Available online at www.elixirpublishers.com (Elixir International Journal)

Tourism Management

Elixir Tourism Mgmt. 57 (2013) 14086-14092

ISSN: 2229-712X

Designing model risk assessment of tourism by using of multistage combination techniques ANFIS and Dematel

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ARTICLE INFO

Article history:

Received: 25 February 2013;

Received in revised form:

17 March 2013;

Accepted: 3 April 2013;

Keywords

Tourism Industry,
Simulink,
Fuzzy Logic,
ANFIS,
DEMATEL.

ABSTRACT

This study by using of fuzzy approach has attempted to model for predicting the risk of tourism in a fuzzy environment developed for this purpose , at first , the effective parameters of the process of determining the number of tourism in metropolises are recognized , then the variables are classified in 11 categories and according to experts' opinions , their importance is identified by DEMATEL technique that it is reduced to 14 variables and classified to 4 groups, and considered as an input. Following the classification each with by using membership functions of linguistic variables were transformed into qualitative variables. Each variable in the fuzzy sign in fuzzy networks finally, each of the output variables of the fuzzy system derived. After the Create 11-fuzzy network, each output results as an affecting factor on main risk associated with specific weight and then the weight relation each of the small risks, the main risks was obtain. The end Tehran city as a case study assessment Tehran, with a 50.503% (average) tourism risk whit human-induced has been calculated. It should be noted that these rhythms were in various cities and countries, is different.

1. Introduction

Issue is predicted that the human mind has long to have self-engaged. In general one of the most important tasks sciences in various fields is effort to find the connections between different phenomena in order to predict the future (Afshar-Kazemi, 2011, 1). Dare to state no industry has not been no exception and the must be for self-preservation and survival to predict the future of the industry. The Tourism as the most important jobs industry in the world and the second industry after oil of the financial turn is the need for infrastructure development (Alfonso Palmer, 2006, 18).

Creation various infrastructures are entails control and planning various in the field of the industry. Also infrastructure and variables influencing the industry due to be in the environmental wholly unlikely, have any kind Probability of accidental (Huang, 2009, 648). Here are methods that make the ability to predict unlikely worlds, of lines are past linear methods, and step in non-linear methods are on a complex and dynamic environmental.

One of these methods is Fuzzy logic, fuzzy logic with relativistic weapon objects has foot in the arena the existence and qualitative variables by using the own specific functions become the quantitative functions (Raymond, 2008; R.C Tsaur, 2009). This method, due to the complex structure of environment Proposed is a theory of possibility because has the ability to learn Series nonlinear complex and the ability to adapt to functions of various statistical distributions (Tugba, Efendigil, 2008; Chang, 2007; Rose, 2000; & Raymond, 2008).

2. Tourism Industry

Tourism industry in many countries worldwide of rapid growth and has an important, although in the four years have passed, this of population growth extends but Process of more balanced due to the decreased global the economic expansion, continuing Process of oil prices and also has increases uncertainty in the global economy these are including key factors the vision of the tourism industry as an opportunity have clear (P.T. Chang, 2008, 775). Therefore, it is predicted that this century, Century, the use of valuable business opportunities are, in the service sectors particularly tourism. The evidence presented by the World Tourism Organization, world tourism turnover whit thousand dollars valuable of turnover capital from important industries such as oil and automotive will exceed (Ghaderi, 2012, 4). In the process, acquiring countries like Iran that are vast tourism attractions as a percentage of turnover in this industry with annual revenue of about 20 billion will be for economies such as Iran's economy, this number is significant and can activities in all economic, social and cultural influence (Zamani-Farahani H, 2012, 806).However, due to lack of effective policies in this section Iran has not been able to properly share in the world tourism market to reach this has resulted many problems of socio - economic that can be with the development tourism overcome remains to be. The process of how access to a pattern that is flow stimuli the dynamism and complexity of environment is impossible.(Buyukozkan, 2010, 209)

In order to achieve this goal, genealogy of effective risks in this industry has potential importance (Zamani-Farahani H, 2012, 806). Because the check the status tourism in the countries and the leading cities in attracting tourists can be observed to the extent that amount tourism destinations has been able to reduce the amount of risk of industry growth path to appropriateness in developing this industry have been successful (Costa, 1991, 68).

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At this regard, this study intends to provide documented in order to assess the risks at of tourism with an emphasis on the risks human origin at large urban areas. Also, because achieving an appropriate pattern in order to assess the risks human because of these risks, located at inaccurate information space, is not an accurate measuring. Therefore used of the fuzzy logic (Kara, 2007, 243). Using this algorithm, a model for predicting the tourism risk is modeled with the lowest error the ability provide appropriate strategies to develop for the advancement of this industry (Tasi-Chi Kuo, 2008, 48).

