A Glimpse of Neutrosophic Approach Publications Relevant to a Prominent Researcher in Africa of the Decade 2010 to 2020: A Digital Vision

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Abstract

In recent times, with a rapid spark of scientific progress and development, new scientific approaches have been begun to emerge and widely spread in various fields. Currently, neutrosophic approach is one of the most approaches which considered as a precious modern approach. With the increasing popularity of Neutrosophic approach, the development of this approach became a great trend of science which has its own rules and principles. The overwhelming spread of neutrosophic approach in the late 20th century has provided a new trend into the debate and research. As well as, it has offered a worthwhile forum and symposiums. The first touches of neutrosophic approach and neutrosophy were provided by the American pioneer researcher Florentin Smarandache. The African researcher prof. Ahmed Salama is one of the most Arab researchers who interested in Neutrosophic approach and he has cooperated with prof. Florentin Smarandache in many studies and symposiums. Neutrosophic approach is a special approach which connected and used in several fields. Due to the importance of neutrosophic approach, this study sheds light on Neutrosophic approach, and lists a glimpse of common publications and studies involved which relevant to the most prominent researcher in Africa. Possible application to virtual university is touched upon.

Keywords: Neutrosophic approach; Neutrosophy; Neutrosophic crisp sets; Neutrosophic topology; Neutrosophic systems

1. Introduction

With a rapid change and developments, which distinguish the scientific field and lead to the emergence of several new approaches and trends such as Neutrosophic approach, which considered as a precious approach. With the increasing popularity of Neutrosophic approach, there are several international conferences, forums, seminars and symposiums for this phenomenal approach.

Neutrosophic approach has become a noteworthy trend, as well as it has begun to emerge by the end of last century. The first touches and cornerstone of Neutrosophic approach were presented in 1995 by the American pioneer researcher Prof. Florentin Smarandache who was the president of NSIA University of New Mexico in USA. Florentin Smarandache has a lot of researches, articles, publications and studies about Neutrosophic approach, e.g. a valuable previous study [1], which discusses some definitions derived from the umbrella of Neutrosophic.

Neutrosophic approach terminology can be confused. Hence, the next lines will demystify the terminology and it is worthy to illustrate about Neutrosophic terminology.

- The word "Neutrosophic" is derived from the terminology "Neurosophy".

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- In Florentin Smarandache book (1998), he provided and coined the words or terms "Neutrosophy" and "Neutrosophic" [2]. Recently there are many applications even today as in [14, 15, 16]

- From etymology perspective, neutrosophy can be divided into two main words "Neuter" and "Sophia". For more illustration, it can be given in the below Figure 1 [3].

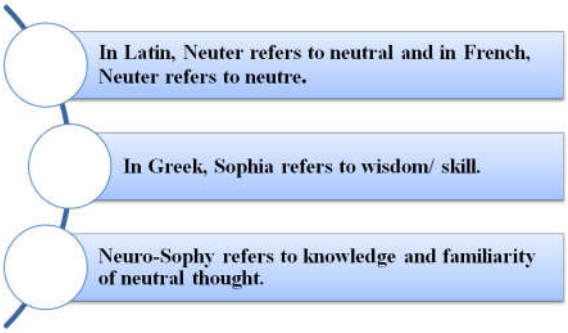
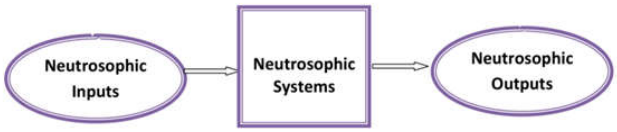


Figure 1. Etymology perspective for Neurosophy

- Neutrosophy is considered as a modern aspect of Philosophy which includes the scope, origin, and nature of neutrality in addition to their interactions and influences with various ideational spectra [3]. Neutrosophy is the root of neutrosophic logic, neutrosophic probability neutrosophic statistics and neutrosophic statistics sets.
- The pioneer researcher Florentin Smarandache [4],[5]suggested and presented neutrosophic logic as an addition and generalization of fuzzy logic. In this regard, the variable
  X can be characterized by three elements X= (T, I, F)

Where
- **T** refers to the degree of truth
- **F** refers to the degree of false
- **I** refers to the level of indeterminacy

- Neutrosophic logic was grown and expanded as an alternative trend to the traditional logics and it represented and described a—mathematical model of the following points [6]:
  - Uncertainty
  - Undefined
  - Imprecision
  - Inconsistency
  - Unknown
  - Vagueness
  - Incompleteness
  - Redundancy
  - Ambiguity
  - Contradiction
- An illustrative example or case of Neutrosophic problems can be stated as follows [4]:
  When conducting a questionnaire using a form with three patterns X, W and Z. Some results appear undetermined and do not belong to any of the groups X, W and Z. Neutrosophic logic can represent these indistinct results. Hence, neutrosophic logic can handle indeterminacy issue where other techniques disregard it.
- Neutrosophic system can be represented as follows:



As it was mentioned before, the emergence of Neutrosophic approach can be traced back to the lately times of the last century. Neutrosophic approach can penetrate into several areas. The Egyptian African researcher prof. Ahmed Salama was certified by the University of New Mexico as the first Arab in this new approach. He is one of the most researchers who interested in Neutrosophic approach and he has cooperated with prof. Florentin Smarandache in several studies, seminars and symposiums. He has more and more of valuable studies about this approach, as well as ideas worth spreading. In Africa 2017, he received an award as the most prominent researcher in Africa.

2. Neutrosophic approach publications in several aspects

The glimpse of varied studies, fields and publications for Neutrosophic approach related to the most prominent researcher in Africa " prof. Ahmed Salama" during the second decade of the 21st century can be stated in the tables (1)-(2).

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Table 1. Studies related to Computer Sciences and Information Systems fields

Study	Year
Ibrahim Yasser, Abeer Twakol, A. A. Abd El-Khalek, Ahmed Samrah and A. A. Salama, COVID-X: Novel Health-Fog Framework Based on Neutrosophic Classifier for Confrontation Covid-19, Neutrosophic Sets and Systems, vol. 35, 2020, pp. 1-21.	2020
A.A. Salama, Mohamed Fazaa, Mohamed Yahya, M. Kazim, A Suggested Diagnostic System of Corona Virus based on the Neutrosophic Systems and Deep Learning, I. J. Neutrosophic Science, Vol.9(1), 2020,pp54-59.	2020
A.A. Salama, Ahmed Sharaf Al-Din, Issam Abu Al-Qasim, Rafif Alhabib and Magdy Badran, Introduction to Decision Making for Neutrosophic Environment “Study on the Suez Canal Port, Egypt”, Neutrosophic Sets and Systems, vol. 35, 2020, pp. 22-44.	2020
A. A. Salama, Rafif Alhabib, Neutrosophic Ideal layers & Some Generalizations for GIS Topological Rules, International Journal of Neutrosophic Science, Vol.8(1), pp.44-49.2020.	2020
A. Salama , M.S.Bondok Henawy , Rafif Alhabib, Online Analytical Processing Operations via Neutrosophic Systems, International Journal of Neutrosophic Science,Vol.8,(2),pp.87-109.2020.	2020
A. A. Salama, M. Fazaa, M. S Yahya, M. Kazem, Neutrosophic Information Systems for Antivirus, (An Applied Study on Corona Virus), The online World Summit on Medical sciences, Pharmaceutical sciences and Nursing sciences research (WOMPAN 2020) is on 30th & 31st May organized by ICMSR and NAPA under the supervision of Eudoxia Research Centre, India.	2020
A.A.Salama, Neutrosophic Mathematical Information Systems Neutrosophic Statistical Data Analysis“Applied Studies”Online International Conference, (2020) Eudoxia Education,Government of India on April 29-30.	2020
A. A. Salama, Neutrosophic Data,”Online International Conference,(2020) Eudoxia Education,Government of India on May 7-8.	2020
A. A. Salama, Structure of Paper, Research Team & Neutrosophic Science International Association, TOUROMP 2020”Online International Conference,(2020) Eudoxia Education,Government of India on May 17-18. http://eudoxiaeducation.com/world-summit-wompan-2020/	2020
Osama Mohamed Elsadoni, A.A. Salama, Florentin Smarandache, Neutrosophic Effectiveness of Web 2.0 in Developing the Performance in Nursing Faculty, The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University, Egypt 2020, Neutrosophic Mathematical Systems and Nursing Scientific Research.	2020
A.A. Salama, Belal Amin, Mona Gamal, M. El-Henawy, Florentin Smarandache, Neutrosophic Simulation for the Cardiotocography Dataset Classification, The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University, Egypt 2020, Neutrosophic Mathematical Systems and Nursing Scientific Research.	2020
A. A. Salama, Neutrosophic Information system to improve, save and retrieve documents, The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University, Egypt 2020, Neutrosophic Mathematical Systems and Nursing Scientific Research.	2020
A. A. Salama, Rafif Alhabib, Florentin Smarandache, The Neutrosophic Time Series of the Liver Patient, The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University 2020,Neutrosophic Mathematical	2020

