

Ranking Egyptian Universities Using Fuzzy Logic

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Abstract—

During the last quarter of a century, university ranking systems have been developed as an outcome of new academic fields and metrics. Although they have attracted wide attention from policy makers, students, academicians, authorities and the media, they have been subjected to criticism. Any university that does not change as with the environment around them is doomed to fail. The results of universities in international rankings are a disturbing and foreboding danger. Universities are seeking to improve its services, students, citizens and visitors, to achieve better results in the international rankings.

The objective of this study is spread public awareness of the importance of ranking of universities and higher education institutions, and push these institutions towards excellence and competition in the quality of scientific research and academic performance, and spreading the culture of the orientation about the universities rankings and higher education institutions in Egypt.

By using web service we have collected data on Egyptian Universities of interest from a more number of web Services for fifteen Indicator each Egyptian University, We have constructed the weight matrix for the Indicator, Where an algorithm was created to Ranking the Egyptian universities using the membership function (trapezoidal) in fuzzy logic Has been applied the fuzzy logic algorithm on the that data, we have compared the results with some International rankings for example (QS,U.S Nwes, Webmatix).

This study showed positive results about comparing the results we get with some of the global rankings, the study confirmed that the Egyptian universities have high capabilities in the field of scientific research.

Keywords—University ranking, Fuzzy logic, fuzzy set, Membership Function

I. INTRODUCTION

One of the most important features of higher education associations is rankings. In the evaluation of university quality, academic performance has a key role in the academic improvement of any university. The rankings help universities become aware of their current status in terms of performance. It also serves a role in helping to setting and achieving meaningful short term and long term goals. In other words, how meaningful goals are set depends on how successful the rankings conducted. Successful rankings also depend on how the indicators selected. In short, indicators, evaluation, awareness and goals are heavily correlated terms. [1, 2]

In part, this is because of the increasing spirit of competition between institutions as they strive to recruit students, to secure commercial and other research funding and to enhance their prestige. Also, it is a mechanism providing information about the comparative standings of institutions demanded by applicants, parents and society. International rankings claim to provide a more objective account of relative quality than perceptions based simply on the history and reputation. To some extent, they claim to enable not only institutions but systems as a whole to be compared between countries. [3]

Consequently, ranking systems have gained wide attention in the last decade. With the introduction of the first institution-based ranking system in 1983 named US News Ranking, there have been several other systems published in both national and global levels. In parallel with the increase in the number of ranking systems, the debates have also increased. [4, 5]

The systems, especially those that focus on world universities, have been criticised due to a number of reasons. Firstly, indicators have been subjected to criticism since there may be a difference between what is measured and expected to measure. The sources used for collecting data of indicators are another controversial issue due to the lack of objectivity and conformity of sources. Scoring procedure is another weakness of existing global ranking systems. Many of them have insufficient statistical studies. Thus an objective and reliable ranking cannot be developed. The scope of rankings has also been criticized, especially by the universities in developing countries. Finally, the names of institutions can be seen as a crucial weakness of some of the existing systems. Although university alternatives, affiliated institutions, city and country information need to be taken into consideration, global ranking systems may neglect them. [3]

II. UNIVERSITY RANKING SYSTEMS

For a long time, the competition has been evaluated by implicit reputation without any data to back up perceptions. There is a long history of colleges and universities competing for students, teachers, donors, and social support. However, with the heightened competition among universities since the 1990s and the dramatic growth of the international higher education market, surveys have emerged in many countries as a means of evaluating and ranking universities. [6]

Competition has accelerated as governments develop initiatives to build world-class universities that can compete more effectively with other leading institutions across the globe. Although there are concerns with using rankings as a tool for measuring the quality of a university, many institutional leaders and policymakers still often rely on rankings to inform their policy making.

Ranking universities is a challenging task because each institution has its own particular mission, focus and can offer different academic programs. Institutions can also differ in size and have varying amounts of resources at their disposal. Also, each country has its own history and higher education system which can impact the structure of their colleges and universities and how they compare to others. It is therefore very difficult to rank entire universities, especially across national borders, according to the single criterion of ranking indicators. [6]

As a consequence of the development of new metric terms of the study of science, technology, and related issues, ranking systems began to emerge and gained cross-national attention. In this part, besides examination of the systems, many systems will be examined. While examining the systems, the current methodologies are investigated for the ones which are evolved in finally years. [6]

