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A Method for TV Channel Package Generation using Artificial Intelligence

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Abstract: Cable TV forms the backbone of the broadcasting distribution industry in India. Because of large number of TV Channels and due to problems of then analogue system, Govt. of India introduced the concept of Digitization and later on, Telecom Regulatory Authority of India(TRAI) advocated the Pay Per Channel concept in the favour of Consumers and made it compulsory for D2H service provider for implementation. But later to the implementation of the concept, it became an extremely cumbersome process for consumers to select TV Channels and packages that suit their own or family needs and again fit into their budget at the same time. This Paper introduces a new methodology for generating TV Channels/packages using Genetic Algorithm and Fuzzy Logic (Popular Branches of Artificial Intelligence).
Keywords: TV Channels, TV Packages, DTH, Telecom Regulatory Authority of India(TRAI), Fuzzy Logic, Membership functions, Genetic Algorithm , Artificial Intelligence

I. INTRODUCTION

Cable TV forms the backbone of the broadcasting distribution industry in India. The cable industry has played a prominent role in the growth of the electronic media sector in the past 20 years. Over the last few years the number of channels being offered on cable television has been increased exponentially.

Due to Analogue Cable limitations of carrying channels, the ordinance passed by the Govt. of India on 25th October, 2011, makes the digitization mandatory of the distribution of TV signals by cable operators. TRAI had recommended implementing the complete digitization of the cable TV network, or complete switchover from analogue to digital form in four different phases by covering metro cities and even different rural areas. After introducing set Top Box for watching TVs and Packages offered by different Direct to Home Service providers, and TRAI envisioned transparent regime, the consumers were charged only for the channels they want to watch and weren't forced to select to those they didn't as part of package deals, lowering bills. The regulator gave viewers, the time till 01 February,2019 to submit their choices. The deadline was further extended to March 31, 2019 with distribution platforms told to move consumers to a "best-fit pack" (BFP) that approximated the existing package. Moreover, it was anticipated that the choice driven subscription model would encourage service providers to improve the quality of programming. But in some cases, the Best Fit Pack plans turned out to be out of budget for middle class segment whose budget ranged between Rs. 300/- to Rs. 350/- per month. Though some consumers only preferred one or two HD channels, they still had to pay a whole package amount of HD Package.

II. THE GENETIC ALGORITHM

Genetic algorithm(GA) is inspired by Charles Darwin's theory of natural evolution. This algorithm emphasizes on the process of natural selection where the fittest individuals get selected and can live for reproduction in order to produce offspring for next generation. The offspring which inherits the characteristics of the parents passes it on further for getting added to the next generation. If parents have better fitness, their children will be better than parents and have a better chance to survive. This process go on and on and at the end, a generation with the fittest individuals will come into existence.

III. THE FUZZY LOGIC

Fuzzy logic is a problem solving methodology that focuses on the way humans represent and reason with the real-world knowledge in the case of uncertainty. Uncertainty emerges due to generality, vagueness, ambiguity, chance, or incomplete knowledge. Fuzzy logic provides a simple way to draw definite conclusions from vague, ambiguous or imprecise data or information. Fuzzy logic's approach to control problems replicates how a person would make decisions, but at a faster pace. It resembles human decision making with its ability to work from approximate data and find definite solutions. When traditional logic deals with deep understanding of a system, exact equations and accurate numeric values, fuzzy logic deals with an alternative way of thinking,

which allows building complex systems using a higher level of abstraction originating from our knowledge and experience. The traditional logic does not allow for degrees of imprecision, indicated by words of phrases such as normal, moderate and severe. Instead of "truth" values such as true and false or 0 and 1, it is possible to introduce a multi-valued logic consisting of Cold, Hot, Very Hot, Very Cold etc. Fuzzy systems implement fuzzy logic, which uses sets and predicates of this types.

IV.   PROBLEMS IN CURRENT METHODOLOGY OF TV CHANNEL SELECTION

In current methodology of TV Channel selection, consumers have full right to choose the TV Channels of their wish, but after the introduction of "Pay Per Channel" concept by TRAI, following problems seem to have been surfacing among the consumers:

1) *Family Size:* In India, the family size may varies from joint families to nuclear families or even individual stays.
2) *Diversified Liking:* Even though in families, , the liking of each family member is like to greatly different from other.
3) *Poor Customer Care:* In India, handling large number of consumers by the DTH Customer Care Representative has been a problem quite a lot. Consumers have reported to have faced a lot of problems while wanting to migrate to plans and packages.
4) *Technology Adaption:* Still in India, Large amount of people are unable to adapt with the latest technologies and hence TV channel selection becomes cumbersome process for them.
5) Even those who are totally unaware about the Indian Televisions, find lot of difficulties for selecting package or channels.

