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Location Based Recommendation System for The Tourists in India

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***Abstract*— In the domain of tourism sector, this study examines the collaborative filtering in recommender system by categorizing users according to their choice of place, food, local item purchase etc. The proposed system will store the opinions of the local users about the sites, foods and products for purchase available in those sites. It uses collaborative filtering technique to find the similar users to a given querying user. The system recommends the best sites along with good foods and products available on those sites according to the recent data. Eighty (Male=50, Female=30) married individuals from Bhubaneswar, Odisha (India) participated in this survey. The results revealed that collaborative filtering is the more reliable technique for personalized recommender systems and fuzzy logic. Experimental results show performance of the proposed system in terms of precision, recall and f-measure values**

Keywords*— Collaborative filtering, Recommender systems, User profile generation, Fuzzy logic.

I. INTRODUCTION (BUILD FUZZY SYSTEMS USING FUZZY LOGIC DESIGNER)

Fuzzy Logic Designer to handle the high-level issues for the system — How many input and output variables? What are their names? Fuzzy Logic Toolbox software does not limit the number of inputs [10]. However, the number of inputs may be limited by the available memory of your machine. If the number of inputs is too large, or the number of membership functions is too big, then it may also be difficult to analyze the FIS using the other tools [4]. Membership Function Editor to define the shapes of all the membership functions associated with each variable [28]. Rule Editor to edit the list of rules that defines the behavior of the system. Rule Viewer to view the fuzzy inference diagram. Use this viewer as a diagnostic to see, for example, which rules are active, or how individual membership function shapes influence the results [2]. Surface Viewer to view the dependency of one of the outputs on any one or two of the inputs; that is, it generates and plots an output surface map for the system[29]. These UIs are dynamically linked, in that changes you make to the FIS using one of them, affect what you see on any of the other open UIs. For example, if you change the names of the membership functions in the Membership Function Editor, the changes are reflected in the rules shown in the Rule Editor [7]. We can use the UIs to read and write variables both to the MATLAB® workspace and to a file (the read-only viewers can still exchange plots with the workspace and save them to a file) [13].You can have any or all of them open for any given system or have multiple editors open for any number of fuzzy systems [22]. In addition to these five primary UIs, the toolbox includes the graphical Neuro-Fuzzy Designer**,** which you use to build and analyze Sugeno-type adaptive neuro-fuzzy inference systems. The Fuzzy Logic Toolbox UIs do not support building a FIS using data[19] .If you want to use data to build a FIS, use one of the following techniques: The genfis to generate a Sugeno-type FIS [1]. Then, select File > Import in the Fuzzy Logic Designer to import the FIS and perform fuzzy inference, as described in The Fuzzy Logic Designer[23]. Neuro-adaptive learning techniques to model the FIS, as described in Neuro-Adaptive Learning and ANFIS.

If you want to use MATLAB workspace variables, use the command-line interface instead of the Fuzzy Logic Designer. For an example, see Build Fuzzy Systems at the Command Line.

The Basic Tipping Problem

This example creates a Mamdani fuzzy inference system using on a two-input, one-output tipping problem based on tipping practices in the U.S. While the example creates a Mamdani FIS, the methods used apply to creating Sugeno systems as well. Given a number between 0.1 and 1 that represents the quality of service at a restaurant (where 1 is excellent), and another number between 0 and10.

The starting point is to write down the three golden rules of tipping:

If the service is poor or the food is rancid, then tip is cheap.
If the service is good, then tip is average.
If the service is excellent or the food is delicious, then tip is generous.

Assume that an average tip is 15%,a generous tip is 25%,and a cheap tip is 5%.The numbers and the shape of the curve are subject to local traditions, cultural bias, and so on, but the three rules are generally universal[9]. Now that you know the rules and have an idea of what the output should look like.

II. PROPOSED MODEL

A. When Not to Use Fuzzy Logic

Fuzzy logic is not a cure-all when should you not use fuzzy logic? The safest statement is the first one made in this introduction: fuzzy logic is a convenient way to map an input space to an output space [3].If you find it's not convenient, try something else if a simpler solution already exists, use it.[15]

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Fuzzy logic is the codification of common sense; use common sense when you implement it and you will probably make the right decision[17]. Many controllers, for example, do a fine job without using fuzzy logic [30].

