ISSN XXXX XXXX © 2017 IJESC

Research Article Volume 7 Issue No.6

Recommender System for Best University/Institute Using Soft Computing Techniques

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Abstract:
Recommendation, in itself, is based on the rank given to a particular thing. When we recommend, there is a need to be sure that the given item is really worth it. Similarly, when a ranking portal ranks a University/Institute; there are certain set of parameters that are taken into account. Based on these parameters, the scores are given. Different ranking portals may give different weightage to these parameters. Hence the Positions of the University/Institute may vary in the ranking lists given by these portals. We have employed an algorithm which is based on Positional Aggregation Method in which ranked positions are taken, sorted in descending order, from different ranked lists and a ranked score is calculated of a University/Institution for a given ranked list. This enables us to combine the results of the existing ranking system in such a way that a more general and precise ranked list of Universities/Institutions is obtained. This proposed work is a new study in the field of Academic rankings. We have used P@k as a performance metric. The results of evaluation metrics show the strength of the proposed mechanism in a way that it shows which ranking portals are to be preferred.

Keyword: Positional Aggregation System, Recommendation Technique, University Ranking portals

1. INTRODUCTION

Recommender systems are Information percolating systems that reduces the information overload problems by puffing out consequential information tracts from a dynamically conjured information in congruence to user's preferences, personal interests, or recognized behaviors about a particular item [1,3]. Recommender system possesses prediction capability about whether a particular user would prefer an item or not, based on the user's profile [2]. These system find utilities in e-commerce environments where online shopping for items require recommendations based on user's shopping history. Recommender systems provides beneficiaries not only to users but also to the service providers. In e-commerce environments [4,5], it enhances revenues by providing effective means for selling more products. In libraries[11], Recommender systems allow users to search beyond the prescribed catalogs. Thus, there is no need for building accurate and relevant recommendation techniques by perceiving user's needs by itself. Having been introduced in mid 90s, Recommender system helps people choose the product of their choice from the plethora of options available to them.

The Key Objective of our system is to provide a more generalized ranking of the Universities/Institutions in India. There are different parameters used by the ranking portals across the globe. Even if the parameters are same, the weight or scores given by each are relatively different based on their proposed algorithms or formulas. Of course, all of them are rated highly by the experts. So this proposed technique combines the ranking given by these portals using soft computing techniques and gives an aggregated ranking to these universities. This aggregated ranking would help students to realize their true potential by choosing the University/ Institution they deserve. Also, it would help these universities/Institution know their true standing and help the peers to assess themselves .This technique would go on to separate top ranked quality portals from the local less accurate portals. Other sections include Related Work, Proposed System, Results and findings, conclusion and future work and references

2. RELATED WORK

Recommendation Techniques are classified in three different categories [9]: Rule Based Filtering System, Content Based Filtering System and Collaborative Filtering System. There are data mining techniques which are often employed for University/Institute or Course recommendation. They use Classification[10], Clustering, association and sequential patterns to discover new models that can help in suggesting recommendation based on user's profile. But, the problem is that these recommendation techniques are dependent on past student's experiences and their individual performances. It is not necessary that the user searching for a University/Institute merits the same. We have proposed,in this system, recommendation of best portals for the users to look into. These portals use standard parameters for University/Institute rankings. By applying Soft computing techniques to these ranked lists, we tend to provide better recommendations to the users.

3. PROPOSED SYSTEM

In this Recommendation technique, we have used Positional Aggregation Method for ranking what is already ranked. We have taken 5 Ranking lists ranked by University/Institute Ranking Portals of different caliber. Some are Universal Ranking Portals like Times Higher Education, QS Ranking, Government rankings like NIRF, and some local ranking portals like Webometrics and Eduworld. We are trying to recommend

best ranking portals which the students can rely upon. For this we, use a Precision Operator, P@K, which describes top 5 commonly ranked Universities/Institutions and gives the precision between the obtained ranked list and the ranked list of these portals. Firstly, for ranking these Universities/Institutions, We have prepared an algorithm based on Positional Aggregation Method, and with the help of this algorithm, we have devised two formulas to obtain the Ranked Score of these Universities. Let us consider, there are 'n' ranking portals; URP_1,URP_2,….,URP_n; each of which gives a ranking list which comprises of 'n' different Universities/Institutions viz U_1R_1, U_2R_2,……U_nR_n. Finally, we give each University/Institute a Positional Score using the formulas. And then we obtain a sorted list of these universities in descending order, and, then a final ranking list is prepared. For obtaining the precision of these ranked lists and comparing different portals, we first combine three of the ranked lists, then 4 of them and then all five of them. Thus we obtain the precision for each of them. Henceforth, we can recommend top ranking portals and save the users from wasting unnecessary time on those ranking portals which are often misleading. The portals whose combined ranked lists give good precision are identified and recommended to the users.

