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Fuzzy Logic Based Optimized Hiring Process

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Abstract: This paper aims to resolve the difficulty of the employee in the hiring process of candidates. This is done using fuzzy logic-based artificial intelligence. The author aims to have a profound understanding as to how these selection strategies in the recruitment and selection processes based upon multiple parameters enable to be simulated. An effort is made through this paper to evolve an optimal and accurate judgment according to the human thinking model and also to mitigate the commonly occurred biases in human recruitment and selection procedures. These criteria frequently involve subjective and complex characteristics that must be adequately assessed to produce the proper decision about the most suitable profile among the available job applicants. A rule-based fuzzy logic is suggested to help in the selection process of the most optimum candidate.

Indexterms:*Fuzzy logic,membership function, rule-base*

I. INTRODUCTION

Artificial intelligence is the intelligence of machines, so machines can perform the tasks that are commonly associated with human intelligence. AI is being used in a variety of applications like computer search engines, medical diagnosis, virtual gaming, and many other fields. It is in fact even considered superior to human intelligence in some aspects. This is because in a lot of situations it is faster than humans in solving problems.[2]

Hiring policies have to be applied in a meticulous way in order to assign each employee the right job. This process requires extensive knowledge about tasks, personal competencies, characteristics of the organization and its needs. When mathematical models are useful in decision-making processes, there are some advantages such as quick and clear solutions that are easy to understand. On the other hand, difficulties appear because, in a general way, mathematical models quantify magnitudes that can hardly be matched to human resources policies. Moreover, managers do not often understand (and they do not have to) complicated mathematical reasoning. To avoid this, we use models based on fuzzy logic is used. Fuzzy logic also considers the uncertainties in data.The main purposes of the work are to discuss the appointment of best possible candidate through fuzzy logic based upon few major criterion, to construct a model for evaluation of best talent and to choose the best candidate accordingly.[3]

II. FUZZY LOGIC

Fuzzy logic is based on the output corresponding to degrees of truth rather than just ‘True’ or ‘False’. This is used in situations where we cannot determine whether the output from that particular situation is just one value ‘True’ or ‘False’, rather it lies between these two. In fuzzy logic systems, the output lies between 0 and 1, so the output might be an intermediate value which is partially true and partially false.

It is basically formed by four parts:

i.Rule-base: This is the decision making part of the system.

ii.Fuzzification: This converts crisp values into fuzzy sets. Crisp values are the actual inputs that are measured.

iii.Inference Engine: This decides which rules are to be used with which input value. These rules are then combined to form the control actions.

iv.Defuzzification: This converts the fuzzy sets which are obtained from the inference engine into crisp values. That is why the output obtained is not a fuzzy set, rather it is an actual value.

III. RULE-BASED SYSTEM

A rule-based system uses rules as its knowledge base and the system is based on these rules. The rules in an AI system acts as the knowledge base. These rules are coded into the system in the form of if-then-else statements. The main idea of a rule-based system is to capture the knowledge of a human expert in a specialized domain and embody it within a computer system. Hence, knowledge is encoded as rules. When a rule-based software is developed, the rules used in that software creation provide solutions to the problems in place of a human expert. It is basically a set of “if-then” statements that use a set of assertions, and then there are rules that define how to act upon those assertions. These rule-based systems are used to create software that will provide answers to problems in place of a human. Rule-based systems are used in AI programming and systems.[4]

IV. MEMBERSHIP FUNCTION

The input parameters in a fuzzy logic system form the membership functions. The membership function is basically a curve that defines how each point in an input space is referred to a value between 0 and 1.Basically it specifies the degree to which any particular input belongs to a set. The output from a membership function lies between 0 and 1. This is called a membership value. The input space is referred to as the Universe of discourse.

