Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 62 (2015) 99 – 106

Procedia Computer Science

The 2015 International Conference on Soft Computing and Software Engineering (SCSE 2015)

Fuzzified Expert System for Employability Assessment

Rajani Kumari[a]*, Sandeep Kumar[a], Vivek Kumar Sharma[a]

[a]*Jagannath University, Jaipur, India*

Abstract

Employability is somebody's prospective for gaining and maintaining employment. Basically employability depends on basic three parameters and these parameters are as education, understanding power and personal development. It is the capability to achieve the preliminary employment, to continue it and to obtain different one, if it is required. This paper introduced an innovative knowledgeable system for valuation of employability through some fuzzy rules. The purpose and scope of this concern research is to observe the optimal valuation for employability. This concern research considers three employability skills as an input namely Education, Understanding power and Personal development and find out a novel crisp value for employability which is basically characterize the ability of employee. This paper uses twenty seven fuzzy rules, by using Mamdani type fuzzy inference system in Mat-lab for catches solitary value of output named as employability.

Peer-review under responsibility of organizing committee of The 2015 International Conference on Soft Computing and Software Engineering (SCSE 2015)

Keywords: Employability Skills; Fuzzy Logic; Personal Developmen; Understanding Power; Education

1. Introduction

The two highest apprehensions of employers are finding good workers and prepare them. The skills gap is a gap between the skills desired on the job and those influenced by applicants. Companies would prefer to appoint people who are trained and prepared to go to work; they are generally willing to deliver the job specific training which essential for those lacking such skills. Most negotiation concerning workforce ultimately turn to employability skills. Employability skills are the elementary skills essential for receiving, observing, and doing well on a job. These are

* Corresponding author. Tel.: +91-946-210-3099
E-mail address: rajanikpoonia@gmail.com.

Peer-review under responsibility of organizing committee of The 2015 International Conference on Soft Computing and Software Engineering (SCSE 2015)
doi:10.1016/j.procs.2015.08.420

the skills, attitudes and activities that allow workers to acquire along with their associated workers and administrators to make reverberation and precarious decisions. Employability skills are in general divided into three skill sets first is basic academic skills (Education), second is personal qualities (Personal Development) and third is higher-order thinking skills (Understanding Power). The employability skill education includes reading, writing, oral communication and listening. The second one includes learning, reasoning, thinking, creatively decisions, making problem solving. The employability skill personal development includes self-confidence, self-control, social skills, honest, integrity, adaptable, self-motivated, self-management, self-directed, good work, attitude, well groomed and cooperative. The devotion within advanced education to increasing student's employability potentially helps a number of significant purposes. First, it reacts to students' motivations for inflowing higher education. A survey of school students originate that the most significant personal reasons mentioned for going to university were beside to study a subject that really suits me and three vocationally oriented causes to increase job prospects, to have a professional career and to achieve entrance to a well-paid career. Each of these four causes was evaluated by around four-fifths as extremely or very important [1]. Where tuition fees are payable, such vocational inspirations are likely to be supported. Second, it reacts to policy concerns in two salutations; an important part of the motivation for the huge sums which the Government finances in higher education is the involvement which it creates to the development of the country's human capital [2]. The further employable students are the superior the economic revenue is likely to be from this investment. Increasing higher education is also considered to attend social-equity goals by growing access for disadvantaged groups. To achieve such goals, devotion needs to be rewarded not only to confirming the participation of these groups in higher education but also to enhancing their consequent success in the employment market [3].Third, faraway from depression wider academic principles it can be deduced as reinforcing such values in three salutations by underlining generic aptitudes rather than straight subject relevance, it can help to fight stealing occupational in terms of course content, and to legitimize the remaining value of traditional academic corrections. Over two-thirds of graduate opportunities in the UK are for graduates in any subject [4]; companies tend to be much more concerned with standard graduate attributes than with subject knowledge [5]. A detailed study of employability in Information Communication Technology carried out by M. de Hoyos [18]. Employability in Europe: enhancing post graduate complementary skills training projected by GP Wall and CP Welsch [19]. Factors Influencing the achievement of Employability Aids by Students of Selected Technical Secondary School in Malaysia proposed by Jovinia Danialand Shamsiah Mohamed [20]. Research for Presentation of the "Internet of Things" in University's Training Management proposed by CJ Zong, BX Jia, and Y Zhang [21].