A. Academic Ranking of World Universities (ARWU):

There are multiple world university rankings available with the best-known being the Academic Ranking of World Universities (ARWU), the Webometrics Ranking of World Universities and Times Higher Education World University Rankings each one uses a different methodology. This can sometimes be confusing, as it is not always easy to see why a university is ranked differently, or why the order within a country change depending on which table you view [7]. Chinese President Jiang Zemin stated to have a number of top- class universities at international level and started a project called Project 1985. As a part of this project, Prof. Dr. Nian CAI Liu, a member of Shanghai Jiao Tong University, and other team members focused on comparisons of universities in terms of different criteria. They developed a ranking system called the Academic Ranking of World Universities (ARWU). The original idea behind this ranking was to know the level of Chinese universities in world class universities. ARWU is first published in June 2003 by the Center for World - Class Universities and the Institute of Higher Education of Shanghai Jiao Tong University, China, and then updated on an annual basis. After 2006, ARWU used five different fields to rank top 100 institutions in the world. The fields are; Natural Sciences and Mathematics (SCI), Engineering/Technology and Computer Sciences (ENG), Life and Agriculture Sciences (LIFE), Clinical Medicine and Pharmacy (MED), and Social Sciences (SOC). In 2009, in addition to other general and field rankings of ARWU, a hundred universities were ranked by their subject categories as Mathematics, Physics, Chemistry, Computer Sciences and Economics/Business.

Table.1 Summary of Criteria, Performance Indicators and Weights used for (ARWU) World Rankings [8, 9]

Area	Indicator	Weight	Source
Quality of Education	<i>Number of alumni winning Nobel Prizes in the sciences or Fields Medals in mathematics (Alumni)</i>	10%	<i>Official Nobel Prize site and International mathematical Union for Fields Medals</i>
Quality of Faculty	<i>Number of staff winning Nobel Prizes in the sciences or Fields Medals in mathematics (Award)</i>	20%	
	<i>A number of highly cited researchers (top 250) in 21 broad subject categories (HiCi)</i>	20%	<i>Thomson Reuters websites</i>
Research Output	<i>The Number of ‘articles’ or ‘proceedings papers’ published in Nature and Science over the last five years (N&S)</i>	20%	
	<i>The Number of ‘articles’ or ‘proceedings papers’ indexed in Science Citation Index -Expanded and Social Sciences Citation Index in previous year (PUB)</i>	20%	
Per Capita Performance	<i>Per capita academic performance with respect to the size of an institution (PCP)</i>	10%	<i>ARWU indicators/university data from national agencies</i>

B. The Webometrics Ranking of World Universities

According to Aguillo, Ortega, & Fernández (2008), there has been a higher interest in web indicators development after EICTES (www.eicstes.org) and WISER (www.wiserWeb.org) projects. The Webometrics Ranking of World Universities was also developed based on those projects.

Cybermetrics Lab in Spain develops the Webometrics Ranking of World Universities. The Cybermetrics Lab’s main focus is a quantitative analysis of the Internet and web contents. They are especially dealing with a new discipline, called Cybermetrics or Webometrics. A free electronic journal and Virtual Forum, named Cybermetrics (<http://www.cindoc.csic.es/cybermetrics>), is developed and published since 1997 by this group. This laboratory is attached to the Spanish National Research Council (Consejo Superior de Investigaciones Científicas (CSIC)) whose

history goes back to the beginning of the 1900s. CSIC is research institute which aims to improve scientific and technological levels of Spain and their citizens.

The Webometrics Ranking of World Universities was first published in 2004 with the aim of motivating institutions about web publication. Their current team members are Isidro F. AGUILLO, José Luis ORTEGA, Mario FERNÁNDEZ, Ana UTRILLA and Ana ALARCÓN. At the first release, 1,000 universities are listed according to web criteria. The main motivation of this ranking is “to provide extra motivation to researchers worldwide for publishing more and better scientific content on the web, making it available to colleagues and people wherever they are located.”(World Universities' Ranking On The Web: Methodology).

The ranking collects data both in January and July and publishes them one month later. In July 2010, it was collecting data about 20,000 Higher Education Institutions and ranking, top 12,000 all over the world. [10]

Table2 Summary of Criteria, Performance Indicators and Weights used for Webometrics World Rankings [11]

Criteria	Performance Indicator	Weight
Size	Web pages	20%
Research Output	Rich files	15%
	(Google) Scholar	15%
Impact	(Links) Visibility	50%

C. Times Higher Education World University Rankings

It is an annual publication of university rankings by the Times Higher Education (THE) magazine. It had previously collaborated with QS to announce THE–QS World University Rankings from 2004 to 2009 before the partnership was terminated and both started to publish their own league tables. They chose to cooperate with Thomson Reuters and more recently Elsevier and created a new ranking system. The publication now comprises the world’s overall, subject and reputation rankings, alongside two regional league tables, Asia, BRICS and emerging economies. Times Higher Education World University Rankings are considered one of the most widely observed university majors. It is praised for having a new improved methodology, but undermining non-English instructing institutions and being commercialised are the major criticisms.[12]