3. Literature review

In this study, two methods are combined, by Dematel techniques will prioritize variables And Anfis techniques modeling & predicting variables. In this section, two techniques separately theoretical framework is briefly outlined.

3-1 DEMATEL technique

In this study to determine effect of indicators and selection effective indicators in tourism venture is used the DEMATEL technique. Technique a structured modeling is based on the shaped by theory of directional graphs and for assessment complex issues have arisen. This technique can be factors affecting the issue separated to two groups to cause and effect (Lin,Chi-Jen& Wu, Wei-Wen, 2008). Dematel methodology to improve understanding of the specific problems and finding practical solutions by the hierarchical the structural through interviews with group of experts in between the years 1972 to 1976 were compiled (Fontela & Gabus, 1976).

Characteristic of this methods Represent the relationship between criteria is by the matrix operations that addition determining the direct relations, indirect relations between the elements to determined and group the possibility group decision making provides in a complex system. (Chung-Wei Li & Gwo-Hshiung Tzeng, 2009).This process is described in the following (Ming-Lang Tseng, 2009).

First stage, determine the correlation between indicators in five levels ineffective (0), very low effect (1), low the impact (2), high impact (3) and very high effect (4), the Group of experts matrix the matrix of direct relations paired comparisons form based on the intensity and direction of the relationship between indices.

Second stage: matrix based on a direct relation A, Normalized matrix direct relations X is obtained from the following formula.

$$X = r.\ A \quad (1)$$

$$r = \frac{1}{Max_{1 \le i \le n} \sum_{j=1}^{n} a_{ij}} \quad i, j=1, 2\ldots, n \quad (2)$$

Third stage: calculate mean matrix by averaging the arithmetic of the h matrix direct relations normalized. (h: times the number of experts)

Fourth stage: after calculating mean matrix, the overall relationship matrix T is calculated using the following formula:

$$T = X(I - X)^{-1} \quad (3)$$

Fifth stage: the sum elements of row and column elements matrix T each into separate fields represents a vector of S and vectors R:

$$D = \sum_{i=1}^{n} t_{ij} = [t_i]_{1 \times n} \quad (4)$$

$$R = \sum_{j=1}^{n} t_{ij} = [t_i]_{n \times 1} \quad (5)$$

A causal diagram can be whit the exact imaging acquired data sets obtained from the Calculate S + R and SR. S+R the value are displayed on the horizontal axis, indicates importance level of indicators and S-R that the amount are displayed on the vertical axis, is represents indicator penetration rate. If amount SR is positive index was effective and is in the group of Causes and if this value is negative index impressionable and effects groups takes place.

3-2 Neural Network – Fuzzy

Fuzzy logic solutions are easily makes possible capabilities of amend and optimization (Zoheid, 2003, 123). Systems that have incomplete definitions or uncertainties in the data can easily be modeled using fuzzy inference system. Secret of the success fuzzy logic in describing the system behavior with commands and simple condition relations when that the possibility solution easier and spent less time provides for the design of the system (Tsai-Chi Kuo, 2008, 48). Fuzzy theory is formed for analyzing systems that in them are complex dependencies between variables (Raymond, 2008, 22).existence of such complexity in various sciences such as economics and many other fields is common. A common string that issues of this type relate to each other, being imprecise range ranks, uncertainties and indefinite of being Reality (Mazhar et al, 2004, 336). The possibility it a powerful and fuzzy logic considered a major limitation for it. Because in many applications knowledge about system behavior described it is implicit in the data set it manually extracts information from the data sod-time high, and has tried to carefully call (Haiyan Song, 2008, 775).

Limits provided was the main driving force behind the idea of creating of fuzzy systems. (Kaebruick et al., 2007). Fuzzy systems are also plentiful important when that varied nature they can be applied in domains applications (Tsaur, 2009 & Tugba Efendigil, 2009). Comparative Network based on Fuzzy Inference system (ANFIS) is a hybrid system that able to create a structure of input - output based on the human knowledge, the rules then there is a proper membership functions. This network model is used to determine the membership functions. This method plays very important role in creating the rules viewed in the fuzzy logic (hadavadi, 2010, 566).

In this research Sugeno system is used to derive. In a one rating Sugeno system common set of rules for both rules if- then the phase is as follows:

$$IF\mathbf{X}ISA_1\ ANDYISB_1\ THENf_1 = p_1\ X + q_1\ Y + r_1 \quad (6)$$

$$IF\mathbf{X}ISA_2\ ANDYISB_2\ THENf_2 = p_2\ X + q_2\ Y + r_2 \quad (7)$$

Which Y, X input variables, B_i, A_i linguistic variables with membership functions (x) μ, r_i, q_i, p_i parameters of Talley output function f (X, Y) that determine training period. Comparative Network based on Fuzzy Inference System, A six-layer feed forward networks along with the maker of fuzzy functions, inference and desensitization of fuzzy is shown in Figure 1.