Systems and Nursing Scientific Research.	
A.A. Salama, Magdy Badran, Ahmed Sharaf Al-Din, Issam Abu Al-Qasim, Support and Decision Making for Neutrosophic Data,"Applied Study on the Suez Canal Port" The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University, Egypt 2020, Neutrosophic Mathematical Systems and Nursing Scientific Research	2020
A. A. Salama, M. Fazaa, M. S Yahya, M. Kazem, Part 1-Education in the Corona virus time: challenges and opportunities, Part 2-Intelligent Neutrosophic Information Systems for Diagnosing Corona virus, Online International Conference, (2020). Medi-Caps University, Indore	2020
A.A. Salama, Mohamed Fazaa, Mohamed Yahya, M. Kazim, A Suggested Diagnostic System of Corona Virus based on the Neutrosophic Systems and Deep Learning, I. J. Neutrosophic Science, Vol.9(1), 2020,pp54-59.	2020
A.A. Salama, Florentin Smarandache, Sixth International Scientific Conference, Faculty of Nursing, Port Said University, Egypt 2020, Neutrosophic Mathematical Systems and Nursing Scientific Research.	2020
A.A. Salama, M. Elsayed Wahed, Eman Yousif: A Multi-objective Transportation Data Problems and their Based on Fuzzy Random Variables. Neutrosophic Knowledge, vol. 1/2020, pp. 41-53.	2020
Shimaa Fathi, Hewayda ElGhawalby, A.A. Salama: On Neutrosophic Graph. Neutrosophic Knowledge, vol. 1/2020, pp. 7-13.	2020
A. A. Salama, Rafif Alhabib, Neutrosophic Ideal layers & Some Generalizations for GIS Topological Rules, International Journal of Neutrosophic Science, Vol.8,(1),pp.44-49.2020.	2020
Salama A.A., Eisa M., ElGhawalby H., Fawzy A.E. (2019) A New Approach in Content-Based Image Retrieval Neutrosophic Domain. In: Kahraman C., Otay İ. (eds) Fuzzy Multi-criteria Decision-Making Using Neutrosophic Sets. Studies in Fuzziness and Soft Computing, vol 369 (pp.361-369),Springer,Cham.	2019
Belal Amin, Mona Gamall, A.A.Salama, I.M.El-Henawy, Classifying Cardiotocography Data based on Rough Neural Network, International Journal of Advanced Computer Science and Applications, Vol. 10, No. 8, 2019, pp352-356.	2019
A. A. Salama, M .Elsayed Wahed, Eman Yousif, Fuzzy Random Based on Multi-objective Transportation Data Problems, International Conference on Science and Technology 10-13 March 2019 Turkey.	2019
A.A.Salama , Hewayda ElGhawalby , A.M.Nasr, On Neutrosophic Crisp Relations, International Journal of Neutrosophic Science, Vol.0(1),pp.35-46,2019.	2019
A.A.Salama , Hewayda ElGhawalby , A.M.Nasr, Star Neutrosophic Fuzzy Topological Space, International Journal of Neutrosophic Science (IJNS) Vol. 0, No. 2, PP. 77-82, 2019.	2019
A. A. Salama, Neutrosophic Crisp β- Functions, I. J. Neutrosophic Science. Vol. 0, No. 2, PP. 90-99, 2019.	2019
A.A.Salama, Elsayda .H. Nasr, A Nursing Expert System Aided by Neutrosophic Logic for Preventing Pressure Ulcer Development in Surgical Patients, The Fifth International Scientific Conference of the Faculty of Nursing, Port Said University 2019.	2019
A.A.Salama, Elsayda .H. Nasr, Neutrosophic Analytic Hierarchy Process in Clinical Nursing, The Fifth International Scientific Conference of the Faculty of Nursing, Port Said University 2019.	2019
A.A.Salama and H. A. Elmaleh, Neutrosophic and alternative Opportunity Cost in Nursing Decision, The Fifth International Scientific Conference of the Faculty of Nursing, Port Said University 2019.	2019
A.A. Salama, Neutrosophic Information Systems and Nursing Scientific Research, The Fifth International Scientific Conference of the Faculty of Nursing, Port Said University 2019.	2019
A.A. Salama, Elsayda .H. Nasr and H. A. Elagamy, DNA Neutrosophic Topology, The Fifth International Scientific Conference of the Faculty of Nursing, Port Said University 2019.	2019
Ph. D., Formulation of The classical probability and some probability distributions due to Neutrosophic logic and its impact on Decision Making (Arabic), PhD Thesis, by Rafif Alhabib, under the supervision of Dr. M .M .Ranna, Dr. H .Farah, Dr. A.A.Salama, Faculty of Science, Department of Mathematical Statistics, University of Aleppo, Syrian Arab Republic, 2019.	2019
Ph. D., Security in Mobile Ad-hoc Networks using Neutrosophic Technique, PhD Thesis, by Haitham Samy Mohammed Elwahsh, supervised by Prof. Dr. Ibrahim Mahmoud ELhenawy & Prof. Dr. Ahmed Abdel-Khalek Salama, Faculty of Science, Port Said University, Egypt, 2019.	2019