Table 3 Summary of Criteria, Performance Indicators and Weights used for THE World Rankings. [13]

Criteria	Performance Indicator	Weight
Teaching -The Learning environment	Reputational Survey-Teaching	15%
	PhD Awards per Academic	6%
	Undergraduates admitted per Academic	4.5%
	Income per Academic	2.25%
	PhD awards/Bachelor’s Awards	2.25
International Mix – Staff & Students	Ratio of international to Domestic staff	3%
	Ratio of International to Domestic students	2%
Research – volume, Income and Reputation	Reputational Survey – Research	19.5%
	Research Income(scaled)	5.25%
	Papers per Academic and Research Staff	4.25%
	Public Research Income/Total Research Income	7.5%
Citations – Research Influence	Citations Impact - Normalized Average Citations per paper	32.5%
Industry Income/Innovation	Research Income from Industry(per academic staff)	2.5%

III. FUZZY LOGIC

The concept of fuzzy logic (FL) was conceived by Lotfi Zadeh, a professor at the University of California at Berkley. It is presented not as a control methodology, but as a way of processing data by allowing partial membership rather than a crisp set membership or non-membership logic. It is the study of the methods and principles of reasoning in all its possible forms. Classical logic deals with propositions that are required to be either true or false. Each proposition has its opposite, which is usually called a negation of the proposition. A proposition and its negation are required to assume opposite truth values. One area of logic, referred to as propositional logic, deals with combinations of variables that stand for arbitrary propositions. These variables are usually called logic variables (or propositional variables). [6, 14, 15]

As each variable stands for a hypothetical proposition, it may assume either of the two truth values; the variable is not committed to either truth value unless a particular proposition is substituted for it. One of the main concerns of propositional logic is the study of rules by which new logic variables can be produced as functions of some given logic variables. It is not concerned with the internal structure of the propositions that the logic variables represent.[16] In this

context, FL is a problem-solving control system methodology that lends itself to implementation in systems ranging from simple, small, embedded microcontrollers to large, networked, multi-channel PC or workstation-based data acquisition and control systems. It can be implemented in hardware, software, or a combination of both. FL provides a simple way to arrive at a definite conclusion based upon vague, ambiguous, imprecise, noisy, or missing input information. FL's approach to control problems mimics how a person would make decisions, only much faster. [17]

A. Membership Functions

A membership function (MF) is a curve that defines how each point in the input space is mapped to a membership value (or degree of membership) between 0 and 1. The input space is sometimes referred to as the universe of discourse, a fancy name for a simple concept. [12]

B. Types of Membership Function:

- Triangular Membership Function.
- Trapezoidal Membership Function.
- Gaussian Membership Function.
- Sigmoidal Membership Function.
- Polynomial based Membership Function

C. Trapezoidal Membership Function

This function is described using the following Equation (3) and Figure (3.3). [12,16]

$$\text{Trapezoid (a,b,c,d)} = \begin{cases} 0 & x \leq a \\ (x-a)/(b-a) & a < x \leq b \\ 1 & b < x \leq c \\ (d-x)/(d-c) & c < x \leq d \\ 0 & d \leq x \end{cases} \quad \text{EQ--->(1)}$$

• Rightmost Trapezoid:

It is a trapezoidal function when the value of a and b equal to the value of the first element in the universe of discourse, and sometimes this function is called Downward Slope. Elements located between b and c have a membership degree 1 while degree decreases for elements located between c and d whenever closer to the element d. Fig1. Gives an example of a rightmost trapezoid function [18]

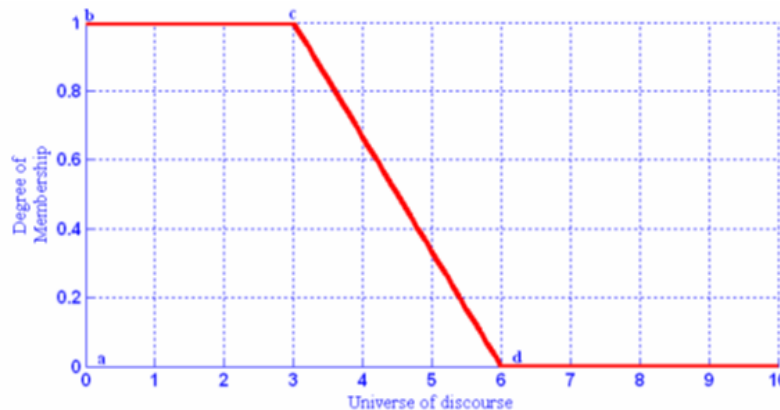


Fig1. Rightmost Trapezoid Function

$$\text{Trapezoid (LOW) (a,b,c,d)} = \begin{cases} 0 & x \leq a \\ (d-x)/(d-c) & c \leq x \leq d \\ 1 & b \leq x \leq c \\ 0 & x > d \end{cases} \quad \text{EQ(2)}$$

▪ Media Trapezoid:

This function is described using the Equation (3) and Fig2.