Figure.1. Positional Aggregation System (PAS)

4.1. Architecture of Proposed System

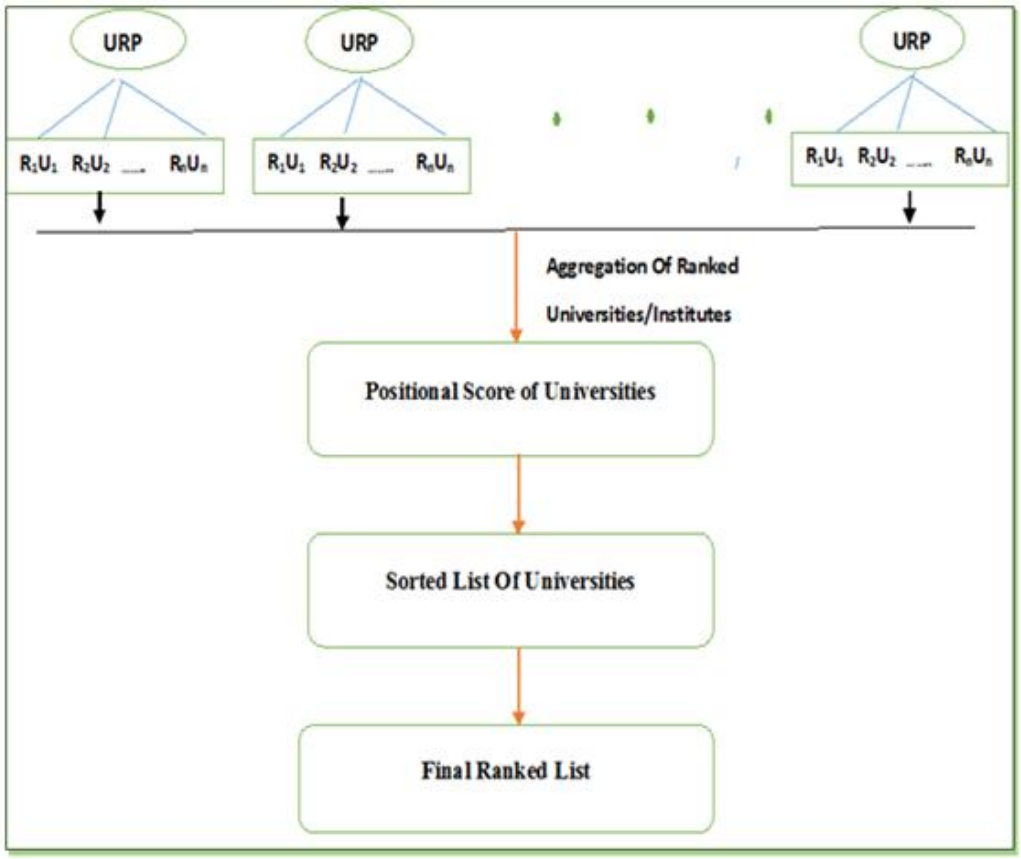


Figure.2. Architecture of Proposed System

Algorithm for calculating positional scores:

Let U be the union of all ranking lists given by different portals. Let us consider x different rankings from y different portals. We get a matrix, R(x * y) with x rows and y columns. We give a rank algorithm to find the final rank.

Algorithm 1. Calculation of positional score

1 : find the ranked position of the j^{th} University from each list I;
2 : If(University 'j' is present in list 'I')
{
3 : P –> ranked position of University; p=1,2,…y
*4 : R(i,j)-□[(x+p)-{(2*p)-1}/]/x;*
5: Else If(University is missing; p=0)
{

R(i,j)=0}
6: repeat the steps 1 to 5 for all positions of R(i,j)
For i=1,2,…x; and j=1,2,…y
7 : find the sum of scores of all entries of R(i,j) and divide by total portals
8: Sort the list in descending order of scores to get the rank

STEP 1: First we find the ranked position of a University/Institution in a given list say TIMES. We consider Top 5 universities/Institution in TIMES list to give a score. Using the formula,$S_i=((n+1)-i)$,where n is the number of Universities/Institution in a given ranked list and 'i'is the position of a University/Institute in that list; we find the scores of these. Here's a table for the same.

Table.1.**Table for positional scores obtained**

Name Of University/Institution	**Score**
Indian Institute of Science, Bangalore	20
Indian Institute of Technology, Bombay	19
Indian Institute of Technology, Delhi	18
Indian Institute of Technology, Kanpur	17
Indian Institute of Technology, Madras	16

Also, the University/Institution that is not ranked in the given portal list, say by TIMES; we give it a score of 0. For example,

Table.*2*.Table for positional scores obtained

Name of University/Institution	**Score**
Indian Institute of Science, Bangalore	20
Indian Institute of Technology, Bombay	19
Anna University	0

STEP 2: Next, we calculate the Normalized Score for these Universities/Institution. Thus, we use the formula, NS= S_i/n, where n is the number of Universities/Institution in a given ranked list. Here's the table for it.