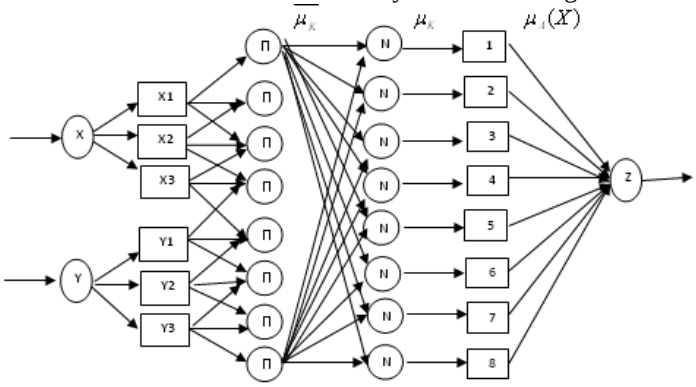

Figure 1: Conceptual Model of Adaptive Network Based inference System Phase

Just as can be seen in this form of the first layer, the input variables are specified the output of the second layer membership The input variables defines in the reference collection.

$$O_i^1 = \mu_{A_i}(x) \quad (8)$$

Which the x input variable node i and A_i a verbal variables are related to the node O_i^1 membership rates input variable x in the set Ai is specified. Usually is determined with a bell-shaped membership function using the following formula: (Tuncer & Dandil, 2008; Abuzakhar & Manson 2005, 667; Rashid& Ramerez,1999,23).

$$\mu_{A_i}(x) = \left(u_{ij}^1, \sigma_{ij}^1, c_{ij}^1\right) = e^{\frac{-(u-c)^2}{2(\sigma)^2}} \quad (9)$$

So the set $\{c_i, b_i, a_i\}$ are membership function parameters and are used to adjust the function. They are called to first parameters (Tugba Efendigil, 2009, 6704).

The third layer is characterize of fuzzy AND operator, the output of the layer input signals multiply at each other and transfer to the next layer. The output of each group at this layer is represents the fire power of a rules.

$$O_i^3 = \mu_i = \mu_{A_i}(x) \times \mu_{B_i}(y) = \min\left(\mu_{A_i}(x), \mu_{B_i}(y)\right) \quad (10)$$

Each group in the fourth layer of the i th rules' fire power of to Calculate the sum power of all rules, the output of this layer are called normalized fire power (tsai-chi kuo, 2008, 48).

$$O_i^4 = \bar{\mu}_i = \frac{\mu_i}{\sum \mu_i} \quad (11)$$

Output of each group at the fifth layer represents the output of i^{th} of fuzzy rules that calculated as follows:

$$O_i^5 = \bar{\mu}_i \times f_i = \bar{\mu}_i.(p_i x + q_i y + r_i) \quad (12)$$

So the $\bar{\mu}_i$ output of forth layer and $\{r_i, q_i, p_i\}$ are parameters of the function the output of Talley. Talley parameters are trained by back propagation algorithm. The third and fourth and fifth layers are represents inference.

Only overall output sixth layer group is Calculate as the sum of all input signals, Single node in this layer is responsible for the task of removing of fuzzy (Fulvio, 2008, 2)

$$O_i^5 = \sum \bar{\mu}_i f_i = \frac{\sum \mu_i f_i}{\mu_i} \quad (13)$$

First and Talley parameters of at algorithms are very important factors, each of which has a different calculation and data the output of are optimal learning (Tsai-Chi Kuo, 2008,48). Hybrid algorithm using on the structure of ANFIS include the method Least squares and gradient for learning membership functions at parameters are reduced. Also, the algorithm is composed of two transmission forward and backward, at the leading transmission using multi-layer feed forward networks*(Feed Forward Network* the output of nodes to move forward by keeping constant the first parameters using the least square method parameters are optimized Talley (Sheng-Lin, 2006,21). Backward transmission error at the output of by learning patterns of error propagation *(Back propagation)* released backwards and first parameters are amending by the reduced gradient method. Repeat this process with minimum of output errors are reduced and reported error (Tsai-Chi Kuo, 2008, 48).

4. Development intelligent model risk assessment of tourism.

Here steps implemented is described order to system design evaluate the tourism ventures. The initially in this stage influencing the factors risk tourism identified through questionnaires and interviews with reporters, the relationship between them was determined. The data for each variable were analyzed by Dematel techniques and identify important. Each variable with what power can affect the tourism venture. In the next step, parameters effective model of risk assessment tourism is a multi-stage design using of fuzzy the neural network. The multi-stage model by Simulink design, the first network outputs (indicators) used as input at the second network. And sub-indices also the primary inputs to the model algorithm performance are presented in Figure 2.