B. Proposed model

The proposed model starts with the questioner estimation from which a database is developed to find out the alike users to a given input query user. It uses the judgments of the local people about the different sites present in that place who are already visited those places. It measures their judgments about a site in terms of a rating value which is also defined through definite variable like horde management, security and purity of the locality. The type of the locality the tourist wants to visit may be spiritual or historical, or adventurous or place of fun. The local users also furnish knowledge about the special localized food items and products accessible in that site through the rating values. The local user rates the food items according to the standard like sanitary, taste and price. The consequences are rated by the local users through the criteria like standard and price. The entire exploratory design elaborate in the whole system can be constitute as shown in Figure1.

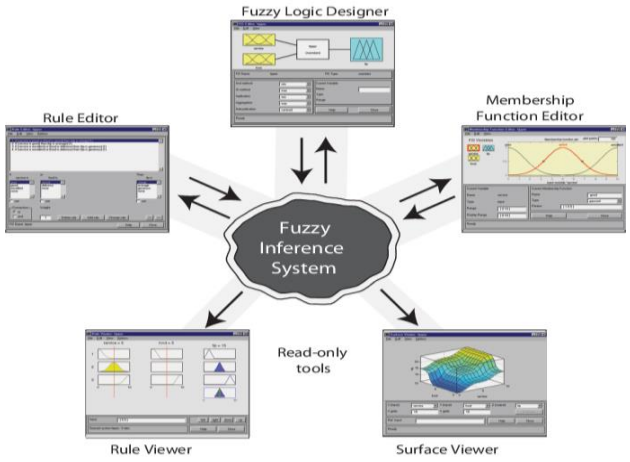

Figure-1: Basics model of FIS

The users who are having fuzzy inference system value as 1 are contemplate as the similar users because their place, food and product parameters are complement with the querying user. If a tourist for example wants to visit the place Bhubaneswar and his preference for place type is spiritual, food type is vegetarian and product type is ladies product then the users can be identified using fuzzy rule-based as shown in Figure 4.

The proposed system is not interested to compute the exact rating value a user would have given to a target item. It uses a simple fuzzy rule-based classifier which uses two class labels like and dislike and classifies the rating values of site.

The classification rule for site is defined as follows:-
IF rating>=0.1and rating<0.3 THEN class is not preferable.
IF rating>=0.25and rating<=0.55 THEN class is preferable.
IF rating>=0.5and rating<0.73 THEN class is most preferable.
IF rating>=0.7and rating<=1 THEN class is highly preferable.

The classification rule for food is defined as follows:-
IF rating>=0.1 and rating<0.4 THEN class is Average.
IF rating>=0.2and rating<=0.7 THEN class is Good.
IF rating>=0.5and rating<=1 THEN class is Very good.
The classification rule for age is defined as follows:-
IF rating>=0.1 and rating<0.4 THEN class is Young.
IF rating>=0.2 and rating<=0.6 THEN class is Middle.
IF rating>=0.4and rating<0.8 THEN class is Old.
IF rating>=0.6and rating<=1 THEN class is Very old.

The item selection method considers those local users for the recommendation whose ratings to the site, food and product are having value “like”. To produce the most recent recommendations the system uses time function to calculate the time value for each similar users which are selected in item selection method. Ninety (Male=50, Female=40) married individuals from Bhubaneswar, Odisha (India) participated in this survey. Prior to their participation, the subjects were informed about the opportunity to cooperate in a study related to fuzzy rule-based process of selecting a good place for visit. The questionnaires consisting of three input variables such as age, rating site, food rating and output variable as fun, adventurous, spiritual, historical as per the individual choice of the participants were prepared. The participants were asked to give opinion while making their choice. Participants were asked to choose the option which they prefer by putting tick mark in front of their choice. After collecting the questionnaires. We evaluated the participant’s choices to each problem for the graph age, rating site, food rating on the basis of the ranges and values provided. Each graph was measured on‘0’representing the lowest value of the graph and‘1’indicating the highest value of the dimension.

III. RESULT AND DISCUSSION DATA DESCRIPTION

Eighty (Male=50, Female=30) individuals from Bhubaneswar, Odisha (India) participated in the study. They were given the questionnaire during the class hour to complete and return the questionnaire to the researcher. The participants took about 40 min to complete the questionnaire. More number of male individuals participated in the study compared to the female individuals. Most of the male individuals were the natives from urban areas and the female individuals from semi-urban areas.

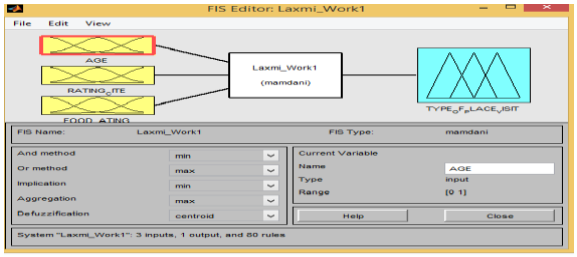

Figure-2 Primary setting of AGE, RATING and FOOD

Very few male as well as female individuals were from rural areas. The female students were little older than their male counterparts and had studied more years in formal educational institutions than male individuals. Both male and female individuals were predominantly from nuclear family having minimum 1 to maximum 5 members and few were from joint/extended families.

