ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

A Review on Analytical Hierarchy Process Techniques

Sonika Sharma[1], Mohinder Singh[2]

M-Tech Student, Dept. of CSE, Maharishi Ved Vyas Engineering College, Kurukshetra University, Haryana, India[1]

Associate Professor, Dept. of CSE, Maharishi Ved Vyas Engineering College, Kurukshetra University, Haryana, India[2]

ABSTRACT: The main objective of this paper is to check construct of analytical hierarchy method and its applications. There are numerous mathematic techniques for choosing associate optimum project. Mathematical programming models is wont to accomplish this call. For instance, the R&D project choice is given supported linear, non-linear, dynamic, goal, and random mathematical programming.

KEYWORDS: AHP, IDSS, DBMS, Grid Computing.

I. INTRODUCTION

A structured technique for managing complicated choices. […] supported arithmetic and science, it had been developed by Thomas L. Saaty within the Nineteen Seventies and has been extensively studied and refined since then. The AHP provides a comprehensive and rational framework for structuring a choice downside, for representing and quantifying its components, for relating those components to overall goals, and for evaluating various solutions. It's used round the world during a big variety of call things, in fields like government, business, industry, care and education.

The purpose of the AHP is to help folks in organizing their thoughts and judgments to create more practical choices. […] The Analytic Hierarchy method (AHP) provides the target arithmetic to method the unavoidably subjective and private preferences of a private or cluster in creating choices. […] basically, the AHP works by developing priorities for alternatives and also the criteria won't to decide the alternatives. […] First, priorities area unit derived for the standards in terms of their importance to realize the goal, then priorities area unit derived for the performance of the alternatives on every criterion. These priorities area unit derived supported pair-wise assessments victimization judgments, or ratios of measurements from a scale if one exists.[…] Finally, a weight and adding method is employed to get overall priorities for the alternatives on however they contribute to the goal.

Human lives area unit the ad of their decisions-whether in business or in personal spheres. In daily lives, people often got to make decisions. "When decision is made" is important as "what decided". Everyday life and history are full of lessons that can help people recognize that critical moment. Folks learn by attempting and by example. Deciding too quickly may be hazardous; delaying too long will mean incomprehensible opportunities. In the end, it's crucial that individuals frame their mind. What folks want may be a systematic and comprehensive approach to higher cognitive process [1].

In evaluating n competitor alternatives A1, ... , below a given criterion, it's natural to use the framework of pairwise comparisons delineate by a n x n matrix from that a collection of preference values for the alternatives comes. Several ways for estimating the preference values from the pairwise comparison matrix are projected and their effectiveness relatively evaluated. A number of the projected estimating ways presume interval-scaled preference values. However most of the estimating ways projected and studied area unit inside the paradigm of the analytic hierarchy method that presumes ratio-scaled preference values. Analytical Hierarchy method (AHP) is one amongst the most effective ways in which for deciding among the complicated criteria structure in several levels. Fuzzy AHP may be an artificial extension of classical AHP technique once the opaqueness of the choice maker is taken into account. This paper aims to review of various varieties of AHP techniques, to point out the variations of the results and also the choices created at the moment. To perform the operations per see distinction on the calculations, a case study is handled from food business within which the management ought to decide regarding the choice criteria for its workers

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

operating within the workplace. To envision the distinctions of those 2 approaches a similar hierarchy structure and criteria set area unit applied. within the flow of the paper, 1st the classical AHP and Fuzzy AHP ways area unit introduced together with the past studied from literature, then the outline of calculations area unit bestowed because the next section. Finally, the paper ends with comparison results, findings, and comments regarding these ways.

II. ANALYTICAL HIERARCHY PROCESS

AHP could be a technique for ranking call alternatives and choosing the most effective one once the choice maker has multiple criteria [8]. It answers the question, "Which one?". With AHP, the choice maker selects that best meets his or her call criteria developing a numerical score to rank every decision different supported however well every alternative meets them.

In AHP, preferences between alternatives square measure determined by creating pairwise comparisons. In an exceedingly pairwise comparison, the choice maker examines 2 alternatives by considering one criterion and indicates a preference. These comparisons square measure created employing a preference scale that assigns numerical values to totally different levels of preference [2]. The quality preference scale used for AHP is one-9 scale that lies between "equal importance" to "extreme importance" wherever typically totally different analysis scales will be used like 1 to five. Within the pairwise comparison matrix, the worth nine indicates that one issue is extraordinarily a lot of necessary than the opposite, and also the worth 1/9 indicates that one issue is extraordinarily lesser than the opposite, and also the worth one indicates equal importance [3]. Therefore, if the importance of 1 issue with relation to a second is given, then the importance of the second issue with relation to the primary is that the reciprocal. Quantitative relation scale and also the use of verbal comparisons square measure used for weight of quantitative and non-quantifiable components [4].