2. Employability

Employability is a set of three achievements that are skills, understandings and delicate attributes which creates gradates more probable to increase employment and be successful in their preferred occupations, which profits themselves, the community and the budget, the labor force. It moreover boosts student's capability to protected rewarding and satisfying outcomes in their social, economic and the public lives. In the present scenario almost each job includes the need for staff that communicates professionally with each other, understand the needs and give good service to their clients, work in a team, adaptability, willingness and flexibility.

Employability has three abilities:

- Achieve preliminary employment
- Preserving employment
- Gaining new employment if required

The most employability skills which look in potential employees areas are as follows:

2.1. Teamwork

Teamwork incorporates the working with others to accomplish results and identifying the value of others contributions and concepts. The effective teamwork skills are established by taking different roles in a team, functioning independently or as a part of a team, giving beneficial criticism, being able to recognize strengths and faults of team participants and working with people of different religions, genders, races or political influences.

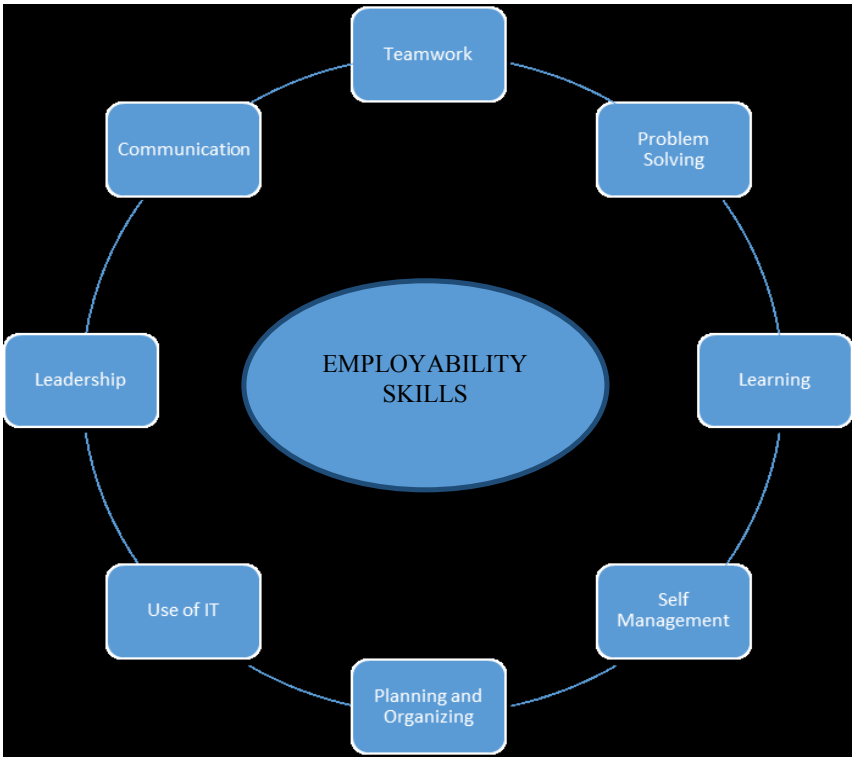

Fig. 1. Employability Skills

2.2. Planning and Organizing

Planning and Organizing involves the ability to recognize that what is essential in a specified situation and to manage persons and resources efficiently to succeed results. It also includes being able to manage time powerfully and primacies what tasks essential to be completed to achieve an inclusive goal. The effective Planning and Organizing skills are established by managing time and primacies, allocating people and further resources to tasks, establishing clear project goals and deliverables, collecting, analyzing and organizing information and time management.

2.3. Self-Management

Self-management skills rise to the ability to revenue duty for your own schedules and to set objectives and effectively complete them. It includes setting practicable goals and using your time and resources successfully to achieve them. The effective self-management skills are established by taking responsibility, expressing one's ideas and visualization, planning fast and consuming a personal vision and goals and estimating and observing one's own performance.

2.4. Communication

Communication is maybe the most required after skills by most employers and includes fundamentals such as being a worthy listener, explaining things to persons from different circumstances and presenting a perfect case.

The effective self-management skills are established by negotiating, writing and speaking in languages other than English and listening and understanding evidence.

2.5. Problem Solving and Creativity

Problem Solving and Creativity involves being able to propose an explanation to a problem by examining a situation and employed out how to reach at a satisfactory outcome. It often includes making optimal use of accessible resources and procuring others to achieve an outcome. The effective self-management skills are established by solving problems in groups, applying a variety of approaches to problem solving and determining customer complaints satisfactorily.