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Figure 2 Input variables “age” “rating site” ”Food rating” 1Output variables “type of place visit”

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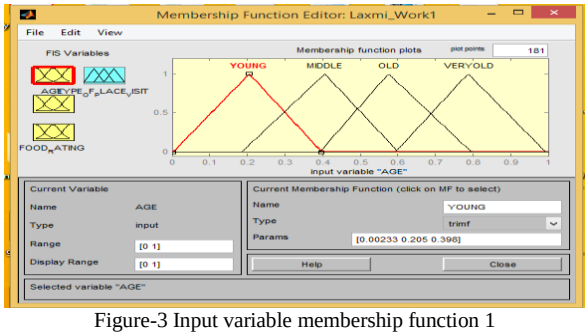

Figure-3 Input variable membership function 1

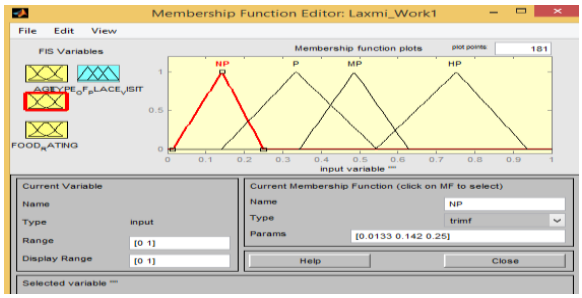

Figure-4 Input variable membership function 2

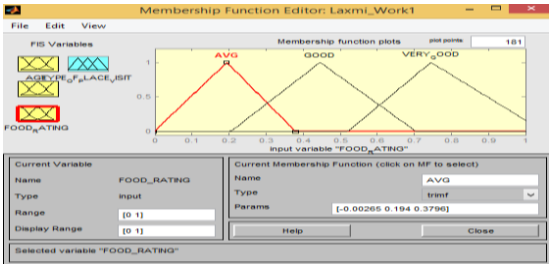

Figure-5 Input variable membership function 3

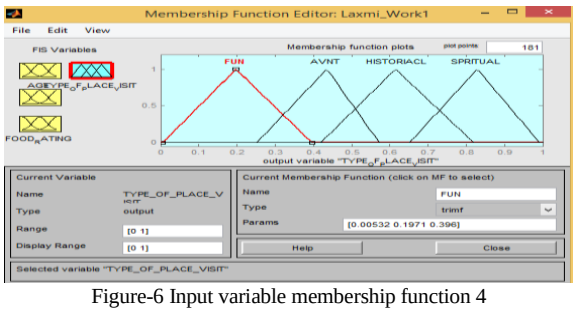