4.1 Step One: Identify the indicators of risk affecting tourism

The first step in designing of fuzzy the neural network identifies the variables, collect and correct the data that define the behavior of the system .A manner that any set of data including an example of output values in exchange for a combination of input variables. Indicators and sub indicators are shown in Table 1. Just as can be seen at Table 1, index (D) for the risk assessment of tourism and in each index the sub-indicators (C) has been detected.

4.2 Step Two: Analysis of indicators and determine the effective indicators

In Table 2, mean normalized matrix direct relationships are shown which represents relative intensity governing on the relationships the existing response and has been extracted from the experts. After the calculated mean normalized matrices experts, the overall relationships between the dimensions of the matrix (T) is calculated using the formula (3). The sum results element D Row and R columnar above mentioned matrix is shown in Table 3. Finally, to determine the causal relationship between the dimensions of diagrams of casual considering two columns of D+ R and D-R can be the formulation in Table 3.

Table 2: Average matrix relative intensity governing the relations between the dimensions (D)

1	2	3	2	0	0	5	0	0	4	0	Terrorism Risk
2	0	0	0	0	0	1	1	1	0	0	Social Risk
2	1	4	3	4	3	1	5	0	4	3	Financial Risk
4	3	3	1	4	3	1	0	1	3	2	Structure Risk
1	2	1	2	0	4	0	1	2	4	1	psychological risk
1	0	2	3	2	0	5	4	4	0	0	Time Risk
0	0	1	1	1	1	5	1	1	5	0	Health Risk
3	2	2	0	4	2	5	3	1	1	5	Cultural Risk
3	1	0	1	5	1	4	0	0	1	5	Safety Risk
5	0	3	3	3	1	3	4	3	2	4	Legal Risk
0	3	5	4	4	5	5	4	4	1	5	Political Risk

As you can be seen in the diagrams, the evaluation criteria divided into two groups, cause and effect group. Criteria that are at based on the first quadrant criteria for cause effective benchmarks are called. In front criteria that are at based on the quarter criteria called the effect and benchmarks are

impressionable (Fontela & Gabus, 1976). C3 and C4 and C8 and C10 indicators in other words in the diagram above, the effective indicators and other indicators are impressionable. Financial risk indicators (D3), the risk of structural and functional (D4) and risk cultural (D8) and the legal and political risks (D10), respectively, with maximum D + CR and DR have the greatest impact on other dimensions of Experts In the among the most important factors affecting the information security requirements. Thus can be concluded at of tourism ventures must most measures be focused on above elements so as to provide acceptable security.

Table 3: The Final calculations relationships between dimension

R	J	R+J	R-J	
0.8858	1.3299	2.2157	-0.4441	A
0.3343	1.4436	1.7779	-1.1093	B
1.5968	0.9433	2.5401	0.6535	C
1.4	1.2078	2.6078	0.1922	D
0.9896	1.9265	2.9161	-0.9369	E
1.2117	1.1441	2.3558	-0.0676	F
0.7559	1.4317	2.1876	-0.6758	G
1.533	1.0957	2.6287	0.4373	H
1.1153	1.2881	2.4034	-0.1728	I
1.7742	0.8024	2.5766	0.9718	J
2.1954	1.1789	3.3743	1.0165	K

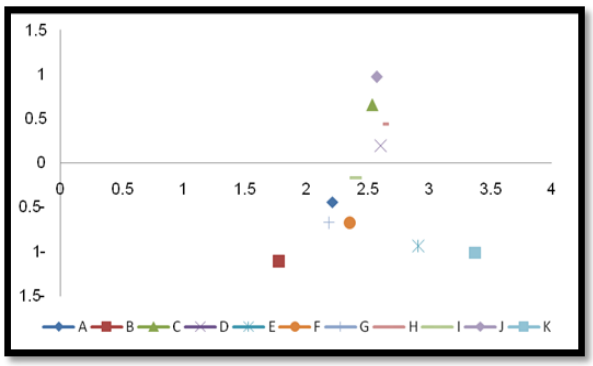

Figure 2: Cause and Effect Diagram Between the Dimensions

4.3 Third step: Primary fuzzy inference system:

In this step, the reference numbers collections sub indicators related to the effective index (D3) are Include: effective Index (D4) are C45, C44, C43 and index effective (D8) are C87, C83, C81, and indicators effective (D10), including C107, C103, C102, C101 determine and any of verbal variables by using a bell-shaped function (equation 8) of verbal form are transformed into fuzzy variables. Then the four Primary fuzzy inference system for effective indicators as sub systems the main model, are made Input to each of the four subsystems are related to sub indicators. Database rules sub-criteria cultural risk (D8) is as follows:

R1:

$$IFC81 IS verylow and C83\ IS\ verylow \textbf{ and C87 IS verylow } THEN f_1 = p_1^1 C81 + p_2^1 C83 + p_3^1 C87 + r_1$$

R2:

$$IFC8 IS verylow and C83\ IS\ verylow \textbf{ and C87 IS low } THEN f_2 = p_1^2 C81 + p_2^2 C83 + p_3^2 C87 + r_2$$

At the rules Database the above, the input variables are lack mastering tourism destination people (C81), distrust of resident's behavior (C83) and ideological assumptions (C87). In Figure 4 Inference System for Index (D8) is shown along with sub indicators(C83) membership functions As can be seen in the figure, the system has three inputs and Sugeno method is used to derive.