2.6. Learning

Learning skills refers to your ability to accomplish your own knowledge and contribute to ongoing enhancement and growth in your own skill set and knowledge. The effective self-management skills are established by contributing to the knowledge community at the workstation, open to innovative thoughts and techniques and prepared to spend time and effort into learning innovative skills.

2.7. Use of Information Technology

Information Technology involves being able to preserve abreast of present technology and apply it to difficulties, as well as the capability to embrace life-long knowledge in the field of technology. The effective self-management skills are established by being prepared to acquire new IT skills, selecting the suitable technology for a specified task and having a variety of basic IT skills.

2.8. Leadership

The act of leading a group of people, an association, or the talent to do this is leadership. The skill to persuade others to act in order to accomplish a common goal and to use the skills and knowledge of team members to work productively together is leadership. Leadership in association has a specific focus on decision-making leadership in large. Organizations and is an effort at bridge the inlet between academics and management practitioners.

3. Fuzzy Logic

Knowledge occurs in two different ways, one is the objective knowledge that occurs in mathematical system is used in engineering difficulties and another one is subjective knowledge that occurs in linguistic system, which is generally impossible to calculate. Fuzzy Logic can synchronize these two systems of knowledge in a logical technique. It deals with reasoning that is approximate rather than accurately gathered from classical predicate logic. The theory of Fuzzy Logic was founded by Lotfi Zadeh [22], a professor of computer science at the University of California. Fuzzy Logic is a problem-solving controller system approach that provides itself to implementation in systems ranging from small, simple, multi-channel PC, networked, or workstation-based data acquirement and control systems. It provides a modest way to reach at a definite assumption based upon ambiguous, vague, noisy, imprecise, or missing input material. It can be applied in software, hardware or a combination of both. It includes a modest, rule-based IF X AND Y THEN Z methodology to a solving control problem rather than trying to model a system mathematically. This model is empirically-based, trusting on an operator's knowledge rather than their technical appreciative of the system. It involves some numerical constraints in order to activate such as what is measured substantial error and substantial rate-of-change-of-error. It measured as an enhanced technique for organizing and handling data but has verified to be an outstanding choice for various control system applications meanwhile it simulators human control logic. A fuzzy set is a set that allows its members to have different degree of membership, called as membership function. The interval of membership function is [0 1].

Innumerable applications of fuzzy logic have pointed a way for an effective exploitation of fuzzy logic in the framework of difficult processes. H. Ramazi and A. Amini [6] applied fuzzy logic control for compiling multi geohazards macro-zone maps. It applied for find flexibility of protein motifs by L.A. Zadeh[7]. Fuzzy logic used to outline differences between an assortment of poly nucleotides by Y. Huang and Y. Li [8]. Adaptive connotation of fuzzy theory [7] analyzed data for experimental appearance [9] by Z. Xiu-fen, P. Zi-shu, K. Le-shan and Z. Chu-yu. A multi-variable fuzzy logic control system for a class of distributed parameter systems proposed by YQ Ren, XG Duan, HX Li, CLP Chen [10]. PID controller enhanced by I. Pan and S.Das [11]. Active bus suspension system designed with help of fuzzy logic control by M. Turkkan and N. Yagiz [12]. A fuzzy matchmaking based system-oriented grid scheduler proposed by A.I. Saleh [16]. Fuzzy logic control in air conditioning system [13], ducting system [14], CPU scheduling [15] and Job shop scheduling [17] employed by R. Kumari, V. K. Sharma and S. Kumar. C. W. Chen uses neural-network-based fuzzy logic control in a nonlinear time-delay chaotic system [23]. C. Cecati et al. developed a multilevel inverter for photovoltaic systems using fuzzy logic control [24]. B. Y. Shih et al. developed a self-governing navigation system for transistor frequency documentation portable robot e-book reader [25]. A detailed list of applications of fuzzy logic control listed in [26]-[29].

4. Proposed Work

This paper initiates a ground-breaking expert system for appraisal of employability by using certain fuzzy rules. These fuzzy rules are mainly used for examine the optimum valuation for employability. The employability deals with certain fuzzy logic rules and these fuzzy logic rules are based on employability skills. The concern research is used to compute the Employability Skills for any employee with the help of Mamdani type inference.