Where: x: represents real value (Crisp Value) within the universe of discourse. a, b, c, d represent a x-coordinates of the four heads of the trapezoid and values should validate the following condition: a < b < c < d. [18]

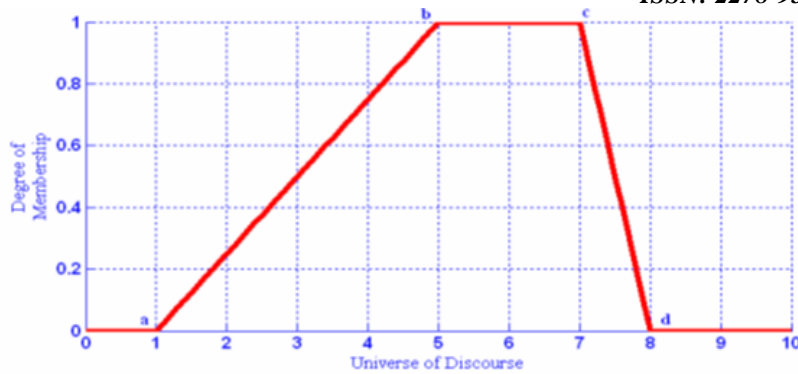


Fig2. Media Trapezoid Function

$$\text{Trapezoid (medial) } (a,b,c,d) = \begin{cases} 0 & x \leq a \\ (x-a)/(b-a) & a \leq x \leq b \\ 1 & b \leq x \leq c \\ (d-x)/(d-c) & c \leq x \leq d \\ 0 & d \leq x \end{cases} \quad \text{EQ--->(3)}$$

▪ Leftmost Trapezoidal:

It is a trapezoidal function when t value of c and d are equal to the value of the last item in the universe of discourse, and sometimes a function is called Upward Slope? Elements between a, b increases are the degree of membership whenever an element is closer to be while elements between b and c has a membership degree 1. Fig3. Gives an example of a trapezoid function [18]:

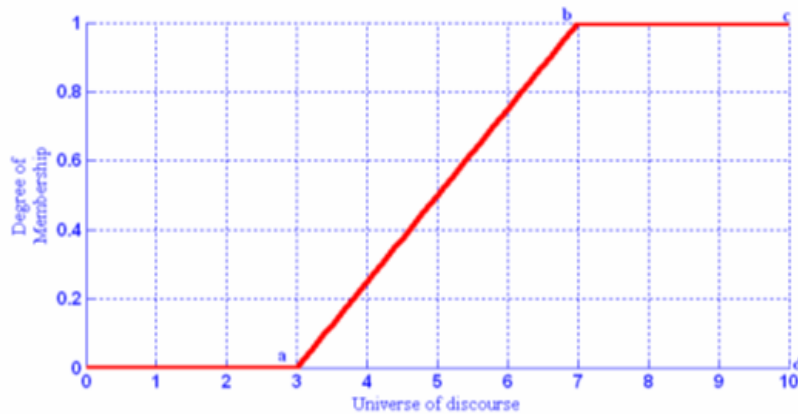


Fig3. Function Leftmost Trapezoid

$$\text{Trapezoidal(high)} = (a,b,c,d) \begin{cases} 0 & x < a \\ (x-a)/(b-a) & a \leq x \leq b \\ 1 & x > b \end{cases} \quad \text{EQ} \rightarrow (4)$$

IV. METHODOLOGY

The Egyptian universities are ranked according to several criteria, including the percentage of faculty members per student, graduates working in the position of chief executive in major companies around the world, international awards including Nobel Prizes, the medals and articles published in the best magazines, faculty members and foreign students in each university. All of these criteria effect the order of the university in this ranking where they are giving each criterion a certain weight according to its importance. Three values are calculated from the fuzzy logic, and the largest values are chosen. All these fuzzy logic values are collected for each university separately, and the universities are ranked according to each sum of these values.

V. GOALS OF EGYPTIAN RANKING FOR UNIVERSITIES

- A. Promote fair competition and advance Egyptian universities.
- B. Support educational institutions physically and morally.
- C. Student helps in the selection of the best universities.