V.   RESEARCH METHODOLOGY

To overcome the problem, following demographic and psychometric variables are identified in .

Demographic and Psychometric variables
Popularity of the TV Channel
Picture Quality of TV Channel
Category of the Channel
Family Size
Channel Price Per Month
Demographic Preference

VI.   FUZZY MEMBERSHIP FUNCTIONS

Fuzziness is a type of deterministic uncertainty. The nature of uncertainty is essentially different. Secondly, the subjective uncertainty is peculiar to human's nature on the whole and to his or her capabilities to evaluate the information in particular. Numerical evaluation is difficult in case of parameters with deterministic uncertainty. .[1] It would be appreciated if a consumer gets a chance to choose fuzzy parameters in form of intervals or with the help of rough sets pointing out the degree of belonging of fuzzy parameters to these sets. In this case objectiveness can be associated with fuzzy parameters by defining weights for each such fuzzy parameter. Hence, the application of fuzzy sets and the function of belonging allows formalizing scale of uncertainty and unclearness which might occur in expert evaluation situation by some reasons.[8]Hence for each Demographic and Psychometric variables, we define following fuzzy membership functions:
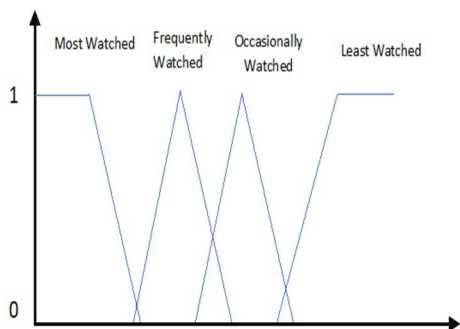

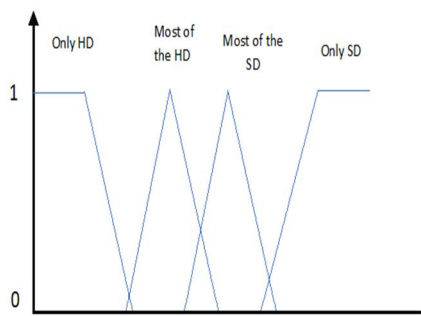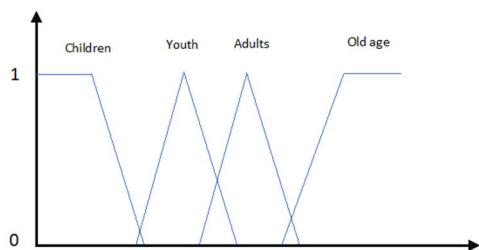Fig. 1 Popularity of the TV Channel   Fig. 2 Picture Quality of TV Channel
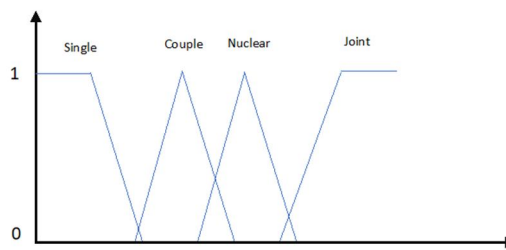
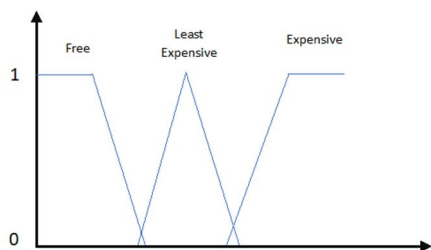Fig. 3 Category of the Channel