Types of membership function:

i.Triangular

ii.Trapezoidal

iii.Piecewise linear

iv.Gaussian

v.Sigmoid

V. METHODOLOGY

As this is a job hiring program, a designation is to be first chosen for which certain parameters are then determined based on which the fuzzy logic is then created. For the purpose of this project, we choose the job designation as a Junior Design Engineer. So the hiring of applicants is to be done for this post.[5]

To begin with, first, a Google sheet was created for receiving inputs from the applicants. The answers from the Google sheet were converted to an online excel sheet. This excel sheet was then copied to offline excel sheet. This offline excel sheet then provides the input for the fuzzification process. For this, a Simulink was created. The offline excel sheet was taken as input in the Simulink.The fuzzy logic for the selection of best applicant for the job of Junior Design Engineer was then created. Now the rule-base

was created.[6] The parameters were then defined as membership functions. The membership function used here is the Gaussian membership function. They were used here because these functions are very smooth and provide a very smooth output also. The rules then created act upon these membership functions. For the given membership functions 279 rules were created. Before the inputs can be sent to the rule-based system fuzzification was done. Here the fuzzification was done using the Mamdani method. This method was used for its simple 'min-max' operation. Also, the fuzzy operator used here is the Fuzzy Intersection I.e. AND. The intersection of two sets A and B-

$$A \cap B$$

This entire system constituted the fuzzy logic system. The final output was varied between 0-3.

In the Simulink created, a fuzzy logic controller was used to implement the fuzzy logic system. The output obtained from this system was then displayed in the Simulink. Certain rules were finalized regarding the output obtained for the selection of candidates for the job. Hence in this way, the most optimum candidates for the job were finalized.