- D. Educate citizens and educational institutions about the importance of ranking and the most important institutions of higher education.
- E. Encouraging universities to compete locally and globally to raise the level of Egyptian students.

Egyptian university rankings should be measured by the score obtained from meeting the set of standards which carry specified weights. This creates a spirit of competition between the Egyptian universities and institutions, thus stimulating these institutions to improve their educational performance and scientific outcome. It encourages a review of study plans and programs, and educational approaches to better serve the interests of students, faculty, and the institution.

Accordingly, we tried as much as possible to reconcile the local, Arab and international requirements to access the desired goal of this research to create a spirit of local competition between universities, and encourage them to improve their educational performance on an ongoing basis.

VI. BASIC CRITERIA IN RANKING

Is given the appropriate weight of the total points. Table 4 gives the details of the criteria and their weights.

Table 4 The details of the indicators and their weights

No	Indicators	Weight
1	quality of education	35%
2	teaching staff	30%
3	research quality	30%
4	foreign arrivals	5%
Total		100%

□ *Quality of Education*

The Quality of Education contains six indicators. Each carries a certain weight according to its importance and the total of these weights is the value of the education quality for each university, the value of these weights is given in Table 5.

Table 5 The details of the Indicator Quality of Education and their weights.

No	Criterion	Weight	Source
1	The proportion of faculty members per student	5%	The Number of Faculty Members / The Total Number of Students
2	The number of university graduates who hold positions of chief executive for major companies in the world for the size of the university	10%	http://cwur.org
3	The proportion of graduate students	5%	The number of graduate students/ The total number of university students
4	The total number of university students	5%	University website
5	Patent	5%	http://cwur.org
6	Number of Colleges accredited	5%	http://www.scu.eun.eg/wps/portal
Total		35%	

□ *Teaching Staff*

This main indicator contains the number of international rewards for each university and the ratio of the foreign teaching staff. All these sub-indicators determine the quality of the teaching staff for each university. Table 6 shows the values of those weights for these indicators.

Table 6 The details of the indicator members of the teaching staff and their weights

No	Criterion	Weight	Source
1	The awards obtained international	15%	http://www.nobelprize.org/
2	The average number of citations of the publications of a university.	5%	http://www.leidenranking.com/
3	The proportion of citations in research	5%	http://www.leidenranking.com/
4	The proportion of foreign faculty members	5%	www.scu.eun.eg/wps/portal
Total		30%	

□ *Research quality:*

This indicator is for the articles published in the best areas and the number of published research for each member of the faculty. In addition to the satisfaction of the university students and the high quality of the university site, all these

sub-indicators are responsible for the quality of scientific research. Table 7 shows all weights. The value of each year varies according to the importance of the indicator. The value of the quality of scientific research from the total points is 30%.

Table 7 The details indicators of the research quality and their weights

No	Criterion	Weight	Source
1	Research published in the best journals Nature and Science	5%	http://www.leidenranking.com/
2	Number of locally published research for faculty members of total faculty members	5%	University website
3	The proportion of the public university satisfaction or exclusion of the University	10%	Questionnaire
4	Quality and efficiency of the website	10%	http://www.webometrics.info/en
Total		30%	

□ **Foreign arrivals:**

This indicator is based on the ratio of foreign students in the university. The importance of this indicator is that universities are competing to attract the largest number of international students to develop their academic and research programs. Table 8 shows the weights.

Table 8 The details of the indicators, foreign arrivals and their weights

No	Criterion	Weight	Source
1	The proportion of foreign students to the sum total of students	5%	The number of foreign students / The total number of students
Total		5%	

VII. RANKING ALGORITHM EGYPTIAN UNIVERSITIES USING FUZZY LOGIC

1. Input: number of Egyptian universities target in the Ranking Egyptian universities (no_u).
2. Input: the number of criteria that were used in rating the Egyptian universities from the tables(5,6,7,8) (standrads_no).
3. let counter =1.
4. Input: indicator value (st_val), indicator_ratio.
5. If (st_val >=0 And st_val <1) Then max= st_val and go to step (20).
6. Find The minimum value (Min= st_val).
7. Find The maximum value (Max= st_val).
8. a=b=Min , l=k=Max
9. xi=(Max – Min)/5
10. c=e=a+xi , f=d=e+xi , g=i=d+xi, j=h=i+xi
11. If st_val <= a Then right_val= 0
 ElseIf c <= st_val <= d Then right_val = (d - st_val) / (d - c)
 ElseIf b <= st_val <= c Then right_val = 1
 ElseIf st_val >= d Then right_val = 0
 End If
12. Max_val = right_val.
13. If st_val <= e Then medial_val = 0
 ElseIf e <= st_val <= f Then medial_val = (st_val - e) / (f - e)
 ElseIf f <= st_val <= g Then medial_val = 1
 ElseIf g <= st_val <= h Then medial_val = (h- st_val) / (h-g)
 ElseIf st_val >= h Then medial_val = 0
 End If
14. If medial_val > max_val then make max_val = medial_val.
15. If st_val <= i Then left_val = 0
 ElseIf i <= st_val <= j Then left_val = (st_val - i) / (j - i)
 ElseIf st_val > j Then left_val = 0
 End If