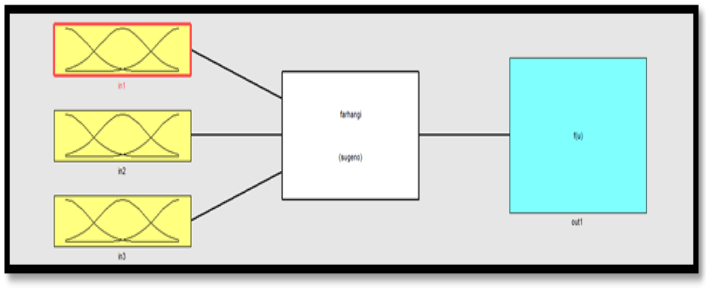

Figure 3: ANFIS Structure (D8)

4.4 Fourth Step: Training of Fuzzy inference system by the neural network.

In this section each of the fuzzy inference subsystems the created in the previous step are taught by the back propagation method. ANFIS networks have created from a multi-layer network do not return communications, and outputs are determined using only the Inputs and current values of the weights, namely relationship of the outputs one layer does not spread to inputs same layer and the previous the layers. At this stage, the number of teaching data in the network is determined in Figure 5) is shown ANFIS network structure for subsystem Cultural Risk (D8). As you can be seen in Figure this network are 6 layers. That Network input layer has 3 neurons, and layer output is a neuron.

Table 4: Information related to D8 ANFIS network

Neural fuzzy Network	
• *Architecture*	
Multi layer Feed Forward Network	
✓ Input Neurons : 3	Hidden layers : 4
✓ Output Neurons : 1	Number of Nodes : 80
✓ Number of Linear Parameters : 225	Number of Nonlinear Parameters : 700
✓ Total Number of Parameters : 925	
✓ Number of Fuzzy Rules : 75	
• *Computation/Termination*	
✓ Max Epochs : 300	Error Goal : 1e-5
✓ Initial Step Size : 0.1	Step Size Decrease Rate : 0.9
✓ Step Size Increase Rate : 1.1	Training : Back Propagation rule
✓ Fuzzy Inference : Sugeno	Average testing error: 0.072678
✓ Average checking error: 0.0309571	Average training error: 0.0106224

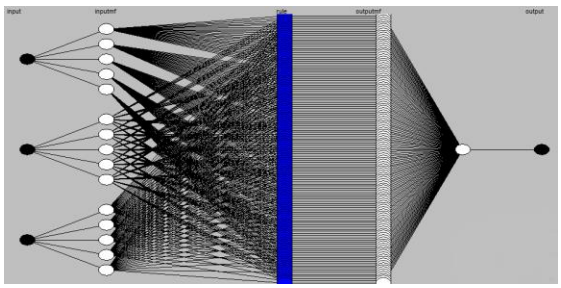

Figure 4: Structure of ANFIS D8 risk

Mentioned networks would have 300 away teaching offer best learning conditions for systems the development and maintenance of information. As it can be seen that average error was of the calculated by MSE method education equal to 0.01, equal 0.03 for the Czech and for test is equal to 0.07.In Figure 5 is shown membership functions the sub system after education.