Ms. C., Neutrosophic Approach for Mathematical Morphology, MSc. Thesis, by Eman Marzouk El-Hassanein Abd El-Samad El-Nakeeb, under the supervision of Prof. Dr. Samy Ahmed Abd El-hafeez, Prof. Dr. Ahmed Abd El-khalek Salama, Dr. Hewayda Abdel Hameed El Ghawalby, Faculty of Science, Department of Mathematics and Computer Science, Port Said University, Egypt, 2019.	2019
Elwahsh, H., Gamal, M., Salama, A., & El-Henawy, I. (2018). A novel approach for classifying MANETs attacks with a neutrosophic intelligent system based on genetic algorithm. Security and Communication Networks, vol.2018, pp1-7. https://www.hindawi.com/journals/scn/2018/5828517 /	2018
ElWahsh, H., Gamal, M., Salama, A., & El-Henawy, I. (2018). Intrusion detection system and neutrosophic theory for MANETs:A comparative study, Neutrosophic Sets and Systems, 23, pp16-22.	2018
A. A. Salama, Rafif Alhabib. (2018). Neutrosophic decision making & neutrosophic decision tree (Arabic version). Albaas Unvi., 40(17), 11-26.	2018
A.A. Salama, Hewayda ElGhawalby, Asmaa.M. Nasr. (2018). Retract neutrosophic crisp system for gray scale image .Asian Journal of Mathematics and Computer Research, 3, 104-117.	2018
Salama, A., Smarandache, F., ElGhawalby, H. (2018). Neutrosophic approach to grayscale images domain. Neutrosophic Sets and Systems, 21, pp13-19.	2018
AA Salama, Mohamed Eisa, Hewayda ElGhawalby, AE Fawzy. (2018). Neutrosophic Image Retrieval with Hesitancy Degree, New Trends in Neutrosophic Theories and Applications, Pons Editions Brussels, Belgium, EU, vol.2,pp237-242.	2018
Yosef, E., Salama, A., & Wahed, M. E. (2018). Big data flow adjustment using knapsack problem. Journal of Computer and Communications, 6(10), 30-39.	2018
Ashery Heba, A.A. Salama. (2018). Expert system for decision making, Applied study, Egyptian Journal for commercial Studies, 1(74), pp1-34.	2018
Ashery Heba,A.A. Salama.(2018).The most Important Fuzzy Variables Related to Development Projects to Suez Canal,Egyptian Journal for commercial Studies, 2(74),pp1-37.	2018
Ms. C., A Study of Neutrosophic Topological Spaces, MSc. thesis, by Majdi Saleh Ahmed Dabash, Supervisors I.M. Hanafy & A.A. Salama, Department of Mathematics & Computer Science Faculty of Science, Port Said University, Egypt, 2018.	2018
Haitham ELwahsha , Mona Gamala, A. A. Salama, I.M. El-Henawy.(2017). Modeling Neutrosophic Data by Self-Organizing Feature Map: MANETs Data Case Study, Procida Computer, Vol.121, pp152-157, 2017.	2017
A A Salama, Mohamed Eisa and A. E. Fawzy. (2017) A Neutrosophic Image Retrieval Classifier. International Journal of Computer Applications 170 (9):1-6, July 2017	2017
A. A. Salama, Hewayda Elghawalby, Asmaa M Nasr: Retract Neutrosophic Crisp Information Systems. The Third International Scientific Conference of the Faculty of Nursing Port Said University 2017; 04/2017	2017
A. A. Salama, S. A. El-Hafeez, Hewayda Elghawalby, Eman M El-Nakeeb: Neutrosophic Crisp Mathematical Morphology & Medical Images. The Third International Scientific Conference of the Faculty of Nursing Port Said University 2017, Port Said; 04/2017.	2017
A A Salama, S A El-Hafeez, Hewayda Elghawalby, Eman M El-Nakeeb: Medical Images Edge Detection via Neutrosophic Mathematical Morphology. The Third International Scientific Conference of the Faculty of Nursing Port Said University 2017, Port Said; 04/2017.	2017
A.A. Salama, Mohamed Eisa, Hewayda ElGhawalby, A. E.Fawzy: Medical Image Retrieval via Neutrosophic Domain. The Third International Scientific Conference of the Faculty of Nursing Port Said University 2017, Port Said; 04/2017.	2017
A.A. Salama, Florentin Smarandache, Neutrosophic Information Systems and Nursing Scientific Research. The Third International Scientific Conference of the Faculty of Nursing Port Said University 2017.	2017
A.A. Salama , Hewayda Elghawalby and Eman Marzouk, Neutrosophic Mathematical Morphology, Nursing Conference21–22th, Port Said, Egypt , 2016.	2016
A.A. Salama, Hewayda ElGhawalby, Image Analysis and Processing using Neutrosophic and Neutrosophic Topology and manifold learning in Progress, 2nd Nursing Conference21–22th, Port Said, Egypt, 2016.	2016
A. A. Salama, Mohamed Eisa, Hewayda ElGhawalby, A.E. Fawzy (2016). Neutrosophic Features for Image Retrieval, Neutrosophic Sets and Systems, vol. 13, pp.56-61.	2016
A.A. Salama, I.M.Hanafy, Hewayda ElGhawalby and M.S.Dabash, Some GIS Topological Concepts via Neutrosophic Crisp Set Theory, to be published in the book titled "New Trends in Neutrosophic Theories and Applications", Publisher: Europa Nova, Brussels, 2016.	2016

A. A. Salama, Elhenawy, Bondok: Neutrosophic Data Warehouse Operations for Supporting Decision making. international conference on Mathematics Statistics and information Technology, Egypt; 12/2016	2016
E.M.EL-Nakeeb; A.A. Salama; Hewayda El Ghawalby, Neutrosophic Mathematical Morphology for Medical Image, Nursing Conference21–22th, Port Said, Egypt , 2016.	2016
A. A. Salama, Mohamed Eisa, S.A.El-Hafeez, M. M. Lotfy. (2015). Review of Recommender Systems Algorithms Utilized in Social Networks based e-Learning Systems & Neutrosophic System, Neutrosophic Sets and Systems, vol. 8, 2015, pp.32-41.	2015
A. A. Salama, M.M.Eisa, S.A.El-Hafeez , M.M.Lotfy.(2015). Social Networks based e-Learning Systems via Review of Recommender Systems Techniques, Int. J. of Computer Science & Network Solutions, Vol.(3), No.(1). Pp.21-48, 2015.	2015
A.A. Salama, Haitham A. El-Ghareeb, Ayman M. Manie, Florentin Smarandache. (2014). Introduction to Develop Some Software Programs for Dealing with Neutrosophic Sets, Neutrosophic Sets and Systems, vol. 3, 2014, pp. 51-52.	2014
A. A. Salama, Mohamed Abdelfattah and Mohamed Eisa. (2014). Distances Hesitancy Degree and Flexible Querying via Neutrosophic Sets, International Journal of Computer Applications, Volume 101– No.10, (2014)pp0975 – 8887.	2014
A.A. Salama, Florentin Smarandache, S.A.Alblowi.(2014). The Characteristic Function of a Neutrosophic Set, Neutrosophic Sets and Systems, vol. 3, 2014, pp. 14-17.	2014
A. A. Salama, Florentin Smarandache, Mohamed Eisa. (2014). Introduction to Image Processing via Neutrosophic Techniques, Neutrosophic Sets and Systems, Vol. 5, 2014, pp. 59-64.	2014
A. A. Salama, Mohamed Abdelfattah, H. A. El-Ghareeb, A. M. Manie. (2014). Design and Implementation of Neutrosophic Data Operations Using Object Oriented Programming, INTERNATIONAL JOURNAL OF COMPUTER APPLICATION (IJCA) Issue4, Vol. 5 (sep-oct 2014), ISSN-2250-1797	2014
A. A. Salama, Mohamed Eisa and M. M. Abdelmoghny . (2014). Neutrosophic Relations Database, International Journal of Information Science and Intelligent System, 3(1) (2014) pp33-46.	2014
A. A. Salama, Haitham A. El-Ghareeb, Ayman M. Manie M. M. Lotfy. (2014). Utilizing Neutrosophic Set in Social Network Analysis e-Learning Systems, International Journal of Information Science and Intelligent System, 3(2), pp61-72.	2014
A. A. Salama, Said Broumi and Florentin Smarandache. (2014). Introduction to Neutrosophic Topological Spatial Region, Possible Application to GIS Topological Rules. I.J. Information Engineering and Electronic Business, 2014, 6, pp. 15-21.	2014
A. A. Salama, Said Broumi and S. A. Alblowi. (2014). Introduction to Neutrosophic Topological Spatial Region, Possible Application to GIS Topological Rules, I.J.Information Engineering and Electronic Business, 6, pp.15-21,(2014) .	2014
A. A. Salama, Mohamed Abdelfattah, Mohamed Eisa (2014) "A Novel Model for Implementing Security over Mobile Ad-hoc Networks using Intuitionistic Fuzzy Function" International Journal of Computer Science International Journal of Emerging Technologies in Computational and Applied Sciences (IJETCAS) 1), December 2013- February 2014, pp. 01-07 ISSN (Print):	2014
Mohamed Abd El-Fattah, A.A.Salama. (2014). A Conceptual Model for Visual Monitoring Information System (VMIS) for the Strategic Plan International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE), Vol4, Issue-12	2014
A.A. Salama, Mohamed Abdelfattah and S. A. Alblowi. (2014). Some Intuitionistic Topological Notions of Intuitionistic Region, Possible Application to GIS Topological Rules International Journal of Enhanced Research in Management & Computer Applications, ISSN: 2319-7471 Vol. 3 Issue 5, JUNE-2014, pp4-9	2014
M. M. Lofty, A. A. Salama, H. A. El-Ghareeb and M. A. El-dosuky. (2014). Subject Recommendation Using Ontology for Computer Science ACM Curricula, International Journal of Information Science and Intelligent System, Vol.3, (2014)pp199-205	2014
O. S. Alshabrawy, A. e. Hassanien, W. A. Awad and A. A. Salama, "Blind separation of underdetermined mixtures with additive white and pink noises," 13th International Conference on Hybrid Intelligent Systems (HIS 2013), Gammarth, 2013, pp. 305-311. doi: 10.1109/HIS.2013.6920450 Pages 305-311.	2013
M.Hanafy, A.A.Salama, M. Abdelfttah, Y. M.Wazery (2013). AIS Model For BOTNET Detection In MANET using Fuzzy Function, International Journal of Computer Networking, Wireless and Mobile Communications (IJCNWMC) ,ISSN 2250-1568 ,Vol. 3, Issue 1, Mar 2013, 95-102 © TJPRC Pvt. Ltd.	2013
Ossama S. Alshabrawy and Mohamed E. Ghoneim and A. A. Salama and Aboul Ella Hassanien, "Underdetermined Blind Separation of an Unknown Number of Sources Based on Fourier Transform and Matrix Factorization" IEEE Federated Conference on Computer Science and Information Systems (FedCSIS13), pp. 19–25, September 8–11, Kraków, Poland, 2013 https://ieeexplore.ieee.org/document/6643971 /	2013
Ossama S. Alshabrawy, Aboul ella Hassanien, W. A. Awad, A. A. Salama, "Blind separation of underdetermined mixtures with additive white and pink noises", Hybrid Intelligent Systems (HIS) 2013 13th International Conference on, pp. 305-311,	2013