16. If left_val > max_val then make max_val = left_val.
17. Make max_val = max_val / 100.
18. Comper between max_val And Indicator_Ratio.
19. If max_val > Indicator_Ratio Then max_val = Indicator_Ratio.
20. Add To List>
21. Counter= counter +1.
22. If counter <= standrads_no go to step (4).
23. END.

VIII. RESULTS OF THE EGYPTIAN UNIVERSITIES RANKING FOR YEAR'S 2014 DATA.

By applying the algorithm to the data gathered of each university targeted in this study, the results of the best universities in Egypt were obtained. Table 9 presents the results of the best universities through applying the algorithm of Egyptian Universities Ranking using the fuzzy rational.

Table 9 Egyptian Universities for 2014 by Ranking Egyptian Universities Using Fuzzy Logic

No	University	Total
1	Cairo University	37%
2	Mansoura University	23.3%
3	Alexandria University	19.2%
4	Zagazig University	17.9%
5	Assiut University	15.2%
6	Tanta University	14.2%
7	Minia University	9.3%
8	Helwan University	7%
9	Banha University	5.6%
10	Ain-Shams University	5.5%
11	South valley University	3.6%
12	Kafr El Sheikh University	1.76%

Table 9 indicates the rate of every indicator of the education quality ranking where Cairo University came in the first rank reaching 37%, Mansoura University in the second rank reaching 23% and Alexandria University in the third rank reaching 19.2%, while Kafr El Sheikh University came last (at the twelfth rank) obtaining 1.76% where the ratio of foreign students is low in this university.

Comparing the results of this ranking with that of webometrics, it is found that, as presented in Table 10, Cairo University came the 358th among the best universities in the world and the first among the best universities in Egypt. This indicator is typically similar to that of our study. The second university is Mansoura University where its world ranking is the 911th and Egyptian ranking is the 2nd. Suez Channel University came at the 10th rank among the Egyptian universities. After comparison, it is clear that both rankings are in agreement that Cairo University is the first among the Egyptian Universities.

Table 10 Egyptian Universities for 2014 By Ranking webometrics(<http://www.webometrics.info/en/aw/Egypt>)

No	University	World Rank
1	Crairo University	358
2	Mansoura University	911
3	Alexandria University	1223
4	Banha University	1493
5	Zagazig University	1729
6	Assiut University	2195
7	Minia University	2575
8	University of Tanta	2996
9	Suez Canal University	3050
10	Helwan University	3150
11	Miufiya University	3292
12	Ain-Shams University	3533

Within the comparison of ranking results of 2014 by QS ranking, we find that Cairo University comes in the second rank among the Egyptian universities after The American University Cairo which came in the first rank, but The American University Cairo is not targeted in this study. So, we consider that Cairo University is the first university amongst the university targeted in QS ranking of 2014.

Table 11 Presents the results of QS ranking of 2014 (<http://www.topuniversities.com>)

No	University	Rank
1	The American University Cairo	348
2	Cairo University	551-600
3	Ain Shams University	601-650
4	Al Azhar University	651-700
5	Alexandria University	701+

IX. RESULTS OF THE EGYPTIAN UNIVERSITIES RANKING FOR YEAR'S 2015

Upon collecting the data of the Egyptian universities of 2015 and defining the rate of every standard as per its importance, the algorithm was applied on such data which resulted in the following results:

Table 12 Egyptian Universities for 2015 By Ranking Egyptian Universities Using Fuzzy Logic

No	University	Total
1	Cairo University	29.1%
2	Mansoura University	28.12%
3	Banha University	17.4%
4	Ain-Shams University	15.6%
5	Alexandria University	14.81%
6	Zagazig University	5.1%
7	Assiut University	5%
8	University of Tanta	4.7%
9	Minia University	4.2%
10	Helwan University	3.8%
11	Kafe El Sheikh University	2.4%
12	South Valley University	1.9%

We observe on one hand that Mansoura University came in the second rank rating 28.12%. On the other hand we see that Banha University made a great leap forward and preceded to the 3rd rank rating 17.41% due to its interest in research and publishing a huge number of indexed research papers. This indicates that this study differentiates between the active universities which distinguish from one year to another and those which have a decline in the academic performance and scientific research.