Since 1977, Saaty [5] planned AHP as a choice aid to assist solve unstructured issues in economic science, social and management sciences. AHP has been applied in an exceedingly form of contexts: from the easy everyday downside of choosing a college to the complicated issues of coming up with different future outcomes of a developing country, evaluating political campaign, allocating energy resources, and so on. The AHP permits the decision-makers to structure a posh downside within the style of a straightforward hierarchy and to gauge an outsized range of quantitative and qualitative factors in an exceedingly systematic manner below multiple criteria atmosphere in confliction [6]. The appliance of the AHP to the complicated downside typically involves four major steps [6]:

1. Break down the complicated downside into variety of little constituent components so structure the weather in an exceedingly gradable type.
2. Create a series of combine wise comparisons among the weather consistent with a quantitative relation scale.
3. Use the eigenvalue technique to estimate the relative weights of the weather.
4. Combination these relative weights and synthesize them for the ultimate activity of given call alternatives.

The AHP could be a powerful and versatile multi-criteria decision-making tool for handling complicated issues wherever each qualitative and quantitative aspects have to be compelled to be thought-about. The AHP helps analysts to prepare the vital aspects of a drag into a hierarchy rather sort of a genealogy [7].

The essence of the method is decomposition of a posh downside into a hierarchy with goal (criterion) at the highest of the hierarchy, criteria and sub-criteria at levels and sub-levels of the hierarchy, and call alternatives at rock bottom of the hierarchy. Components at given hierarchy levels square measure compared in pairs to assess their relative preference with relation to every of the weather at consecutive higher level. The strategy computes and aggregates their eigenvectors till the composite final vector of weight coefficients for alternatives is obtained. The entries of ultimate weight coefficients vector mirror the relative importance (value) of every different with relation to the goal expressed at the highest of the hierarchy [4]. A decision maker may use this vector according to his particular needs and interests. To elicit pairwise comparisons performed at a given level, a matrix A is created in turn by putting the result of pairwise comparison of element i with element j into the position aji as below.

$$A = \begin{matrix} C_1 \\ C_2 \\ C_3 \\ C_n \end{matrix} \begin{bmatrix} 1 & a_{12} & a_{13} & a_{1n} \\ a_{21} & 1 & a_{31} & a_{2n} \\ a_{31} & a_{32} & 1 & a_{3n} \\ a_{n1} & a_{n2} & a_{n3} & 1 \end{bmatrix}$$

Where n = criteria number to be evaluated

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

Ci = i. criteria,
Aij = importance of i. criteria according to jth criteria

After getting the burden vector, it's then increased with the burden constant of the component at a better level (that was used as criterion for pairwise comparisons). The procedure is recurrent upward for every level, till the highest of the hierarchy is reached [9]. The weight constant, with regard to the goal for every call different is then obtained. The choice with the best weight constant worth ought to be taken because the best alternative. Saaty's AHP, could be a well-known decision-making analytical tool used for modeling unstructured issues in varied areas, e.g., social, economic, and management sciences [10-12].

III. GRID COMPUTING PROBLEM

In general, grid is aimed at sharing resources in a dynamic and probably heterogeneous environment. These resources would be accessible through a number of policies. This sharing is mainly used for computational objectives in scientific applications. They can be in forms such as CPU, hard disk, software, as well as sensors.In late 1990, process grid networks emerged as substitute for current super computers to resolve special issues, and that they needed various numerical computations and a lot of quantity of distributed knowledge. In line with [13], grid computing is hardware and package infrastructure which provide an inexpensive, distributable, coordinated and reliable access to powerful process capabilities. "When the network is as quick because the computer's internal links, the machine disintegrates across net into a group of special purpose appliances [14]".

Most of authors have worked on grid computing problems kind the technical perspective. Authors like Bawa and Sharma [15], Vijaykumar and Banu [16] and Metke and Ekl [17] have planned models to form high the safety of system by protection capability. Kavitha and Sankaranarayanan [18] have planned a process grid design for sharing of resources supported user QoS and trust, however their thought of criteria aren't versatile and users cannot add their desired criteria to the framework.

An important issue is most of authors worked on criteria like security, etc. from the technical perspective and that we are about to work on grid resource choice from the manager's read. Our framework tries to assist the managers once they need to dam insecure resources from the list or add one per their organization ways and policies. We have a tendency to are about to style a versatile framework to rank resources.