2013. https://ieeexplore.ieee.org/document/6920450 /	
Ossama. S. Alshabrawy, A. A. Salama, Aboul Ella Hassanien , "Underdetermined Blind Source Separation Approach based on S Transform, Rough Set Theory, and General Matrix Factorization" Springer, Soft Computing (SOCO).	2013

Table 2. Studies Related to Mathematics and Statistics Fields

Study	Year
Ahmed B. AL-Nafee, Florentin Smarandache and A. A. Salama, New Types of Neutrosophic Crisp Closed Sets, Neutrosophic Sets and Systems, vol. 36, 2020, pp. 175-183.	2020
Rafif Alhabib and Ahmad Salama, Studying Neutrosophic Variables, Neutrosophic Theories in Communication, Management and Information Technology, Series: Mathematics Research Developments, ISBN: 978-1-53617-485-4, Categories: Nova, 2020, Mathematics,	2020
Alhabib, Rafif, A. A. Salama. "The Neutrosophic Time Series-Study Its Models (Linear-Logarithmic) and test the Coefficients Significance of Its linear model." Neutrosophic Sets and Systems 33.1 (2020) pp105-115.	2020
Alhabib, Rafif, and A. A. Salama Using Moving Averages To Pave The Neutrosophic Time Series, International Journal of Neutrosophic Science (IJNS),3,1(2020),pp14-20.	2020
Alhabib, Rafif, and A. A. Salama, Introduction to Neutrosophic Statistics, , Education Publishing, 1313 Chesapeake Avenue, Columbus, Ohio 43212, USA, Arabic Book.	2020
A. A. Salama, H. A. Elagamy, Neutrosophic Fuzzy Ideal Open Set and Neutrosophic Fuzzy Ideal Closed Set, The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University 2020,	2020
A.A. Salama, H. A. Elagamy, Neutrosophic Fuzzy Bitopological Ideals Spaces, The Sixth International Scientific Conference of the Faculty of Nursing, Port Said University, Egypt 2020, Neutrosophic Mathematical Systems and Nursing Scientific Research.	2020
A. A. Salama, Florentin Smarandache: Neutrosophic Local Function and Generated Neutrosophic Topology. Neutrosophic Knowledge, vol. 1/2020, pp. 1-6.	2020
Alhabib, Rafif; Moustafa Mzher Ranna; Haitham Farah; and A.A. Salama. (2019)."Some Neutrosophic Probability Distributions. Neutrosophic Sets and Systems vol 22, pp.30-38.	2019
A.A.Salama , Hewayda ElGhawalby , A.M.Nasr, On Neutrosophic Crisp Relations, International Journal of Neutrosophic Science, Vol.0(1),pp.35-46,2019.	2019
A. A. Salama, Neutrosophic Crisp β- Functions, I. J. Neutrosophic Science. Vol. 0, No. 2, PP. 90-99, 2019.	2019
A.A.Salama , Hewayda ElGhawalby , A.M.Nasr, Star Neutrosophic Fuzzy Topological Space, International Journal of Neutrosophic Science (IJNS) Vol. 0, No. 2, PP. 77-82, 2019.	2019
A. A. Salama, Kawser El-Hassan, Introduction to Neutrosophic Measure, Neutrosophic Integral, and Neutrosophic Probability, Education Publishing, 1313 Chesapeake Avenue, Columbus, Ohio 43212, USA. Arabic Book.	2019
A.A. Salama, I.M Hanafy, M.S. Dabash. (2018). Semi-compact and semi-lindelöf spaces via neutrosophic crisp set theory. Asia Mathematika, 2(2), 41-48.	2018
A. A. Salama, Rafif Alhabib.(2018). Some neutrosophic probability distributions. Neutrosophic Sets and Systems, 22, 30-38.	2018
A.A.Salama, Rafif Alhabib.(2018).Studying the random variables according to neutrosophic logic (Arabic version). ALbaath University Journal, 40(3), 129-151.	2018
Alhabib, R., A, Mzher Ranna, M., Farah, H., & Salama, A. A. (2018). Foundation of Neutrosophic Crisp Probability Theory. "Neutrosophic Operational Research" Volume III. Pons Editions Brussels, Belgium, EU	2018
A.A. Salama, Hewayda ElGhawalby, Shimaa Fathi Ali. (2017). Topological Manifold Space via Neutrosophic Crisp Set Theory, Neutrosophic Sets and Systems,Vol.15, 2017, pp.18-21.	2017
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3. Digital Transformation

Recently, Information and Communication Technology (ICT) has been developed and widely spread which led to the emergence of digital transformation trend around the world. In this regard, the wide spread of ICT in daily life can be shown in the next Figure 2, which shows the developments of various elements developments of ICT from (2001 to 2018) relevant to the International Telecommunication Union (ITU) [7, 12, 13].

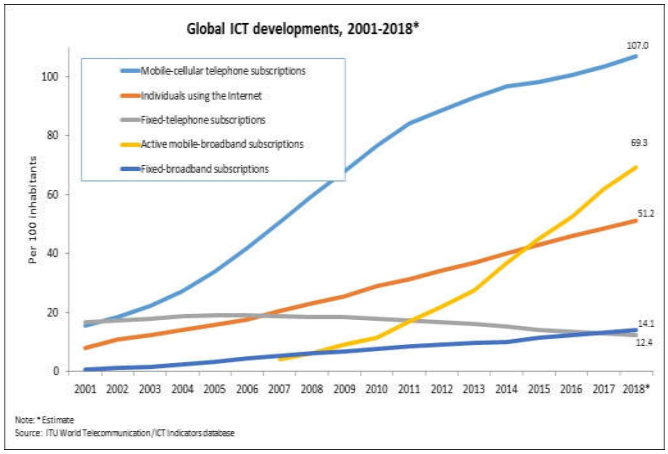


Figure 2. ICT developments (2001 - 2018) [7]

Moreover, the Internet is considered as the major aspect of ICT and became more available globally. In the last few years, it is remarkable that Internet usage has spread exponentially by users. According to ITU statistics, Figure 3, indicates the Internet users percentage through the period from 2005 – 2019.