Table 1: Indicators, sub- criteria of venture of Tourism

Sub-indicators	Assessment indicators
C11 The bombing C12 plane hijacking C13 kidnappings C14 assassination	D1- terrorism risk
C21 inadequate understanding of the destination C22 low diversity of tourism attractions	D2- social risk
C31 widespread bribery C32 price difference High places of C33 creating unforeseen costs similar C34 input complications country C35 high financial volatility C36 black market of exchange C37 The high cost	D3- financial risk
C41 lack of hosted C42 corporate and non-professional a tourist guides C43 weakness communication systems C44 difficulty in accessing the destination C45 lack or weakness of banking services C46 excessive bureaucracy at the administrative system C47 difficulty availability to shopping centers C48 inconsistent government policies. C49 weakness in airport services C410 un trusted mail service C411 obtaining a visa difficulties	D4- risk structure and operational
C51 inappropriate image transmission by Native C52 tourists experiences C53 negative publicity by foreign media C54 perception of foreign tourists C55 weak global communication C56 war threats	D5- psychological risk
C61 of strikes in urban transportation systems C62 lack of sensitivity of of urban transport	D6- Time Risk
C71 Absence or weakness in the quality and safety of food C72 vermin and biting C73 Weak cleanliness C74 water pollution	D7-Healthy Risk
C81 lack dominance tourists to one of the world's languages C82 absence or weakness of the verbal symptoms C83 distrust of inhabitants behavior C84 cultural problems at trading behaviors C85 negative perception than terrorists C86 imagination of ideological C87 inappropriate lifestyle C88 coverage	D8-Cultural Risk
C91 inappropriateness of Safety Places C92 Lack safety lines C93 nosocomial and therapeutic facilities C94 improper driving manner C95 Access to police C96 theft	D9-Safety Risk
C101 weakness of laws protecting tourists C102 ambiguity in the law enforcement	D10-Legal Risk
C111's causing crisis by the authorities C112 literal conflicts with other countries C113 Urban riots 4-2 C114 universal negative popular perception C115 Sanctions and Boycott C116 political instability C117 strikes C118 Revolution C119 Coup C1110 war	D11- Political Risk

Table 5: Composition of various modes of input variables and risk of Tourism

	D3(Financial Risk)				D4(Structure & Operational Risk)			D8(Cultural Risk)			D10(Political & legal Risk)			
Tourism Risk Pre.	C37	C35	C34	C33	C45	C44	C43	C87	C83	C81	C107	C103	C102	C101
50.503%	L	M	M	L	M	M	L	L	M	M	M	L	M	L

Table 6: Results from improvement of the state of one variable High to Very High

C107	C103	C102	C101	C87	C83	C81	C45	C44	C43	C37	C35	C34	C33	VARIABLES
63.2	61.4	61.6	62.4	61.3	61.1	62.2	60.6	61.32	62.2	62.4	62.1	62.2	61.8	RISK
3.22	1.42	1.62	2.42	1.32	1.12	1.22	0.62	1.34	2.22	2.42	2.12	2.22	1.82	GAP

Just as can be seen in this figure, the membership functions in Figure 5 as a bell, and were similar after teaching from identical has to be out. For example Medium function membership values was determined in initially (0.5 2 3) after the 225 rpm teaching with release of after way was changed to values (0.7327 1.962 3.083).

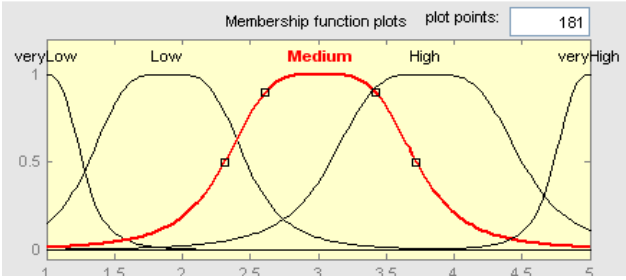

Figure 5: Membership functions of variables (C82) after training

4-5 Fifth Step: Confirmation model validation

Validation is a process that ensures accuracy of model desired for goals the purpose of It is ensure that the model is accurate enough to or not. In fact a valid model is model that is accurate enough to for the intended purpose. Method's validation of ANFIS like other supervisory techniques, using the test data . In this model the test is done by method of a hybrid least-squares and the gradient of reductions after the release of test. Due to implementation errors are calculated for Czech is equal to 0.065809 and equal 0.078 for test. Czech and test data in Figure 6 show that given that the error values are less than 0.1 can be known a valid model.

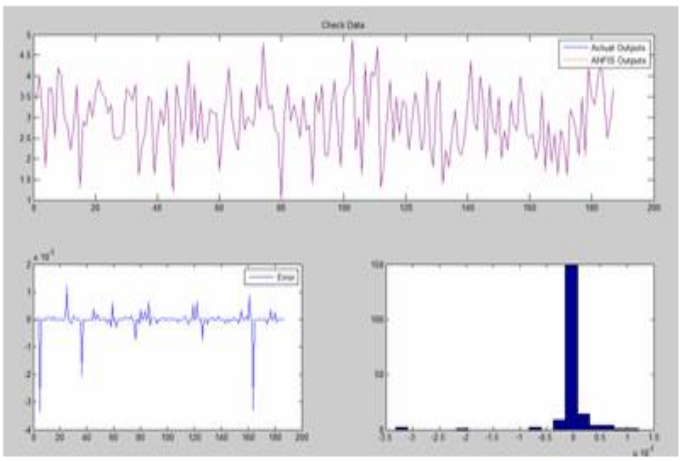

Figure 6: Training & test data and Error Figure

4-6 Sixth Step: Developing of adaptive neural network model based on multi-stage fuzzy inference system (Multi-step ANFIS)

For the Tourism risk assessment intelligent is developed model named multi-step ANFIS using simulink in the MATLAB software environment. Just as can be seen in Figure 7, 4 outputs tourism risk, financial risk C3, structure and function risk C4 and, cultural risks C8, legal and political risks C10 as the input has inter to system, the input data has been processed by the ANFIS model and output that is represents risk-tourism as percentage of will be sign out. After network training, Tehran is evaluated as a case study and the rate of tourism risk with human origin in Tehran metropolis is equal to 0.50503 (with regarding to membership functions definitions , the tourism risk of Tehran is equal to average). The following table (Table 4) shows the input variables and risk of Tehran's tourism.