IV. EVALUATION SYSTEM FOR EMPLOYEE RECRUITMENT

In this fast-changing world, there are fast-changing industrial and market aspect. Because the nice growth of commercial aspect, several company seeking for a lot of and a lot of worker. Not solely a standard and less-skilled worker, however well trained and work best at their position at business. Human resource development in associate business, conjointly produce a lot of strict choice to make sure the most effective human resource for his or her company. Several efforts and cash extended to feed those manual system on recruiting a brand new worker therewith technique. An honest worker recruiting strategy is that the best thanks to avoid having recruiting transform a time-draining, money-sucking activity. We've all run an advertisement and been inundated with unqualified folks that eat up time and resources [19]. it's a giant challenge to make a system that facilitate the human resource development in business to form their work easier while not missing a chance to urge a best worker. Mistreatment this new technique, human resource development can apprehend that is that the worthed person and less-worthed person and kind them in several order like their work expertise, grade, and majoring. The tactic that purposed during this thesis is AHP and formal logic. Per Saaty (1980) "It could be a systematic higher cognitive process technique which incorporates each qualitative and quantitative techniques" [20]. A call creating and evaluating system for worker achievement ready to alter the work of human resource development on business. This technique can access all person knowledge from given resume, or by alternative knowledge that given at personal interview with the human resource development department. This may offer the accuracy of the achievement progress associated conjointly produce an evaluating system of all new recruited employee. The evaluating system can have all the info of the worker associated create it easier to guage an employee. Analysis Decision-Making System could be a centralized public access portal designed to produce info associated with analysis of a library's services and resources for management and support functions [21]. By utilizing the AHP and Fuzzy properly, it show a higher results to decisive the analysis score, as a result of the defuzzyfication

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

technique ready to overcome the uncertainty issue as we all know that the item we'll choose is human. Fuzzy AHP methodology is versatile and may be used for alternative sectors with some sector specific characteristics changes. Humans usually unsure in distribution the analysis scores in crisp AHP. Fuzzy AHP will capture this issue [22].

V. IDSS SYSTEM

Intelligent call web (IDSS) is that the development of call support systems exploitation the information (the rules of the character and parts of the problem) like fuzzy systems, neural networks and genetic formula [23]. This goal is to assist users to access, view, understand, and manipulate information a lot of quickly and simply to assist in creating selections. Therefore with intelligent call support systems will be accustomed build best selections to approach learning and reasoning ability and therefore the ability of a system grounded in selecting an answer, as was done by a skilled in creating selections that may get consistent and effective resolution. The method consists of sub-systems structure system input, sub-systems and sub-structuring issues simulation system state and determinative the simplest resolution. The output of intelligent call Support Systems is within the sort of reportage solutions, prediction the impact of its selections on input and suggestions and explanations effects. Input features a feedback output to get a best resolution in creating selections on effective and economical.

VI. DBMS SELECTION

The selection of the management System (DBMS) has been continually been thought-about as a significant supply of uncertainty. The price of buying and running software system expeditiously is extremely high; thus, software system choice is extremely crucial step for the software package companies. Software system software package packages offer an outsized variety of options that are customizable to satisfy specific desires of the organizations. Choosing a right software system to satisfy the structure needs could be a troublesome task.

It desires a full examination of the many factors. A form is employed for decisive the user preferences in software package engineering method. There has been a growth within the variety of multiple-criteria decision-making (MCDM) strategies to guage many alternatives to realize an exact goal. The analytic hierarchy method (AHP) [5] is one in every of the foremost wide used strategies. AHP methodology could be a multi-criteria decision-making approach. The AHP methodology has attracted the interest of the many call manufacturers to its ability to unravel complicated call issues. It organizes the essential rationality by breaking down a tangle into smaller constituents so demand solely easy pairwise comparison judgments, to develop priorities in every level [24]. AHP decomposes a choice drawback into a hierarchy of additional simply understood sub-problems. The component of the hierarchy will relate to any side of the choice drawback. Once the hierarchy is made, the choice manufacturers valuate its components consistently by comparison them to alternative one, mistreatment 2 components at a time [25].

VII. CONCLUSION

In this paper basic concepts of analytical hierarchy process is discussed and studied successfully. Different applicationslike employee recruitment, DBMS selection system, grid computing system is reviewed in this research paper.