Figure-6 Input variable membership function 4

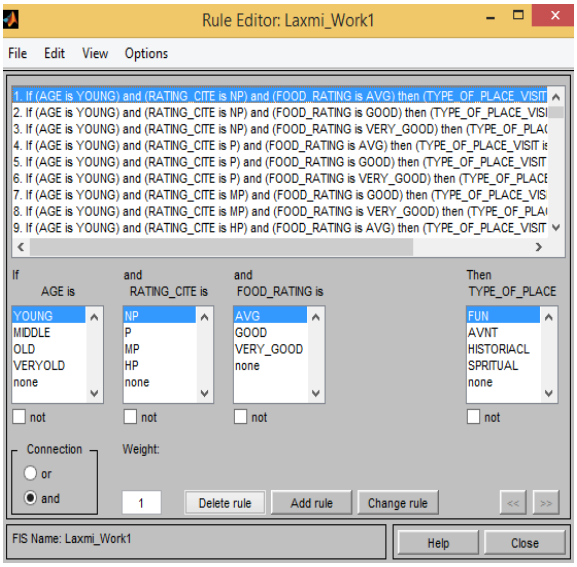

Figure-7 AI the rules designed in rules Rule Editor

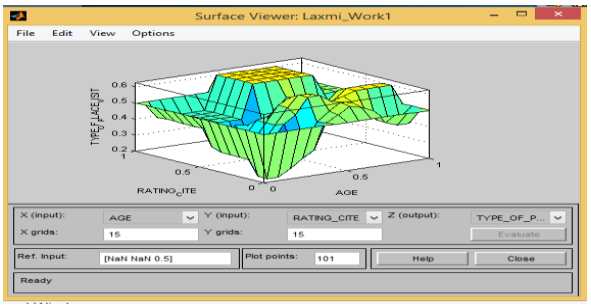

Figure-8 Surface value after rules fort**(i)**

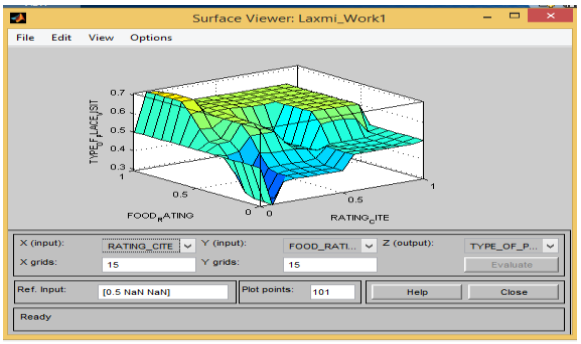

Figure-9 Surface value after rules fort**(ii)**

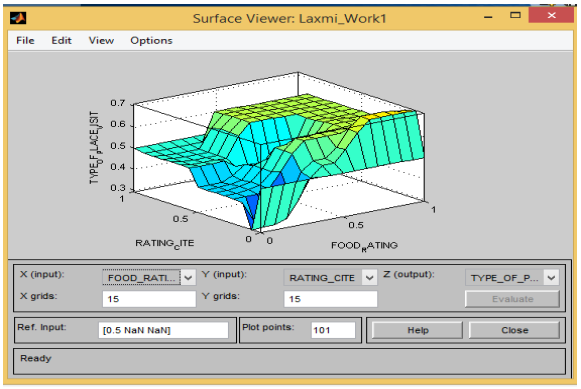

Figure-10 Surface value after rules fort**(iii)**

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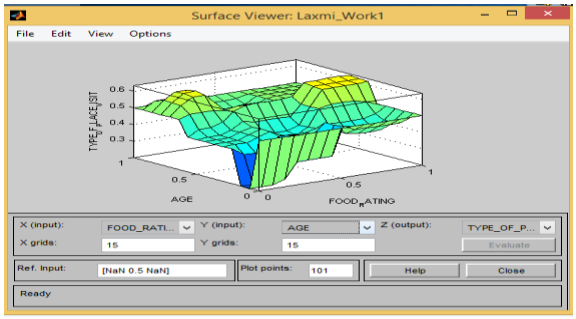

