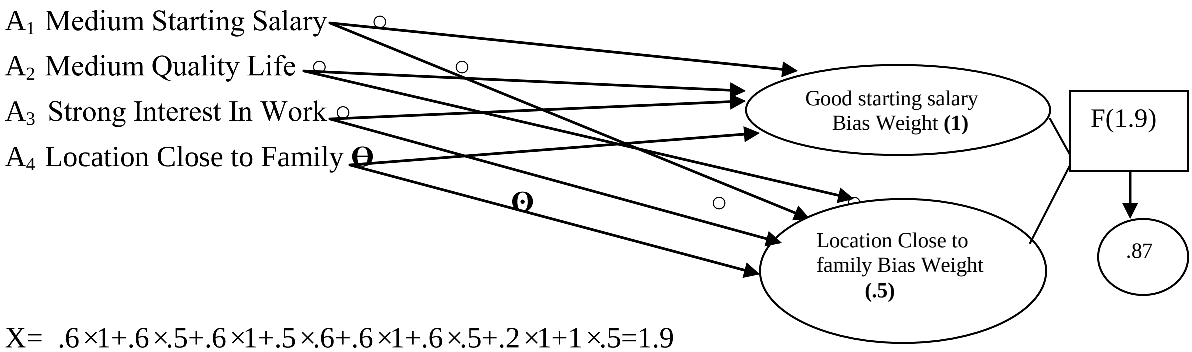
J_3



X= .2×1+.2×.5+1×1+.6×.5+.6×1+.6×.5+.2×1+1×.5-1.5=1.7

F(X)= .84

J_4



X= .6×1+.6×.5+.6×1+.5×.6+.6×1+.6×.5+.2×1+1×.5=1.9

F(X)= .87

FIRMS	RATINGS
J_1	.81
J_2	.78
J_3	.84
J_4	.87

Table 2: Showing Ratings Assigned to firms Through ANN Computaional Alogrithm[9]

4. Conclusion

In this paper Author and Co-Author used ANN computational model to provide precise ratings to different firms providing multiple opportunities to a job seeker having some preferences of his own.So,integrating this technique with QFD results in precise ratings.Moreover ANN is adaptive in nature and can learn from experience also it can handle large amount of data,all these qualities make ANN technique imperative to QFD for accurate results.The Methodology used in this paper can also be used in optimized decision making and for analysis of a best alternative.

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