Table *3*:Table For Normalized Score

Name of University/Institution	**Normalized Score**
Indian Institute of Science, Bangalore	1
Indian Institute of Technology, Bombay	0.95
Indian Institute of Technology, Delhi	0.9
Indian Institute of Technology, Kanpur	0.85
Indian Institute of Technology, Madras	0.8

STEP 4: Next, we find the average of these Normalized scores given by different portals and thus we obtain an overall score for these. Here is the table.

Table *4*: Table for Average of Normalized scores for different portals

Name of University/Institution	**Average Normalized Score**
Indian Institute of Science, Bangalore	1.0
Indian Institute of Technology, Bombay	0.92
Indian Institute of Technology, Delhi	0.78
Indian Institute of Technology, Madras	0.76
Indian Institute of Technology, Kanpur	0.73

5. RESULTS/FINDINGS

The application of Soft Computing techniques precisely answers all of the problems relating to scarcity of data and Data Redundancy. There are plenty of ranking portals available on the web and sometimes they can be misleading. There is a case of forgery possible too if some of the institutions use money power to force their case in these ranking lists. So, we have taken all the standard portals and references for the same are also given. A general table for the scores obtained by a University/Institution with reference to different portals has been created. So, we can comparatively see the positions of these. Next, we have used the precision operator to find out how closely our obtained ranked list resembles the one given by these ranking portals. This helped us to identify those ranking portals which give good precision ratings and hence are deemed to be the ones needed to refer to when a user wishes to find the top Universities /Institutions. Thus, the system delivers what was intended from it.

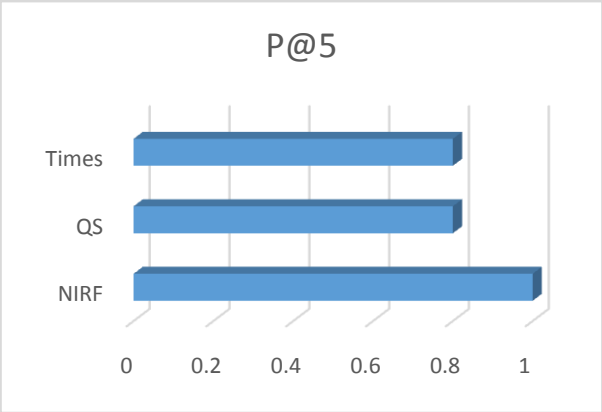
Performance Evaluation:
We have used precision operators to find the precision of obtained ranked lists in relation to the given ranked lists by these portals. We have taken Top 5 universities/Institutions from the obtained list and taken the ranking portal's list 3,4,5 at a time. Next, we compared the ranked lists obtained from these portals and the individual ranked lists of these portals. We then took the Top 5 commonly ranked universities/Institutions and applied this formula on them to find out there precision.

Precision, P@K= Total number of Commonly ranked items at top K positions

K Following is the table for Ranked Score obtained from the ranking lists of QS, THE, NIRF taken together.

Table.12. Comparisons between precision of Ranking Portals

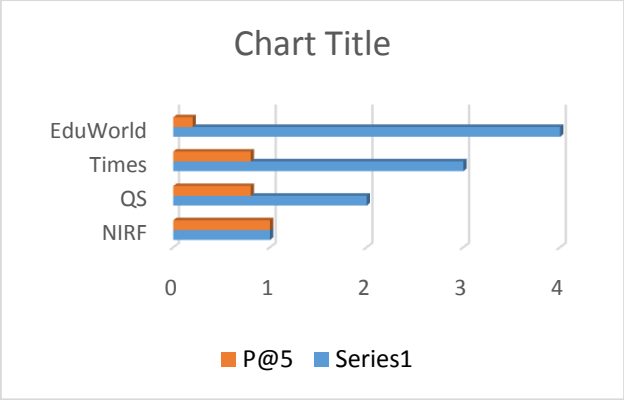
Ranking Portal	Similar items at top 5 positions 'SI'	P@5
NIRF	5	1
QS	4	.8
Times	4	.8
Average Precision		0.87



Following is the table for Ranked Score obtained from the ranking lists of QS, THE, NIRF, Eduworld taken together.

Table 16. Comparisons between precision of Ranking Portals

Ranking Portal	Similar items at top 5 positions 'SI'	P@5
NIRF	5	1
QS	4	.8
Times	4	.8
EduWorld	1	0.2
Average Precision		0.70



6.CONCLUSIONS:

This Recommendation system provides the user with the correct choices when looking to find out a University/Institute ranking from a plethora of ranking portals. The use of Soft Computing technique greatly helps in observing the ranking list given by these portals with reference to each other. Often, when we look at someone similar to us, there are some contrasting differences that separates us. Likewise, though these portals may seem similar, but the methods and parameters used by them may vary. Often they are found to be misleading. Hence the proposed system reduces the possibility of faulty representation.

6.1. Future Extension

The problem with Positional aggregation method is that, sometimes it may lead to tied scores between more than one University/Institutes. But, these problems happen with a large dataset. Still, it needs to be eradicated. Hence, in my future work, I would like to work on the problem of tied scores using some other soft computing techniques like Shimura and Modified Shimura Techniques.

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