Figure-11 Surface value after rules fort**(iv)**

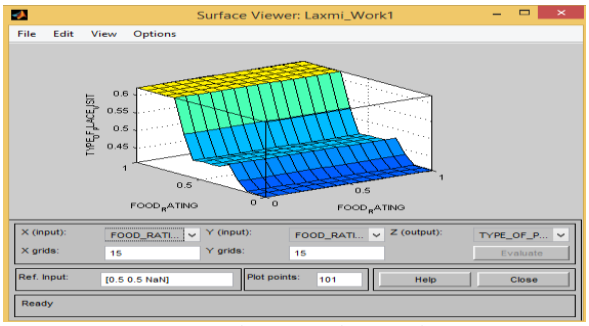

Figure-12 Surface value after rules fort**(v)**

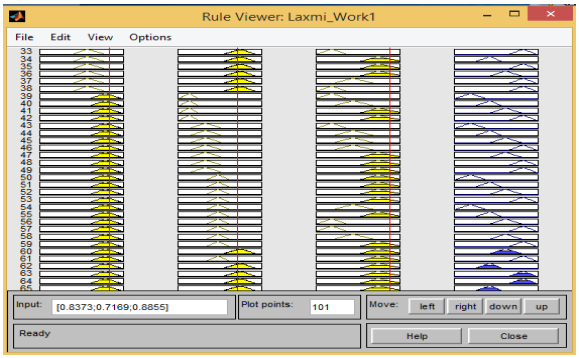

Figure-13 Rules fire mamdani approach**(i)**

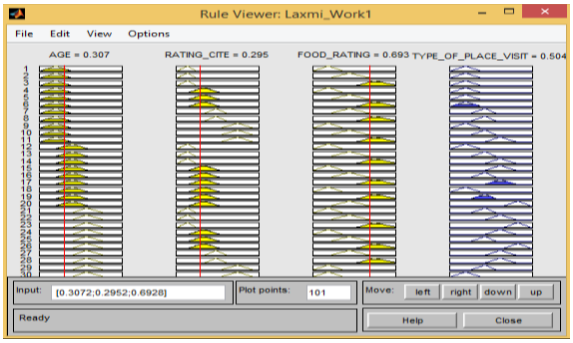

Figure-14 Rules fire mamdani approach**(ii)**

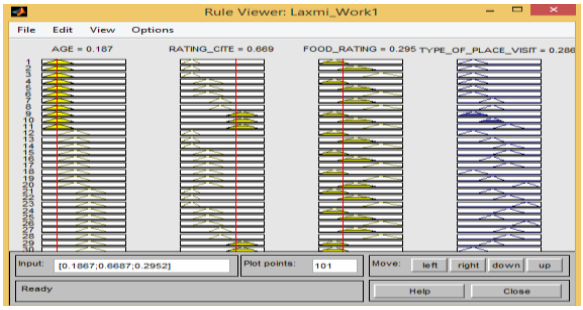

Figure-15 Rules fire mamdani approach**(iii)**

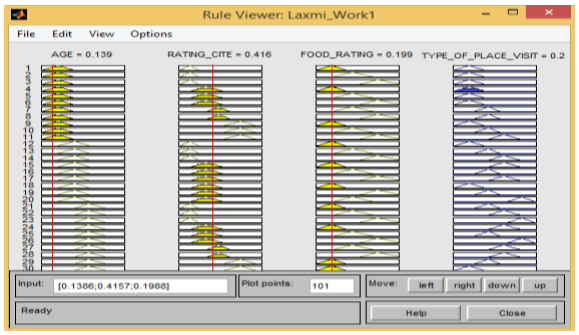

Figure-16 Rules fire mamdani approach**(iv)**

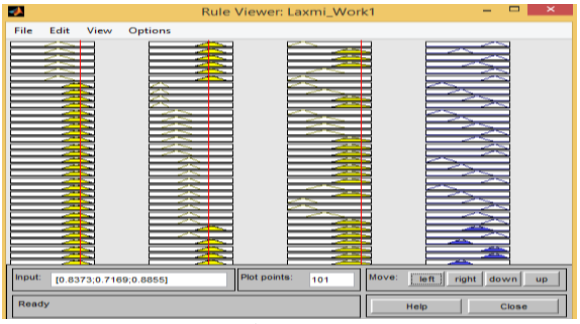

Figure-17 Rules fire mamdani approach**(v)**

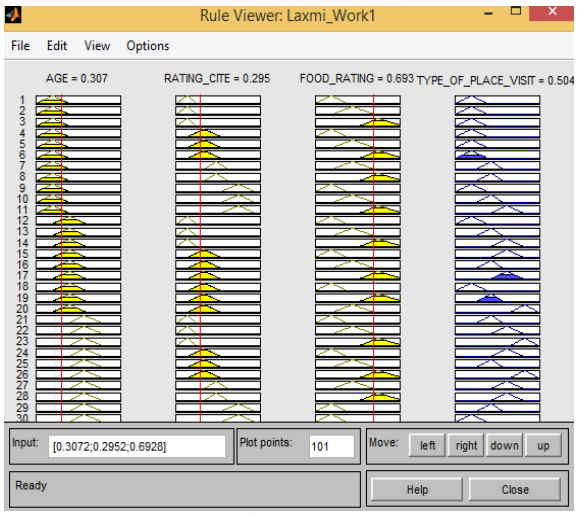

Figure-18 Rules fire mamdani approach**(vi)**

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IV CONCLUSION & FUTURE WORK

Recommender system has been widely used from the last few years. Recommender systems in tourism sectors recommend places to the tourist for their journey. A technique to enrich typical personalized location recommendation system has been presented through this paper and the proposed technique can be applied in the tourism sector to provide the best possible recent recommendations to the tourists to make their journey successful complete. This system will store the opinions of the local users (men's and women's) about the sites and the foods and products for purchase available in those sites. It uses fuzzy inference system to find the similar users to a given querying user. The system recommends the best sites along with good foods and products available there according to the recent data of the system. This system may helpful for tourists who wish to explore the best sites and available the good foods and products available in those sites. The proposed system outperforms the traditional recommender systems in terms of precision. The proposed approach will only recommend the sites available in Bhubaneswar. In the future work, we can apply the same technique to tourists of all the states of India for accuracy of our proposed system. The proposed system does not consider how the tourist will cover a set of sites available in a place In future we will try to recommend itinerary plans to the tourist who will recommend the order of visiting the sites along with food and product recommendation by considering the shortest distance. We will also try to develop a location based group recommender system on the basis of Point of Interest (POI) of the tourists for the recommendations.

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