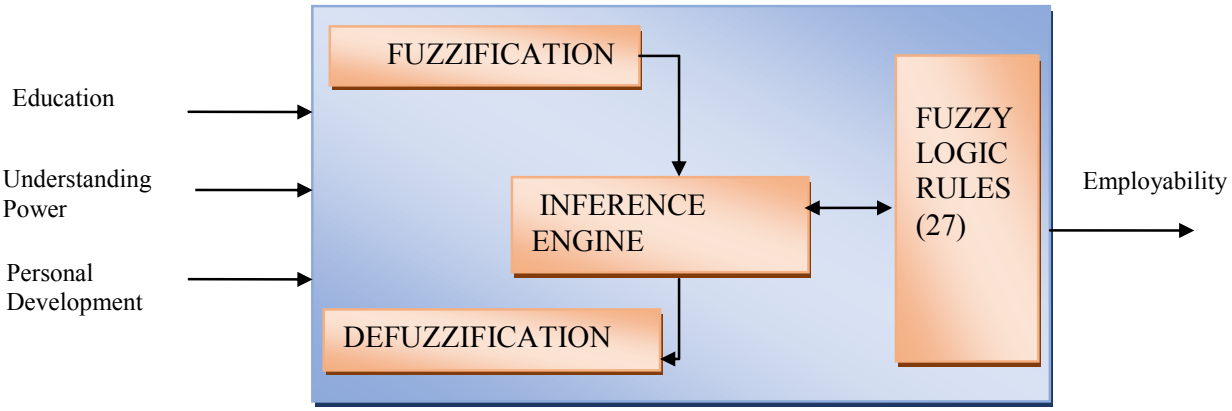

Fig. 2. Architecture of the Proposed System

This paper use appropriate linguistic variables as input and output for compute a crisp value for employability skills. The linguistic input variables named as Education (E), Understanding Power (UP) and Personal Development (PD) measured as Low, Medium and High. And the linguistic output variable named as Employability skills (ES) measured as Very Low, Low, Medium, High and Very High. The proposed skills is an assortment of linguistic fuzzy rules which define the relationship between defined input variables (E, UP and PD) and output (ES).

4.1. Fuzzy Rules

Table 1 covers the range of input variables named as education, understanding power and personal development. Table 2 outlines the range of output variable named as employability. Table 3 outlines the experimental results. This concern research use the twenty seven rules which are founded based on the IF THEN statement such as

IF E is low and UP is low and PD is low THEN ES is low

These rules compute the crisp value using centroid defuzzification method of Mamdani inference in Matlab that represents the employability skill of each and every employee. Figure 3 outlines rules of employability. Figure 4 shows the surface viewer of employability.

Table 1. Range of input variables “Education”, “Understanding Power” and “Personal Development”

Education	Understanding Power	Personal Development	Range
Low	Low	Low	0-4
Medium	Medium	Medium	2-8
High	High	High	6-10

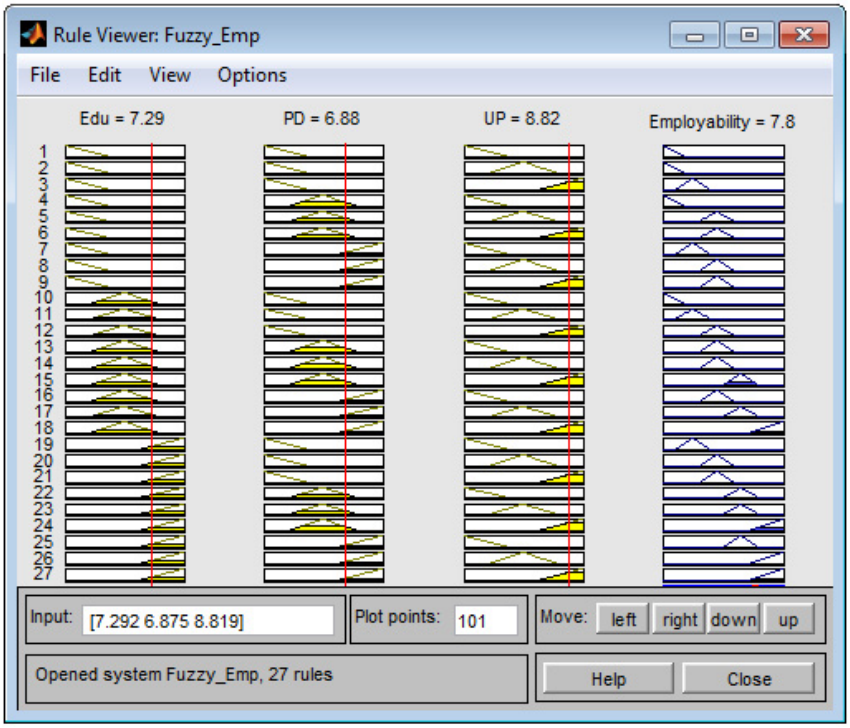

Fig. 3. Rules of employability

Table 2. Range of output variable “Employability”

