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 "Neurophy".
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

\[
\begin{align*}
T & \text{ refers to the degree of truth} \\
F & \text{ refers to the degree of false} \\
I & \text{ refers to the level of indeterminacy}
\end{align*}
\]

Neutrosophic logic was grown and expanded as an alternative trend to the traditional logics and it represented and described as 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).

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

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
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<tbody>
<tr>
<td>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 &amp; 31st May organized by ICMSR and NAPA under the supervision of Eudoxia Research Centre, India.</td>
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Table 2. Studies Related to Mathematics and Statistics Fields

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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].

![Global ICT developments, 2001-2018](image)

**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]](image-url)
Figure 6. Describes 1st phase (Planning) [10]

Design (2)

- Content
  - Well designed software to increase learning motivation
  - Updated content
  - Content flexibility
  - Presenting lots of content in a short time
  - Presentation at any time & place

- Learning
  - Virtual
  - Group
  - Individual
  - Easy access to research resources
  - Ability to use others’ experiences
  - Modify evaluation program in every time & place

- Learners classification due to their talents
  - Content presentation in line with every body’s aptitude

- Software classification with regard to educational planning
  - Simulation
    - Time press
    - Time expanding
  - Program training
    - Tree planning education
    - Linear planning education
  - Information access from learning resources
  - Recording learners’ performance

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

Figure 8. Describes 3rd phase (Performance) [10]
Figure 9. Describes the 4\textsuperscript{th} phase (Evaluation) [10]
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](image)

**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](image)

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

\[ A = \{ T_1(x), I_1(x), F_1(x), x \in U \} \]  

(2)

\[ B = \{ T_2(x), I_2(x), F_2(x), x \in U \} \]  

(3)

The Neutrosophic Euclidean distance is equal to

\[
d(A, B) = \sum_{i=1}^{10} ((T_1(x_i) - T_2(x_i))^2 + (I_1(x_i) - I_2(x_i))^2 + (F_1(x_i) - F_2(x_i))^2) 
\]

(4)

Figure 14. Neutrosophic VU classifier Architecture

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

1- Convert each crisp data in Tu database from spatial domain to Neutrosophic domain

2- Create a database containing several VU data base

3- Extract features of VU data base

4- Construct a combined feature vector for T, I, F and Stored in another database called Featured Database

5- Find the distance between feature vectors of queries and feat of featured databases

6- Sort the distance between nodes

The next Figure 15 may represent 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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