Those results have been compared with some world university rankings as follows:

First: These results have been compared with the results of 2015 US News Ranking as presented in table 13 where Cairo University came in the first rank rating 50.1% followed by Ain Shams University rating 44.2% and at the third rank came Alexandria University rating 41.8%. Whereas Cairo University came first in both rankings, which is a good indicator, but on the other hand we notice that positions of other universities differ in the ranking. We also notice that most of the first five universities are included in the ranking in different rates, as every ranking depends on different criteria and indicators.

Table 13 Top 6 Universities By Ranking U.S.News For Year 2015. (<http://www.usnews.com/education>)

No	University	Total
1	Cairo University	50.1
2	Ain Shams University	44.2
3	Alexandria University	41.8
4	Assiut University	39.5
5	Mansoura University	38.7
6	Al Azhar University	34.9

Second: with comparing the results of the Egyptian ranking with webometrics ranking results of 2015, we find an agreement that Cairo University comes in the first rank followed by Mansoura University in the second rank among the universities targeted in this study. It is also noticed that Banha University precedes Alexandria University acquiring the fourth rank among the Egyptian universities and the third rank among the universities targeted in our study due to the improvement of the website of the university.

Therefore, we notice that Banha University precedes in the Egyptian ranking, as indicated by the webometrics ranking that the university develops its teaching plans and its website to compete for higher ranks in the world rankings.

Table 14 Egyptian Universities for 2015 By Ranking webometrics. (<http://www.webometrics.info/en/aw/Egypt>)

No	University	World Rank
1	Cairo University	474
2	Mansoura University	1167
3	Banha University	1419
4	Alexandria University	1448
5	Zagazig University	1922
6	Assiut University	2026
7	Kaferishekh University	2292
8	Minia University	2565
9	Suez Canal University	2886
10	Helwan University	2973
11	Ain-Shams University	3150
12	University of Tanta	3292

Third: by comparing the results of the Egyptian ranking with QS 2015 ranking results, it is noticed that Cairo University comes in the first rank among the universities targeted in the study and in the fifth rank at the level of the Arabic universities followed by Alexandria University which came in the second at the Egyptian level and in the 12th rank at the Arabic level. Then come Ain Shams University, Mansoura University, Assiut University and Al Zagazig University respectively as presented in Table 15 It is also noticed that those universities represent the best universities in Egyptian ranking as well but with little difference in ranks.

Table 15 Egyptian Universities for 2015 By Ranking QS (<http://www.topuniversities.com>)

No	University	Rank
1	The American University Cairo	5
2	Cairo University	9
3	Alexandria University	12
4	Ain Shams University	13
5	Mansoura University	31
6	Al Azhar University	37
7	Assiut University	40
8	Zagazig University	48

X. RESULTS OF THE EGYPTIAN UNIVERSITIES RANKING FOR YEAR'S 2016

By collecting the data of the Egyptian universities of 2016 and defining the rate of every standard as per its importance, the algorithm was applied on such data which resulted in the following results as presented in table 16.

Table 16 Egyptian Universities for 2016 By Ranking

No	University	Total
1	Alexandria University	33.586%
2	Cairo University	17.212%
3	Mansoura University	13.292%
4	Banha University	13.261%
5	Kafr El Sheikh University	13.245%
6	Zagazig University	13.075%
7	Ain-Shams University	12.841%
8	Assiut University	12.614%
9	South Valley University	12.518%
10	Helwan University	12.421%
11	Minia University	10.55%
12	University of Tanta	10.14%

Alexandria University came in the first rank preceding Cairo University for the first time, while Cairo University came in the second rank. This is attributed to the noticed development of the website by the university and the increase of the published research papers as indicated in the above table.

These results have been compared with the results of 2016 US News Ranking as presented in table 17 where Cairo University came in the first rank rating 82% followed by Ain Shams University rating 71% and at the third rank came Alexandria University rating 65.6% followed by Mansoura University in the fourth rank. It is noticed that the result contradicts with the results of the algorithm where the indicator of the website is relatively high. We also notice that among the first four ranks come three universities which mean that the results are close, but the different rates of the indicators from one year to another resulted in this little difference. In my opinion, I see the results and comparison are likely accepted.