Employability	Range
Very Low	0-2
Low	1-4
Medium	3-6
High	5-8
Very High	7-10

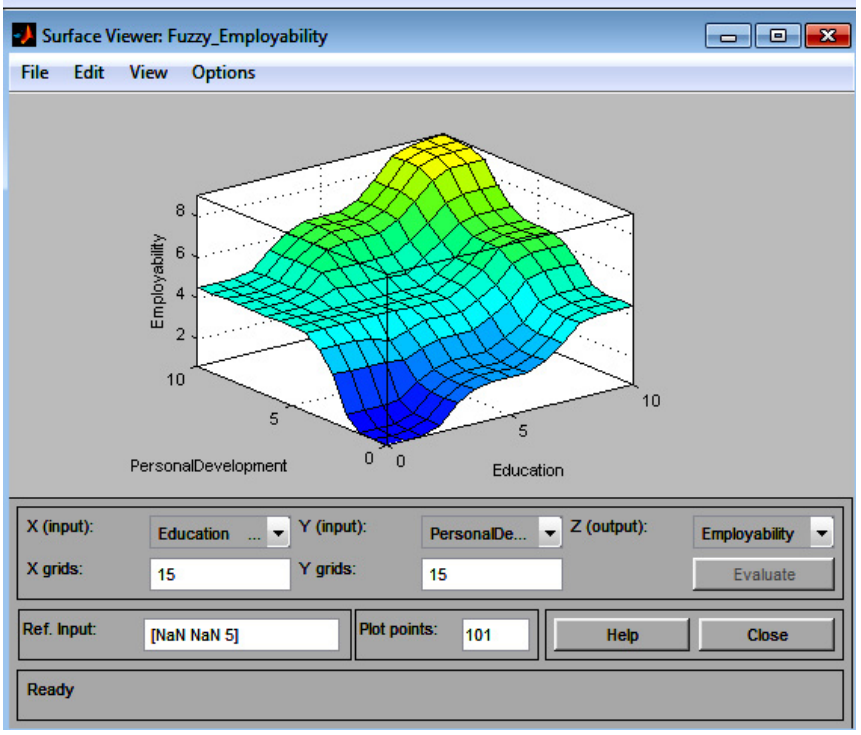

Fig 4. Surface viewer of employability

Table 3 Experimental Results

Education	Understanding Power	Personal Development	Employability
1	2	1	0.75
4	2	3	1.98
1	2	9	2.5
6	5	8	6.5
7	8	8	8.76
10	9	9	8.98

5. Conclusion

This paper anticipated a fuzzified expert system for employability assessment. The apprehension research finds the capability or level of several employees through these employability skills. The proposed expert system is useful for organization to calculate employability smoothness for different persons in a very simple manner. Through the proposed expert system employer can easily filter best suitable applicants based on their education, understanding power and personal development. This concern system manipulates above three inputs based on fuzzy rules and calculates employability.

In future this system may be improved using more appropriate rule base as per requirements. Neuro fuzzy system may be used instead of fuzzy control system.

References

[1] Connor H., R. Burton, R. Pearson, E. Pollard, and J. Regan. Making the Right Choice: How Students Choose Universities and Colleges, *Appendix 2, the year 11/S4 survey*. London: CVCP, 1999.

[2] Dearing R., Higher education in the learning society [Dearing report]. 1997.

[3] Morey A., L. Harvey, J. Williams, A. Saldana, P. Mena. HE Careers Services and Diversity. Manchester: Careers Services Unit. 2003.

[4] Prospects G. Prospects Directory salary and vacancy survey. *Graduate Market Trends, Winter*, 2005:11-17.

[5] Harvey L., S. Moon, V. Geall, & R. Bower. *Graduates' Work: Organisational Change and Students' Attributes*. Birmingham: Centre for Research into Quality, University of Central England in Birmingham & Association of Graduate Recruiters. 1997.

[6] Ramazi H., A, Amini. *Fuzzy logic application in compiling multi geohazards macro-zone maps; case study: Rahdar, 1: 25,000 Quadrangle, Khuzestan, Iran.* Arabian Journal of Geosciences 7, no. 8 :2014: p. 3243-3249.

[7] Zadeh L. A. Fuzzy logic, neural networks, and soft computing. *Communications of the ACM* 37(3);1994: p. 77-84.