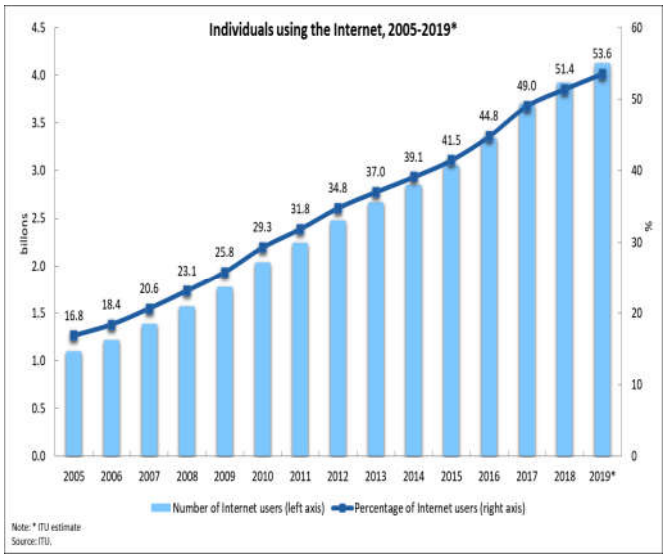


Figure 3. Individuals using Internet, 2005-2019 [8]

Digital transformation is becoming a buzzword draws attention and interest of many individuals, researchers, institutions, organizations and countries. According to the importance of digital transformation, there are several studies and publications about this trend. Figure 4, indicates a notable increase in publications about digital transformation, especially in the past few years [9].

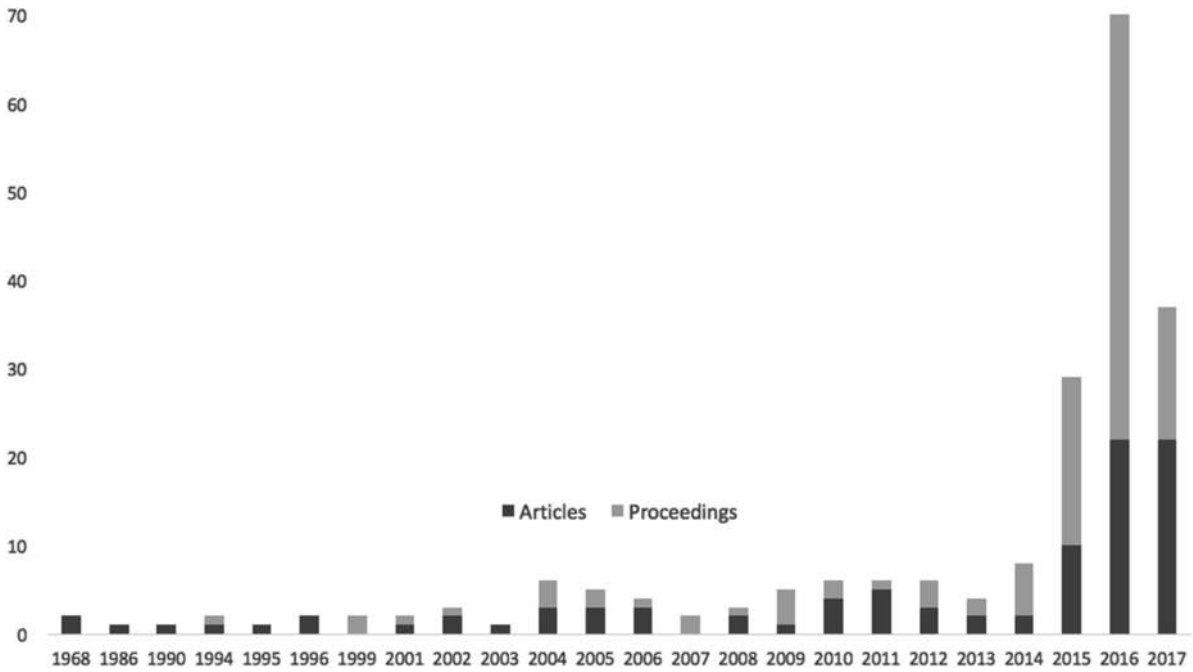


Figure 4. Publications and studies distribution on digital transformation

Digital transformation can be described as the usage of ICT and uptake of digital technologies to providing the capability of reaching more users and changing the styles in which they interact in order to enhance activities and services of individuals, organizations and countries. With no doubt, the digital transformation increasingly began to penetrate into various fields. Prominently, digital transformation has enriched the scientific and academic field such as digital library, remote learning and virtual university (VU).

In the age of information explosion, information services and digital library are a vital activity to meet the needs of users, especially in research trends and modern distinct topics such as Neutrosophic approach. The

research on digital library has drawn attention of the majority of countries around the world. Besides, the terms such as digital library, virtual library or electronic library are used synonymously. On the other side of the coin, the virtual university can embrace a digital library for more harmony in order to extend and enhance its mission and vision.

The virtual university is a prominent example of digital transformation trend and information and communication technology usage. It is a powerful trend, climate for research and can offer great potentials, especially in sensitive times. The mission of virtual university is like a classical university except that learning delivery ways are different.

Besides, virtual university is connected to some key approaches, e.g. virtual learning, virtual learning environment, virtual world and virtual reality. The virtual university in any region can extend its mission by connecting it to the traditional universities in the same region. There are several research initiatives to design a strategic model of virtual university such as mentioned in the previous study [10], which provided a strategic model of virtual university as indicated in the Figures 5-9.

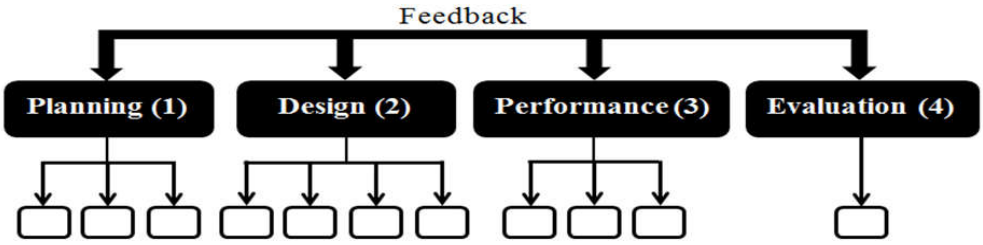


Figure 5. VU model [10]

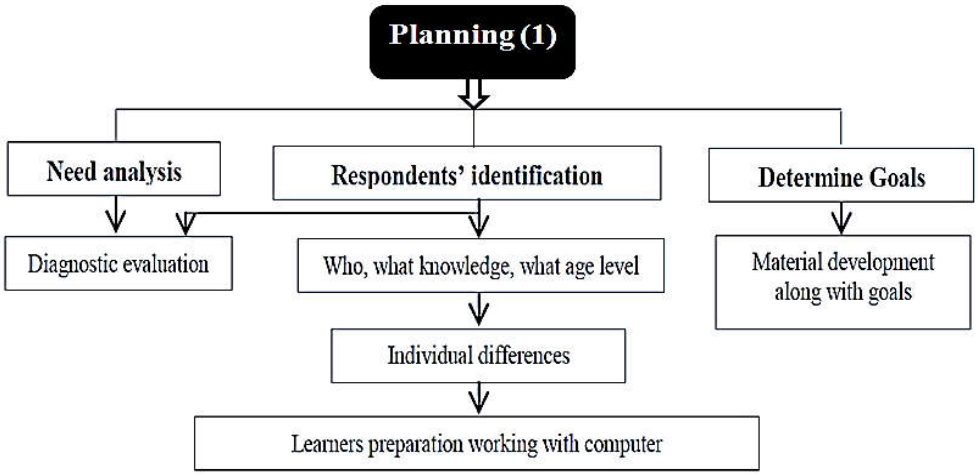


Figure 6. Describes 1st phase (Planning) [10]