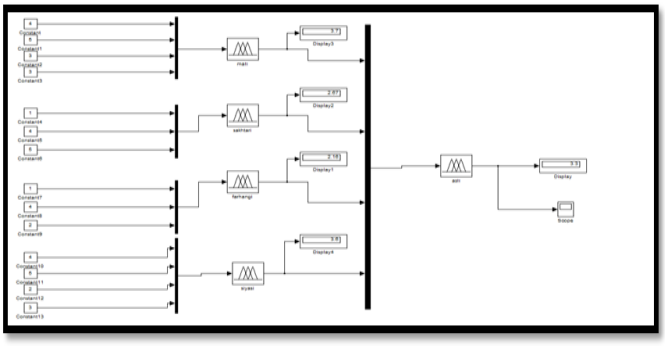

Figure 7: Multi-step ANFIS

5. Conclusion

Just as was observed, by determining the rate of each variable influence, a predictable result of impact and importance rate of each variable is reached, but what in this project expresses the difference of current risk rate in each metropolis, is the degree of seriousness of each variable. Weights and effects of each risk variables are different in different cities and countries. By changing the weights and their effects in different locations, the model can be implemented simply in each city or country. After the necessary computation to DEMATEL method has been determined of 11 indicators only four of risk tourism effective and other factors are impressionable. Therefore, can be by using 4 mentioned indices action to design of multi-stage model for determine risk the tourism. Due to the nonlinear relationship between the variables affecting each sub-system and presence different rhythms for each variable can be concluded that change in each variable, affects has a different effect on risk of the system. For example, if all the evaluate variables in the fuzzy-network in M verbal situation be the tourism risk is estimated equal 59.98%, now if only state of one variable improve and reach H the situation verbal, Different results are obtained from the system are shown in the table below.

Just as can be seen, just by improving monitoring variables (C107) from state of Medium to High tourism risk can be grow up to 63.3 .if all variables be Very High in a state of verbal, tourism risk will be equal 98.89%, and there is still the influence way risk of Tourism.

Reference

1. Alfonso Palmer, Juan José Montaño and Albert Sesé. (2006). Designing an artificial neural network for forecasting tourism time series. *Tourism Management*, Volume 27, Issue 5, October 2006, Pages 781-790

2. Asgharpour. M.J. (2003).Group decision making and games theory with a operations research approach Book-*Tehran University Publications*, Tehran, Iran.

3. Buyukozkan S. Vinodh, Gopinath Rathod. (2010). Green QFD-II: A life cycle approach for environmentally conscious manufacturing by integrating LCA and LCC into QFD matrices. *International Journal of Production Research*. 2000. Journal of Cleaner Production, Volume 18, Issue 8, May 2010, Pages 833-842

4. Chao-Hung Wang.(2004). Predicting tourism demand using fuzzy time series and hybrid grey theory. *Tourism Management*, Volume 25, Issue 3, June 2004, Pages 367-374

5. Chi-Yo Huang. (2008). Multiple generation product life cycle predictions using a novel two-stage fuzzy piecewise regression analysis method. *Technological Forecasting and Social Change*, Volume 75, Issue 1, January 2008, Pages 12-31

6. Chung-Wei Li, Gwo-Hshiung Tzeng .(2009).Identification of a threshold value for the DEMATEL method using the

maximum mean de-entropy algorithm to find critical services provided by a semiconductor intellectual property mall ,*Expert Systems with Applications*, Volume 36, Issue 6, August 2009, Pages 9891-9898

7. Chi-Jen Lin, Wei-Wen Wu .(2008). A causal analytical method for group decision-making under fuzzy environment .*Expert Systems with Applications*, Volume 34, Issue 1, January 2008, Pages 205-213

8. D. Dubois, H. Prade. (2009). Theory and Applications of Fuzzy Sets Systems, Academic Press, New York. *Information Sciences*, Volume 36, Issues 1–2, July–August 1985, Pages 85-121

9. Hadavandi Esmaeil, Arash Ghanbari, Kamran Shahanaghi and Salman Abbasian-Naghneh. (2010). Tourist arrival forecasting by evolutionary fuzzy systems, *Tourism Management*, Volume 32, Issue 5, October 2011, Pages 1196-1203