[8] Huang Y., Y. Li, Prediction of protein subcellular locations using fuzzy k-NN method, *Bioinformatics*, Vol. 20(1); 2004: p. 21-28.

[9] Xiu-fen Z., P. Zi-shu, K. Le-shan, Z. Chu-yu, Evolutionary computation techniques for Protein structure prediction: A Survey, *Wuhan University Journal of Natural Sciences*, Vol. 8(1B);2003: p. 297-302.

[10] Ren Y.Q., X.G. Duan, HX Li, CLP Chen, Multi-variable fuzzy logic control for a class of distributed parameter systems, *Journal of Process Control* 23(3); 2013: p. 351-358.

[11] Pan I., S. Das, Enhancement of Fuzzy PID Controller with Fractional Calculus, *In Intelligent Fractional Order Systems and Control. Springer Berlin Heidelberg*. 2013: p. 159-193.

[12] Turkkan M. and Yagiz N., (2013) Fuzzy logic control for active bus suspension system, *Journal of Physics: Conference Series*. Vol. 410(1); 2013: p. 012006. IOP Publishing.

[13] Kumari R., S. Kumar, V. K. Sharma. Air Conditioning System with Fuzzy Logic and Neuro-Fuzzy Algorithm. *In Proceedings of the Second International Conference on Soft Computing for Problem Solving (SocProS 2012)*, December 28-30, 2012, pp. 233-242. Springer India, 2014.

[14] Kumari R., V. K. Sharma, S. Kumar. Two Way Ducting System Using Fuzzy Logic Control System. *International journal of Electronics and Communication Engineering & Technology (IJECET)*, 4(7); 2013: p. 309-317.

[15] Kumari R., V. K. Sharma, S. Kumar. Design and Implementation of Modified Fuzzy based CPU Scheduling Algorithm. *International Journal of Computer Applications* 77(17); 2013:1-6.

[16] Saleh A.I. An efficient system-oriented grid scheduler based on a fuzzy matchmaking approach. *Engineering with Computers,* 29(2); 2013: p. 1-22.

[17] Kumari R., V. K. Sharma, S. Kumar. Fuzzified Job Shop Scheduling Algorithm. *International Journal of Technology Innovations and Research (IJTIR)*, vol 7; 2014: p. 1-20.

[18] de Hoyos M., A. Green, S. A. Barnes, H. Behle, B. Baldauf, D. Owen. Literature Review on Employability, Inclusion and ICT, Part 2: ICT and Employability. No. JRC78601. Institute for Prospective and Technological Studies, Joint Research Centre, 2013.

[19] Wall G. P., C. P. Welsch. Employability in Europe: enhancing post graduate complementary skills training. *Proceedings of the HEA STEM Learning and Teaching Conference*. 2013: p. 151-157

[20] Danial J., S. Mohamed. Factors Influencing the Acquisition of Employability Skills by Students of Selected Technical Secondary School in Malaysia. *International Education Studies* 7(2);2014: p.117.

[21] Zong C. J., B. X. Jia, Y. Zhang. Research on Application of the Internet of Things in University's Teaching Management. *Advanced Materials Research* 860; 2014: p. 3017-3020.

[22] Zadeh L. A. Fuzzy sets. *Information and control* 8(3);1965: p. 338-353.

[23] Chen C. W., RETRACTED: Applications of neural-network-based fuzzy logic control to a nonlinear time-delay chaotic system. *Journal of Vibration and Control* 20(4);(2014: p. 589-605.

[24] Cecati C., F. Ciancetta, P. Siano. A multilevel inverter for photovoltaic systems with fuzzy logic control. *Industrial Electronics, IEEE Transactions on* 57(12); 2010: p. 4115-4125.

[25] Shih, B. Y., M. C. Lin, C. Y. Chen. Autonomous navigation system for radiofrequency identification mobile robot e-book reader. *Journal of Vibration and Control*.;2012.

[26] Hayward G., V. Davidson. Fuzzy logic applications." Analyst 128(11); 2003: p. 1304-1306.

[27] Yager R. R., L. A. Zadeh. *An introduction to fuzzy logic applications in intelligent systems*. Kluwer Academic Publishers.1992

[28] Yen J. R. Langari, L. A. Zadeh. *Industrial applications of fuzzy logic and intelligent systems*. IEEE Press. 1995.

[29] Ross T. J., *Fuzzy logic with engineering applications*. John Wiley & Sons. 2009.