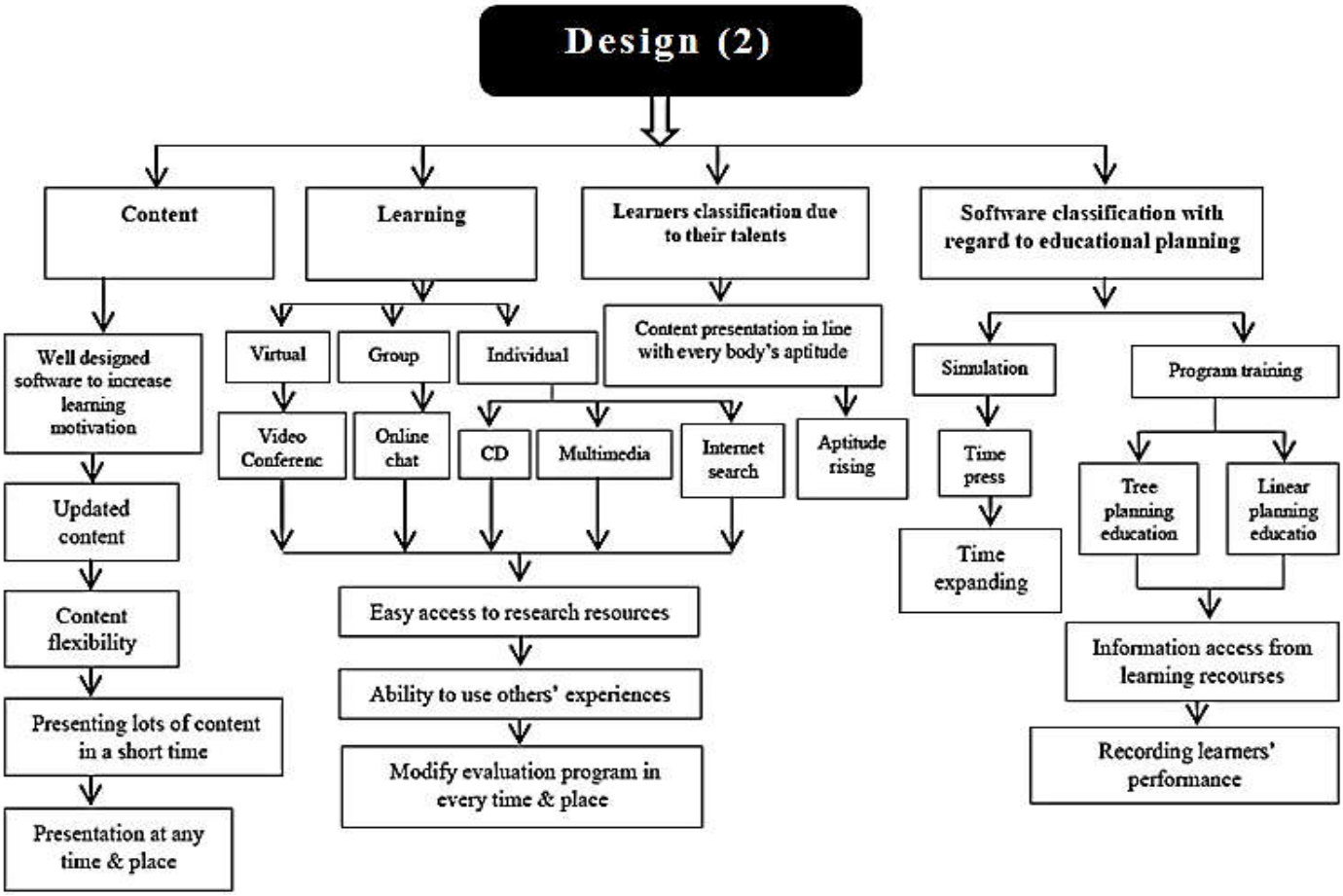
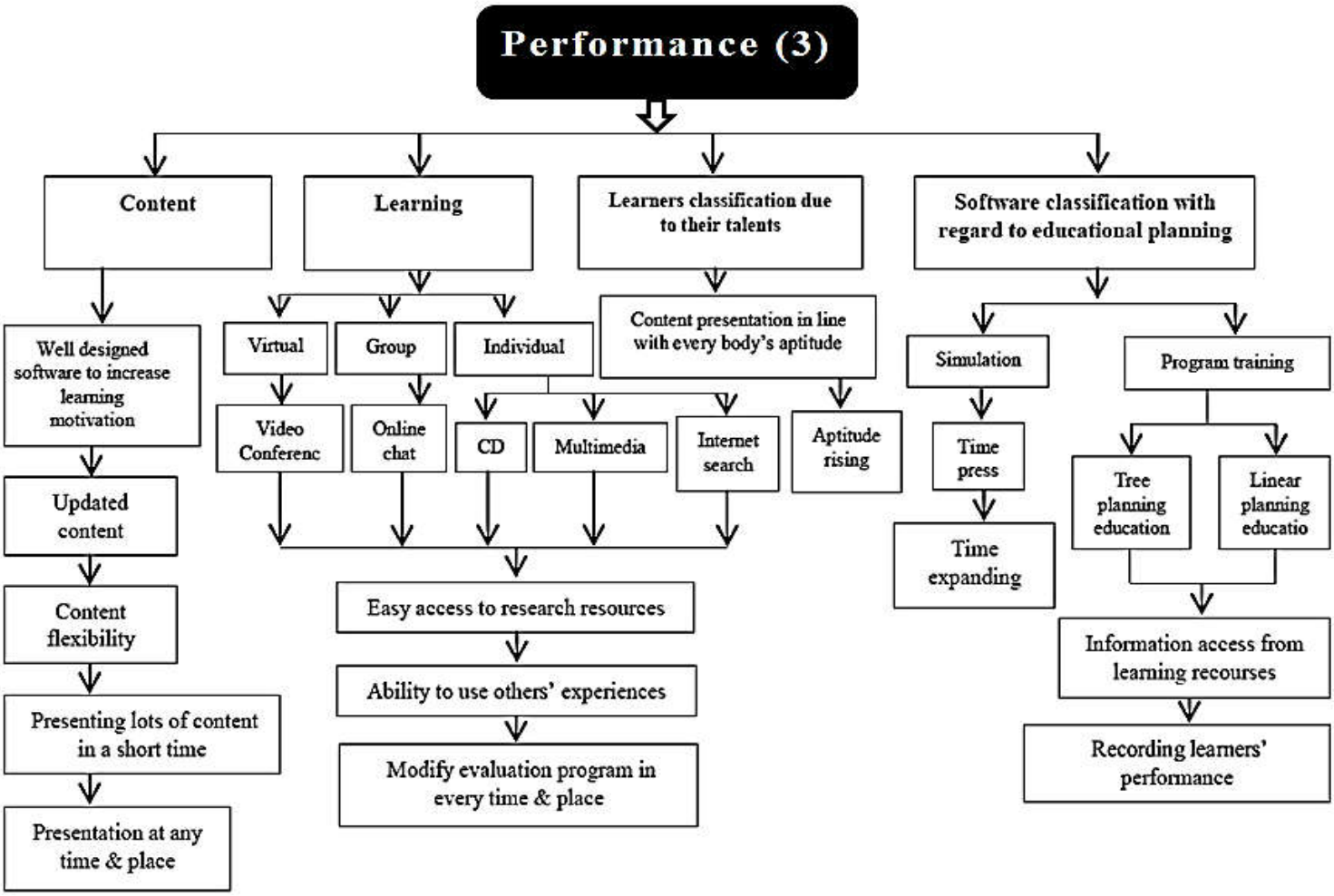