REFERENCES

1. Saaty, T. L., (2001), Decision Making with Dependence and Feedback: Analytic Network Process, RWS Publications, Pittsburgh.
2. Taha, H. A., (2003), Operations Research, Pearson Education Inc., Fayetteville.
3. Sarkis, J., and Talluri, S., (2004), "Evaluating and Selecting e-Commerce Software and Communication Systems for a Supply Chain", European Journal of Operational Research, 159, 318-329.
4. Pohekar, S. D., and Ramachandran, M., (2004), "Application of Multi-Criteria Decision Making to Sustainable Energy Planning", A Review Renewable and Sustainable Energy Reviews, 8, 365-381.
5. Saaty, T. L., (1980), The Analytical Hierarchy Process, Mc Graw Hill, New York.
6. Cheng, C. H., Yang, K. L., and Hwang, C. L., (1999), "Evaluating Attack Helicopters by AHP Based on Linguistic Variable Weight", European Journal of Operational Research, 116, 423-435.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 4, April 2017

7. Bevilacqua, M., D'Amore, A., and Polonara, F., (2004), "A Multi-Criteria Decision Approach to Choosing The Optimal Blanching-Freezing System", Journal of Food Engineering, 63, 253-263.
8. Taylor, B. W., (2004), Introduction to Management Science, Pearson Education Inc., New Jersey.
9. Saaty, T. L., (1994), Fundamentals of Decision Making and Priority Theory with The Analytical Hierarchy Process, RWS Publications, Pittsburgh.
10. Bard, J. F., and Sousk, S. F., (1990), "A Trade Analysis for Rough Terrain Cargo Handlers Using The AHP: An Example of Group Decision Making", IEEE Transactions on Engineering Management, 37, 3, 222-228.
11. Triantaphyllou, E., and Mann, S. H., (1995), "Using The Analytic Hierarchy Process for Decision Making in Engineering Applications: Some Challenges", International Journal of Industrial Engineering: Applications and Practice, 2, 1, 35-44.
12. Wabalickis, R. N., (1988), "Justification of FMS with The Analytic Hierarchy Process", Journal of Manufacturing Systems, 17, 175-182.
13. Foster, I. (2002), "What is the Grid", Daily News and Information for the Global Grid Community J., Vol. 1, No. 6.
14. Barroso & Jose Morales (2005), "From Computer Networks to the Computer on Net, the Convergence of Internet, Broadband and Telephone Networks in the IEEE 802 Standards," IEEE Global Communication Newsletter, page 2.
15. Kumar, R., Bawa & Sharma, G. (2012), "Reliable Resource Selection in Grid Environment". In International Journal of Grid Computing and Applications, Vol. 3, No. 1.
16. Vijayakumar, V. & Banu, R.S.D.W. (2009), "Secured Resource Selection in Grid Computing: Trust and Reputation Sentient Scheme", Advances in Communication and Networking, Vol. 27, pp. 169- 183.
17. Metke, A.R. & Ekl, R.L. (2010), "Security Technology for Smart Grid Networks", Smart Grid, IEEE Transactions on, Vol. 1, No. 1, pp. 99-107.
18. G.Kavitha & V.Sankaranarayanan. (2011), "Resource Selection in Computational Grid Based on User QoS and Trust", IJCSNS International Journal of Computer Science and Network Security, Vol. 11, No. 3, pp. 214-221.
19. Barry, Shamis, "Selecting Winners on Site www.selectingwinners.com" (2008), accessed on December 28th, 2012.
20. T. L. Saaty, The analytic hierarchy process, McGraw-Hill, New York, 1980.
21. McClure, Charles, "Evaluation Decision-Making System", Florida State University (2009) URL = <http://www.ii.fsu.edu/Solutions/Evaluation-Decision-Making-System/>
22. Cebeci, Ufuk, "Fuzzy AHP-based Decision Support System for Selecting ERP Systems in Textile Industry by Using Balanced Score Card", Department of Indistrial Engineering, Istanbul Technical University.
23. Sadly, M. (2007). Utilization of Technology Assessment Knowledge-based Expert System in the Management of Natural Resources.
24. Saaty, T.L (1986) "Axiomatic Foundation of the Analytic Hierarchy Process", Management Sciences, Vol. 32, No. 7, pp 841-855.
25. [25] Saaty, Thomas L., (2008) "Relative Measurement and its Generalization in Decision Making." Review of the Royal Spanish Academy of Sciences, Mathematics. Vol. 6, No 2, pps. 251-318.

BIOGRAPHY

Sonika Sharmais a M. Tech student in the Computer Science Department, Maharishi Ved Vyas Engineering College, Kurukshetra University, Haryana.