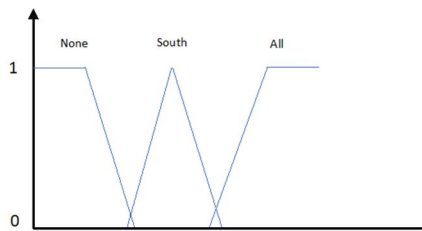Fig. 4 Family Size

Fig. 5 Channel Price Per Month

Fig. 6 Demographic Preference

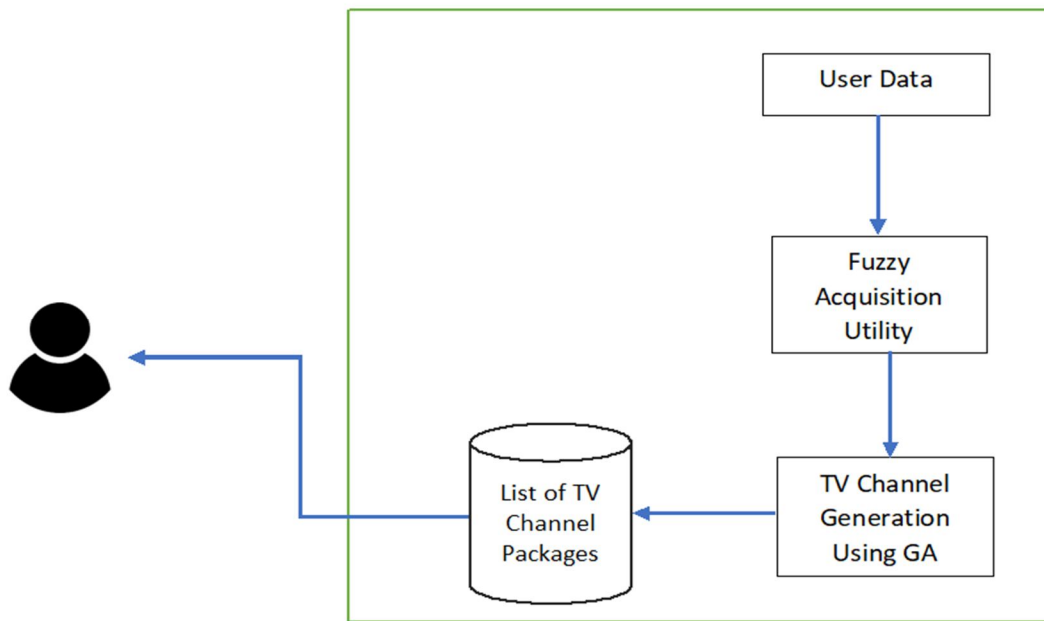## VII.   PROPOSED MODEL FOR TV CHANNEL SELECTION

Fig. 7 System Architecture for selecting TV Channels using AI

For building the model, the initial Population was generated using Genetic Algorithm. Then the population was mapped with Fuzzy Acquisition Utility. Fuzzy Acquisition Utility consisted of the data regarding the demographic variable and psychometric variables of the consumer who want to select the channel or package.

When the TV Channel was generated as per the consumer's demographic or psychometric variables after mutation and crossover process was done. As per the selection actual weight for each variable for each user was obtained. The weighted average method was used to calculate aggregate value for demographic or psychometric variables. The weighted average method was given as follows:

$$\sum_{i=1}^{m} Wexp(i) * W(i) \qquad (1)$$

$$AV = \frac{\sum_{i=1}^{m} Wexp(i) * W(i)}{\sum_{i=1}^{m} Wexp} \qquad (2)$$

Wexp(i) is expected weight for i^{th} demographic or psychometric variable

W(i) is actual weight for i^{th} demographic or psychometric variable

AV is Aggregate value for demographic or psychometric variable

The result will be generated using weighted average method is passed through the fuzzy rule set that defines threshold values for three possible outcomes i.e. Select, Neutral or Reject the Channel. The result is compared against these threshold values and relevant fuzzy rule is executed and final decision package is displayed to the Consumer.

VIII   CONCLUSION

Thus it can be concluded that the research paper tries to address the stated problem that is faced by the many consumers of D2H services after the introduction of Pay Per Channel rule. The proposed model identifies significant demographic and psychographic variables and presents a system architecture which enables consumers to select the best channels and packages according to their needs and choices. It can be considered as more or less a complete method for identifying uncertainty inherent in TV Channel package generation. Genetic Algorithm is the best optimal way to generate the population while Fuzzy logic is the best option to represent higher level of abstraction originating from knowledge and experiences. Thus GA and fuzzy logic based TV Channel generation allows the consumers to introduce vagueness, uncertainty, and subjectivity in the process of TV Channel selection, which models human like decision making approach.

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