VI. SIMULATIONS AND EXPERIMENTAL RESULTS

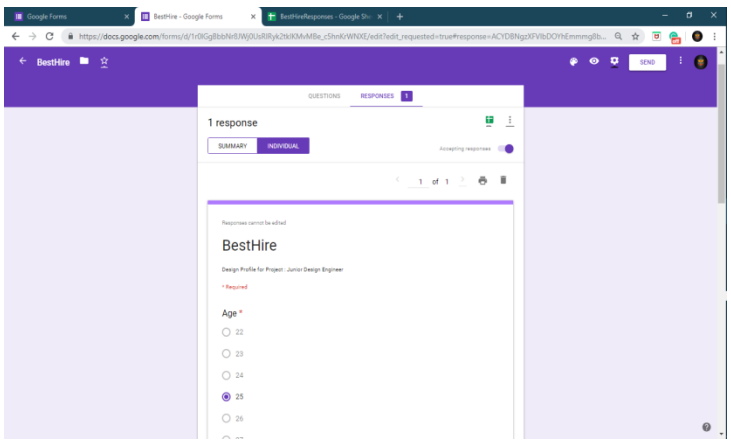

Fig 1: Google Sheet

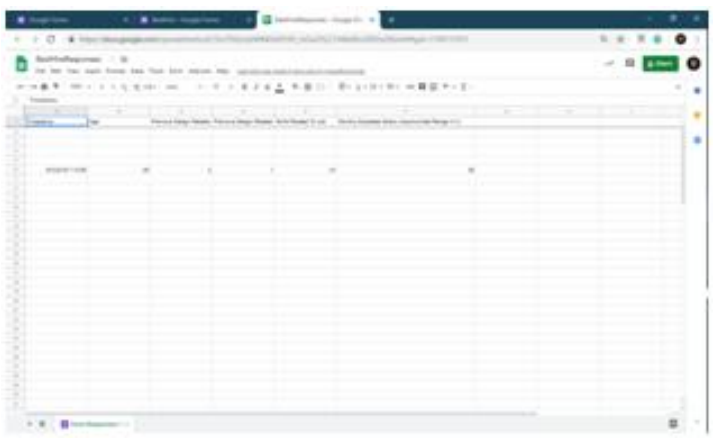

Fig 2: Online Excel Sheet

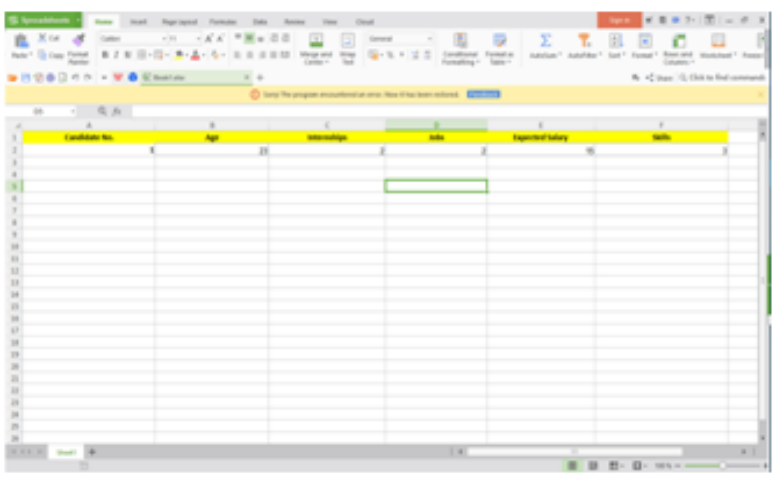

Fig 3: Offline Excel Sheet

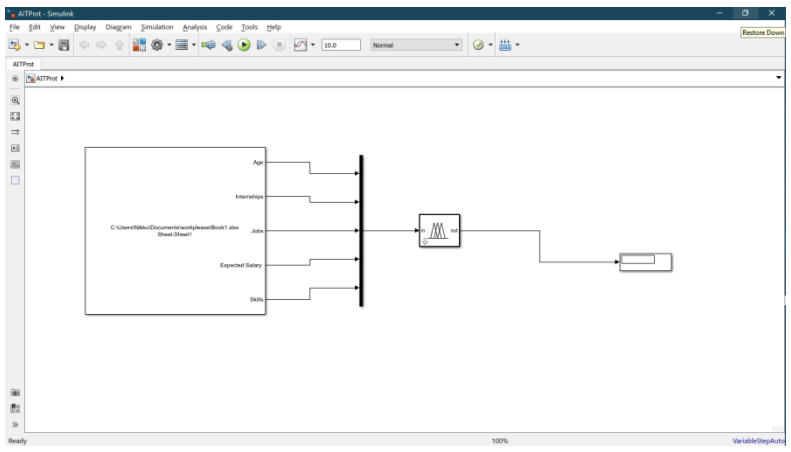

Fig 4: Simulink

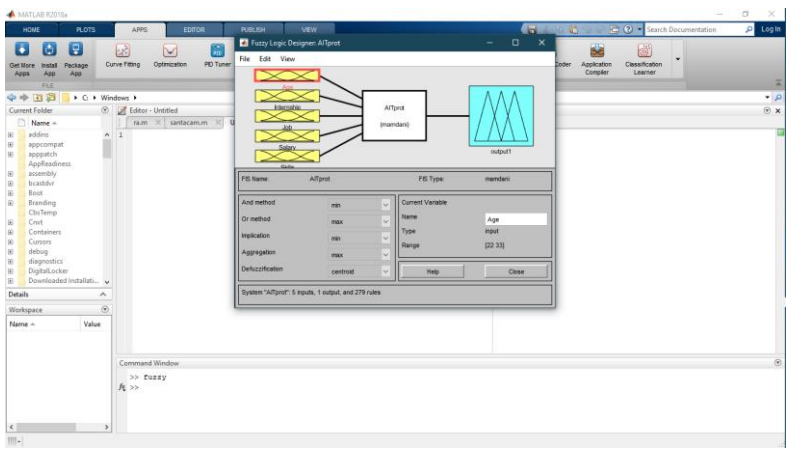

Fig 5: Fuzzy logic control box

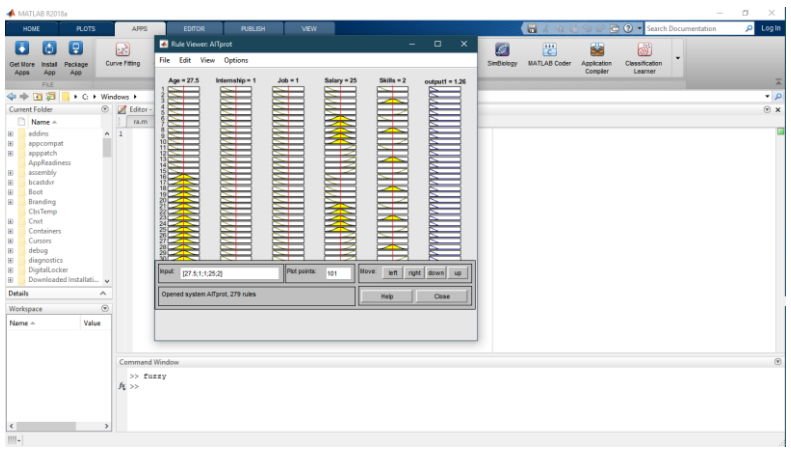

Fig 6: Rule Base

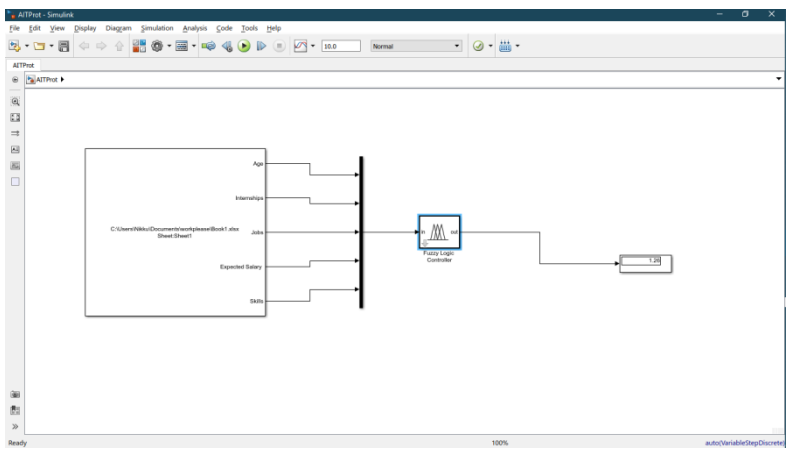

Fig 7: Output

CONCLUSION

Using the inputs given my different candidates, the fuzzy logic based process was implemented and an optimum output was obtained. An accurate output was obtained each time which could chose best candidate out of the available data base. Hence it can be said that this programme can be successfully used for hiring of candidates for specific jobs.

REFERENCES

[1] Mittal, K.C.G., Ashok Kumar; Mohindru, Pankaj, *Fuzzy Multi-Criteria Decision Making (MCDM) in Human Resource Selection Procedure - A case*