Figure **7.** Describes 2nd phase (Design) [10]

Figure 8. Describes 3rd phase (Performance) [10]



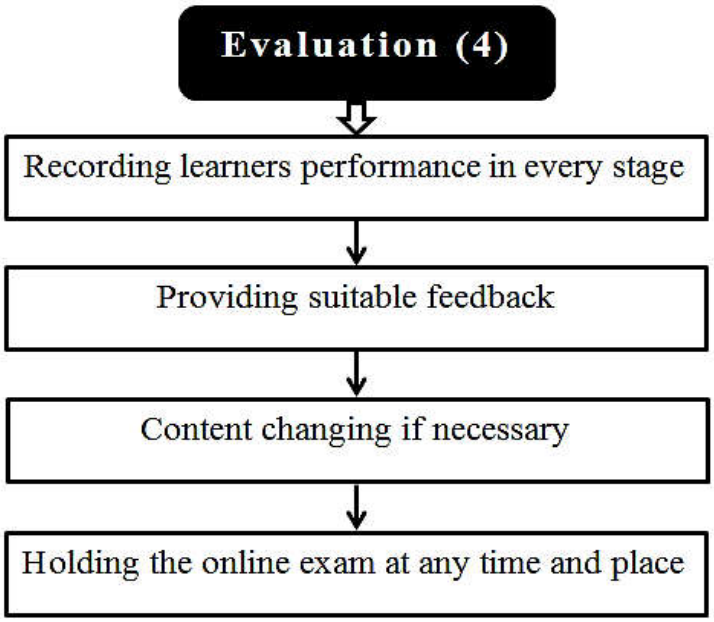


Figure 9. Describes the 4th phase (Evaluation) [10]

4. Recommendation and Vision

Currently, neutrosophic approach is a valuable approach which considered as a scientific phenomenon and penetrates the majority of fields. Thus, creating a digital library dedicated to neutrosophic approach as a digital vision is recommended for more fostering collaboration of this significant approach. The major features of digital library can be stated as follows:

Gathering, storing, cataloguing, delivering, indexing and retrieving of information- browsing and navigation -cooperation and integration through other resources, materials, services or libraries- accessibility, searchability, availability and usability-user friendly-user centered interface-social interaction-relevant and timely content- dissemination and finding information- no physical boundary- round the clock accessibility and availability.

Undoubtedly, traditional learning process can be affected by some critical factors. Figure 10 can show some critical factors affecting traditional learning process, especially in higher education and practical colleges such as medicine, nursing, engineering and science.

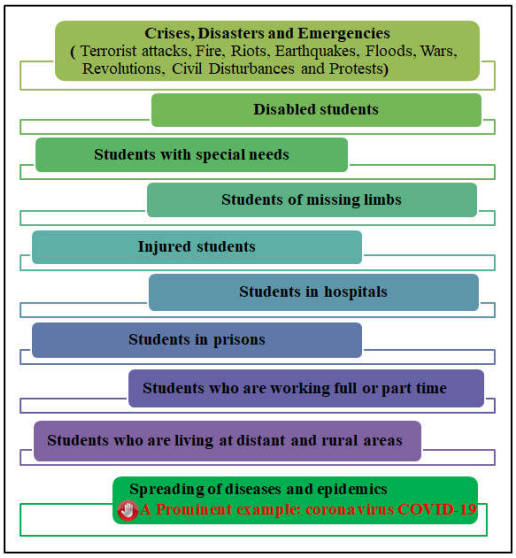


Figure 10. Examples of critical factors affecting learning process

Additionally, for example, the study process suspension in last periods in Egypt due to some hot cases such as an Egyptian military campaign in Sinai against terrorist attacks, a rainstorm and corona virus global crisis. Therefore, founding a virtual university in Egypt as a digital vision is recommended for confronting these critical factors. Moreover, the virtual university can provide extraordinary opportunities for students. This virtual university can extend its mission by connecting it to existing Egyptian traditional universities. By virtual university, students can learn any content, anytime and anywhere as a slogan of digital transformation age which mentioned in the Figure 11.

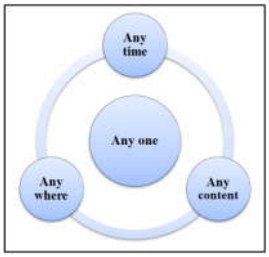


Figure 11. Key trends of virtual university

5. Possible Neutrosophic Application of VU

As it was mentioned before in this paper, it is possible that the existing Egyptian traditional universities may be different in their system and technological means. Hence, a unified system to link these different

systems is required under a digital umbrella such as virtual university. This dilemma can be handled from Neutrosophic approach perspective as follows:

- Figure 12, shows the schema of a Neutrosophic classification system [11].
- Neutrosophic components values (T, F and I) are independent.
- Although these components working independently, a correlation between membership functions of Neutrosophic components(T, F and I) is drawn in order to capture the truthness, falsity and indeterminacy of input and output.

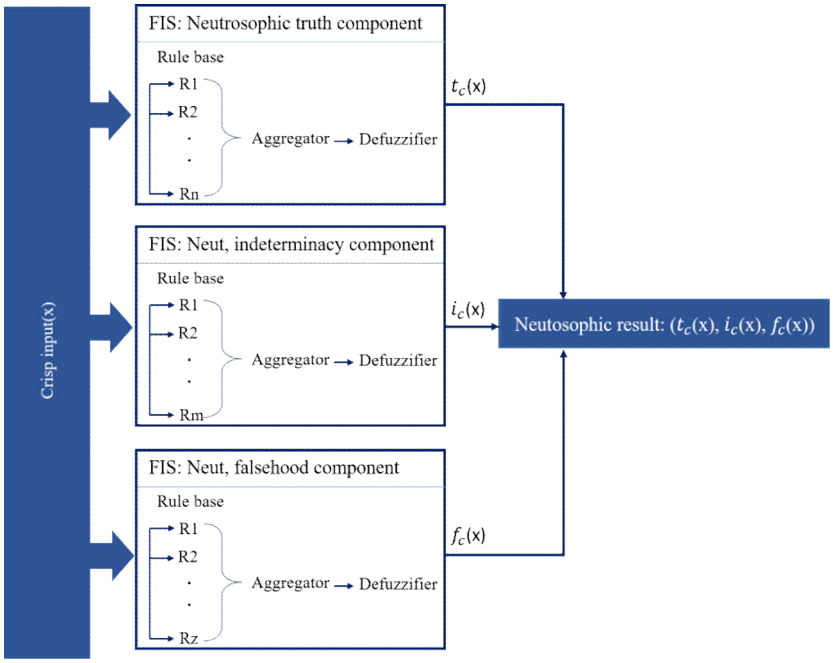


Figure 12. Schema for Neutrosophic components [11]

Neutrosophic Rule based System (NRS) uses Neutrosophic logic as a method to represent various kinds of knowledge about the under study issue (problem), in addition to modeling the interactivities and relations which exist between its items (variables). The general structure of NRS shown in Figure 13.