10. E.Fontela, A.Gabus, The DEMATEL observer, DEMATEL 1976 Report Switzerland Geneva: Battelle Geneva Center

11. Fulvio Ardente, Marco Beccali, Maurizio Cellura. (2004).fuzzy software for the energy and environmental balances of products. *Ecological Modelling*, Volume 176, Issues 3–4, 1 September 2004, Pages 359-379

12. H.Gh. Zadeh.(2007) Soft formula with Fuzzy logic & Neural network,208(148).

13. J.G. Yu.(2007) General fuzzy piecewise regression analysis with automatic change-point detection, *Fuzzy Sets Syst*. Physics Letters B, Volume 606, Issues 1–2, 20 January 2005, Pages 25-33

14. M.I. Mazhar, S. Kara, H. Kaebernick.(2007). Remaining life estimation of used components in consumer products: Life cycle data analysis by Weibull and artificial neural networks. *Journal of Operations Management*, Volume 25, Issue 6, November 2007, Pages 1184-1193

15. Mazhar, M.et al. (2004). Reuse Potential of Used Parts in Consumer Products: Assessment with Weibull Analysis. Proceedings of the 11thClR P International Seminar on Life Cycle Engineering. Belgrade..

16. Mohammad Ali Afshar-Kazemi, Abbas Toloie-Eshlaghy, Mohammad Raze Motadel, Hamed Saremi . (2011). Product lifecycle prediction using Adaptive Network-Based Fuzzy Inference System, *International Conference on Innovation*, Management and Service, IPEDR vol.14(2011) © (2011) IACSIT Press, Singapore

17. Nikola K. Kasabov.(2000). Learning fuzzy rules and approximate reasoning in fuzzy neural networks and hybrid systems.2009. of the 7th ClRP International Seminar on Life Cycle Engineering. *Neurocomputing*, Volume 41, Issues 1–4, October 2001, Pages 25-45

18. P.T. Chang.(1994). Ranking of fuzzy sets based on the concept of existence, Fuzzy Sets Syst. *Computers & Mathematics with Applications*, Volume 27, Issues 9–10, May 1994, Pages 1-21

19. R.C. Tsaur.(2009). Hybrid forecasting model for product life cycle. *Indust. Eng*.19 (5).

20. Raymond R. et al.(2008). A fuzzy linear programming extension of the general matrix-based life cycle model. *Reliability Engineering and System Safety*, 91(8), 872-881.

21. Rose. C. Applying Environmental Value Chain Analysis to Product Take-back and Technical Service. Proceedings

22. S. Kara.(2007) Determining the Reuse Potential of Components Based on Life Cycle Data. .

23. Seyed Kalali, N., Akhavan Anvari, M. R., Pourezzat, A. A., Karimi Dastjerdi, D. (2011). Why does strategic plans implementation fail? A study in the health service sector of Iran. *African Journal of Business Management*. 5(15), 9831-9837.

24. Sheng-Lin et al.(2006). Applying fuzzy linguistic quantifier to select supply chain partners at different phases of product life cycle. *International Journal of Production Economics*, Volume 100, Issue 2, April 2006, Pages 348-359

25. Shih-Y.et al.(2012) Assessment of supplier performance based on product development strategy by applying multi granularity linguistic term sets. *Expert Systems with Applications*, Volume 39, Issue 3, 15 February 2012, Pages 2662-2668

26. Tuğba Efendigil, Semih Önüt, Cengiz Kahraman . (2009). A decision support system for demand forecasting with artificial neural networks and neuro-fuzzy models: A comparative analysis. *Expert Systems with Applications*, Volume 36, Issue 3, Part 2, April 2009, Pages 6697-6707

27. Tsai-Chi Kuo et al.(2009). Integration of environmental considerations in quality function deployment by using fuzzy logic. 2008. *Expert Systems with Applications*, Volume 36, Issue 3, Part 2, April 2009, Pages 7148-7156

28. Tzeng, G., & Huang, J. (2011). Multiple attribute decision making: methods and applications. Boca Raton, FL: CRC Press.

29. Wu, W. W. (2008). Choosing knowledge management strategies by using a combined ANP and DEMATEL approach. Expert Systems with Applications, 35(3), 828-835.

30. Zamani-Farahani, H. & Henderson, J.C. (2011). Iran: Shia pilgrimage and tourism. In World Tourism Organisation (Ed.), *Religious tourism in Asia and the Pacific* (pp.163–174). Madrid: United Nations World Tourism Organisation

31. Zhang, G.P.(2005). Neural network forecasting for seasonal and trend time series. *European Journal of Operational Research*, Volume 160, Issue 2, 16 January 2005, Pages 501-514

32. Zoheidi.R (2003) Industrial application of fuzzy logic & neuro- fuzzy, *institute in Iran*. 2003.288(123).