study of Indian IT Industry. BVIMR Management Edge, 2013. **6**(1): p. p89-97. 9p.

[2] 2. Bose, B.K., *Fuzzy logic and neural networks in power electronics and drives*. IEEE Industry Applications Magazine 2000. **6**(3): p. 57-63.

[3] 3. ROBERT FULLÉR, L.C.-D., MARÍA-JOSÉ CANÓS-DARÓS, *TRANSPARENT FUZZY LOGIC BASED METHODS FOR SOME HUMAN RESOURCES*

[4] *PROBLEMS.* Revista Electrónica de Comunicaciones y Trabajos de ASEPUMA, 2012. **13**: p. 27-41.

[5] 4. Daniel Cardosode Salles, A.C.N., Lino GuimarãesMarujo, *Using fuzzy logic to implement decision policies in system dynamics models.* Expert Systems with Applications, 2016. **55**: p. 172,183.

[6] 5. Royes, G.F.B., Rogério Cid | Royes, Golber Fernandes, *Applicants' selection applying a fuzzy multicriteria CBR methodology*. Journal of Intelligent & Fuzzy Systems, 2004. **14**(4): p. 167-180.

[7] 6. VeroniqueAdriaenssensa, B.D., Peter L.M.Goethalsa,Niels DePauwa, *Fuzzy rule-based models for decision support in ecosystem management.* Science of The Total Environment, 2004. **319**(1-3): p. 1-12.