Table 17 Top10 Universities By Ranking U.S.News For Year 2016. (<http://www.usnews.com/education>)

No	University	Total
1	Cairo University	82
2	Ain Shams University	71
3	Alexandria University	65.6
4	Mansoura University	57.4
5	Assiut University	53
6	Al Azhar University	48.4
7	American University in	47.4
8	Suez Canal University	46.6
9	Zagazig University	44.2
10	Helwan University	42

Upon comparing the results with the results of webometrics of 2016, we find that Alexandria University precedes all universities where its website was ranked as the best among the sites of all Egyptian universities. Whereas the rate of the ranking quality indicator of university website was high in this year, the results were very close to those of webometrics where Cairo University came in the second rank, while Mansoura University came in the third rank. The rest of the university ranks will be presented in Table 18 which indicates the best five websites of the Egyptian universities as per webometrics ranking of 2016.

Table 18 Egyptian Universities for 2016 By Ranking webometrics. (<http://www.webometrics.info/en/aw/Egypt>)

No	University	World Rank
1	Alexandria University	579
2	Cairo University	693
3	Mansoura University	1110
4	Banha University	1316
5	Kaferishekh University	1357
6	Ain-Shams University	1499
7	Assiut University	1697
8	Zagazig University	1697
9	South Valley University	1935
10	University of Tanta	2086
11	Minia University	2188
12	Helwan University	2188
13	Al Azhar University	2223
14	Minufiya University	2359

Finally, these results have been compared with the QS 2016 results. The best ten universities included in our study were approximately similar to those of QS ranking, but with a little difference in the ranks of each university whether on the summit or the bottom. Generally, the results are close regardless the order of each university in the list. This confirms that the results obtained are correct which presents a good indicator of our study and the selection of indicators and its rates.

Table 19 Top 10 Egyptian Universities for 2016 By Ranking QS. (<http://www.topuniversities.com>)

No	University	Rank
1	The American University Cairo	5

2	Cairo University	10
3	Ain Shams University	12
4	Alexandria University	14
5	Mansoura University	30
6	Assiut University	34
7	Al Azhar University	35
8	Zagazig University	43

We note that some of the universities came on the top list of the best or more qualified universities over time and this is due to the following:-

1. The number of the qualified teachers who were well educated.
2. Scientific research published by the University.
3. International awards obtained by the university.
4. The powerful management of that, universities and their ability to contact with students.
5. The ability to contact with the international universities and having some courses abroad.
6. The available tools and the modern labs that enable the students of getting a good education system.
7. The good services.

These are the causes behind the changes in the table that shows the ranking of those universities over time from 2014 up to now, to the cause of having some universities in the bottom of the list we can say that they stopped the development [4, 19].

XI. CONCLUSION

The aim of this study was to highlight the influence of global and regional rankings on higher education institutions in Egypt.

The opinions of stakeholders with a sound knowledge of rankings seem to generally be divided into two opposite sides - the ones who believe rankings to be tools of marketing and self-assessment, and the ones who see them as means equivalent to political and economic power. Ironically, their fears and actions were the ones which made rankings so influential as they were initially created to identify strengths and weaknesses and help HEIs improve on them. Regardless of their views, institutions and local governments are usually the ones which have the lowest power of choice in response to rankings, despite their vast influence and prestige.

Although rankings are acting as instigators to competition at an inter-institutional and international level, On the other hand, rankings have also had a global effect on departmental and programmer restructuring. In an attempt to improve their standings, many institutions have cancelled short period or niche programs and focuses on the ones which are more visible to the public. As it is impossible to compete for prestige in all fields, universities feel it was necessary to choose departments and programs in which they could excel at a national or even global level, such as sciences and technologies, sometimes at the expense of arts and humanities.

Another important purpose of this research was to determine whether or not rankings are affecting the ultimate goal of higher education institutions, which is to create, advance and disseminate knowledge in order to produce graduates with competences in specific professional fields, as well as in social responsibility.

It is important to mention that, even though rankings play a big role in today's higher education, they should be utilized just as self-assessment and benchmarking tools by the institutions that seek improvements, and as just one of the sources of information for student decision making.

Where an algorithm was created to Ranking the Egyptian universities using the membership function (trapezoidal) in fuzzy logic Has been applied the fuzzy logic algorithm on the that data, we have compared the results with some International rankings for example (QS,U.S Nwes, Webmatix).

This study showed positive results About comparing the results we get with some of the global rankings, The study confirmed that the Egyptian universities have high capabilities in the field of scientific research.

XII. FUTURE WORK

The methodology of the current ranking system may be developed by adding new indicators and modifying existing ones in order to propose a less size-dependent ranking system. Moreover, ranking institutions by their subject areas, fields or disciplines may be another future study. Thus, the institutions might be compared according to their specialised areas instead of as a whole. There may be future studies on data collection process by developing more user-friendly tools. This study suffered from data mining issues. Future studies could collect data directly from databases instead of limited web interface.

Also, neural network can be applied to get further results about the current research, these results will be taken into consideration and the concluding remarks will have a positive impact to improve the researches in this area.

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