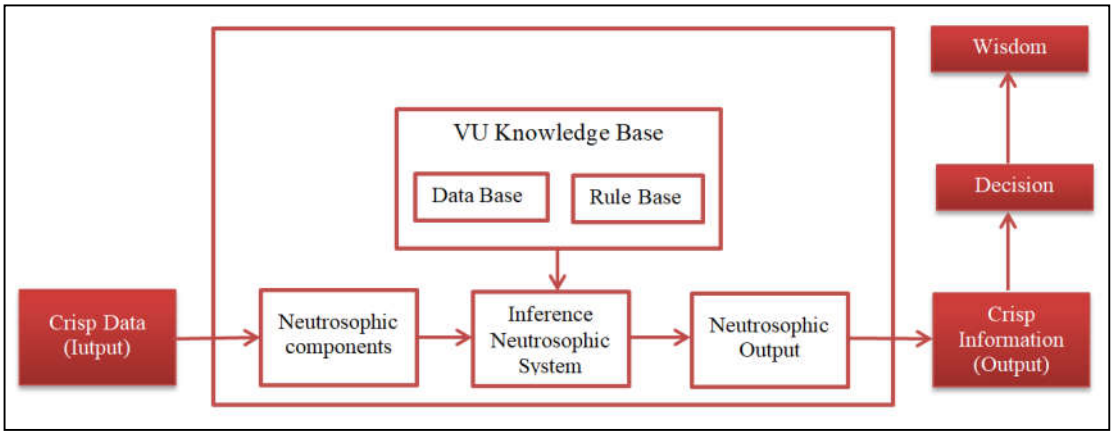


Figure 13. Basic structure of NRS

Let Tu be a universe of Traditional Universities and Wu is a set in Tu. A Neutrosophic for Tu is characterized by three components T, I, and F as follows:

-T refers to membership degree
- F refers to non-membership degree
- I refers to indeterminacy degree

The data base domain is transformed to

$$NDT_U(i,j) = \{T(i,j), I(i,j), F(i,j)\} \quad (1)$$

In this study, we are using a Neutrosophic version of the Euclidean distance. For any two Neutrosophic Sets,

$$A = \{T_A(x), I_A(x), F_A(x)), x \in U\} \text{ and} \quad (2)$$

$$B = \{T_B(x), I_B(x), F_B(x)), x \in U\} \text{ in} \quad (3)$$

$$U = \{u_1, u_2, u_3, \dots, u_n\} \text{ then} \quad (3)$$

The Neutrosophic Euclidean distance is equal to

$$d(A,B) = \sqrt{\sum_{i=1}^{n} ((T_A(x_i) - T_B(x_i))^2 + ((I_A(x_i) - I_B(x_i))^2 + ((F_A(x_i) - F_B(x_i))^2} \quad (4)$$

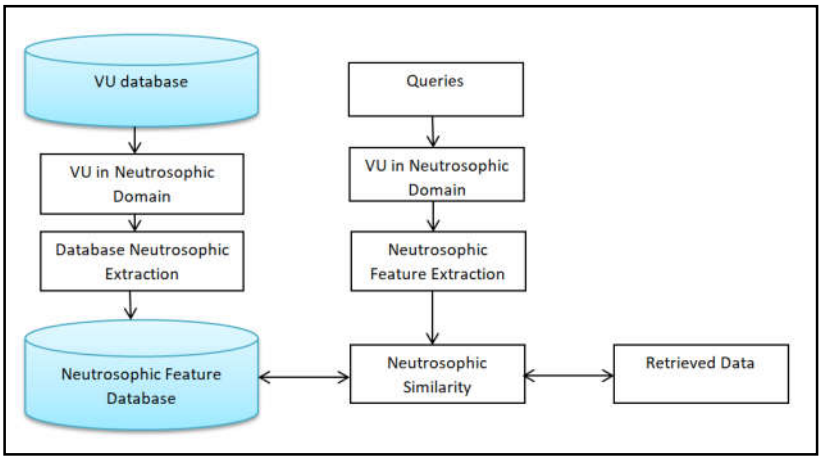
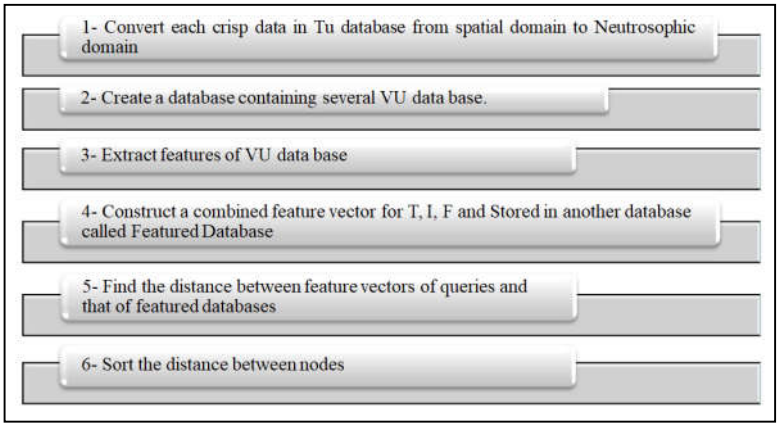


Figure 14. Neutrosophic VU classifier Architecture

The algorithm for the proposed system is given below which presented in Figure 14:



The next Figure 15 may represent Neutrosophic data warehouse Model for Tu.

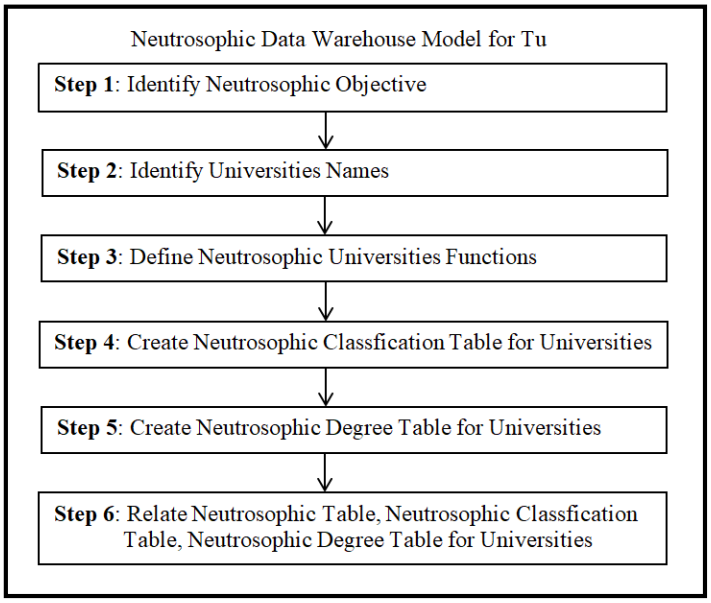


Figure15. Neutrosophic data warehouse Model for Tu

6. Conclusion

The concluding remarks can be stated as follows:

- ICT is a focal tool for digital transformation.
- Digital library and virtual university are special aspects of digital transformation
- Implementation of a digital library dedicated to Neutrosophic approach is a digital vision and research repository for this salient approach.
- A virtual university in Egypt as a digital vision can play a vital role and it can provide extraordinary opportunities for students, especially in critical times. The virtual university can extend its mission and vision by embracing a digital library for more effectiveness.
- Over recent years, there are several new scientific approaches have enriched several sectors. Neutrosophic approach is a valuable scientific field which can offer a great potential in many areas and it became a fashionable word and global logic. The first fingerprint of this approach is owned by the American mathematician, experimental writer and innovative painter prof.Florentin Smarandache.
- Neutrosophic approach is a rapid growing trend and it is a robust and effective tool in varied fields such as computer sciences, information systems Mathematics, Statistics medicine, nursing, engineering, commerce, etc.
- Neutrosophic approach provides a worthwhile means of scientific research and opens new prospects.
- Neutrosophic approach has increased popularity around globe and drawn attention for the-research audience.
- The most prominent researcher in Africa prof. Ahmed Abdel Khalek Ahmed Salama has presented valuable publications on Neutrosophic approach during the second decade of the 21st century.

Ultimately, the research on Neutrosophic approach has offered fruitful outcomes. It is still full of research chances and becomes a significant field for the researchers of tomorrow. From the future direction aspect, it is possible to create an Egyptian satellite for academic and instructional purposes.

Acknowledgment

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