



LET THE STUDENTS DECIDE: A PERSONALISED RANKING OF TURKISH UNIVERSITIES

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Abstract

Choosing a university from a vast range of choices is a major decision in every student's life. There are various amounts of university ranking systems that mostly use academic indicators such as number of citations, number of publications and doctorate students in their ranking model, but other indicators such as socio-cultural and physical structure of the university also factor into their decision, especially when choosing between universities of the same league. In this paper, the multi-criteria decision-making methods, AHP and PROMETHEE are used together to rank universities according to personalized criteria weighted by students individually and compared with a ranking that only uses academic indicators. This paper also proposes a wiki-type web platform for students to be able to choose the criteria they see fit to evaluate universities and give each criterion their own weights which in turn will help them make a more informed decision. The proposed system will additionally gather data from students regarding the criteria they seek when choosing a university for their higher education, thus giving universities insight on student evaluations.

Keywords: AHP, PROMETHEE, Multi-criteria decision making, University ranking, Personalized ranking

Özet

Her öğrencinin hayatındaki en kritik kararlarından biri şüphesiz ki üniversite seçimidir. Birçok üniversite sıralama sistemi mevcuttur. Bunların çoğu, sıralama modellerinde bilimsel yayın sayısı, atıf sayısı, doktora mezun sayısı gibi akademik göstergeler kullanarak sıralama yapmakta fakat üniversitenin sosyo-kültürel ve fiziksel yapısı gibi göstergelerin de öğrencilerin tercihlerinde etkili olduğu görülmekte, özellikle aynı puan grubundan üniversiteler arasında tercih yaparken. Bu çalışmada, çok kriterli karar verme yöntemlerinden AHP ve PROMETHEE bir arada kullanılmış ve öğrenciler tarafından kriterlere verilen ağırlıklarla kişiselleştirilmiş bir sıralama yapılarak sadece akademik performans göstergelerle yapılan sıralamayla karşılaştırılmıştır. Bu çalışma aynı zamanda öğrenciler için wiki-tabanlı bir web platformu önermektedir. Bu platformun, öğrencilerin kendi belirledikleri kriterlere verdikleri ağırlıklar ile ortaya çıkan sıralamalar sayesinde daha bilinçli tercihte bulunmalarına yardımcı olacağı düşünülmüştür. Önerilen sistem, aynı zamanda öğrencilerden üniversite tercihlerinde dikkat ettikleri kriterler ile ilgili veri toplayarak üniversitelere, öğrenci değerlendirmeleri ile ilgili ışık tutacaktır.

Anahtar Kelimeler: AHP, PROMETHEE, Çok kriterli karar verme, Üniversite Sıralaması, Kişiselleştirilmiş üniversite sıralaması

Introduction

The average person makes many decisions in their lifetime. Choosing a university and major to enroll in may be one of the most significant decisions that one can make, which in turn influences the many other decisions to come. To choose between one of many alternatives essentially means to give up the rest. The choice can vary according to the person's priorities and the importance they put on a specific criterion (Akar, 2012).

Turkish students have a tedious job of studying for the university entrance exam which determines their rank among their peers and subsequently which universities and departments they can attend. This exam narrows down the options for students significantly as they can only choose to apply to schools in the range of their ranking order. It is known that while the academic performance of a university is important for their reputation and that most ranking systems use these academic performance indicators in their methodology, students looking to enroll in these universities base their decisions on many other indicators as well. Students are unaware of the criteria used when making these rankings, therefore when choosing between a selective list of universities they rely on peer and family influences along with these rankings which do not always produce the best outcome for them as many of these insights can be biased.

For many students, the surroundings of the university as well as the campus are an important factor in the final decision of the ranking of selected universities. Therefore it can be said that this is a multi-criteria decision as it entails more than one criteria, not only the prestige of a university.

In this paper, the multi-criteria methods AHP and PROMETHEE are combined in order to rank five chosen universities of the same league. AHP is used to attribute weights to the criteria given using pairwise comparison and the Visual PROMETHEE software is used for the final ranking outcome.

Students were given a survey regarding the weights for each criterion. Two students' who aim to enroll in a department of architecture answers were taken and the five pre-picked universities were ranked according to their respective weights. These outcomes were compared with the ranking based solely on academic indicators.

This study aims to visualize the outcome of a personalized ranking of universities and show the significant difference other indicators can have on the final ranking. In turn, the goal is to aid students in making the decision that best suits them.

Literature Review

There are many university ranking systems such as THE (Times Higher Education), Shanghai Jiao Tong University Rankings and CWUR (Center For World University Rankings) to name a few.

In Turkey, URAP (University Ranking by Academic Performance) is the basis of national ranking. As can be understood by its name, the methodology of URAP is based on the following academic performance indicators; number of articles, number of articles per academic member, number of citations, number of citations per academic member, total number of scientific documents, total number of scientific documents per academic member, number of doctorate graduates from the previous year, doctoral student ratio and number of students per academic member (URAP 2016).

Many studies regarding indicators that factor into a student's decision to enroll in a university have been made. For instance, Uslu (2008) has examined national and global ranking

systems and has suggested using physical, academic and socio-cultural criterion to rank Turkish universities.

Akar (2012) has determined that academic reputation, geographical location of the university are the most considered factors. Günay et. al. (2013) have studied the effects of socio-cultural structure on the department selection of the Anadolu University students.

Studies have also been conducted to establish student satisfaction levels of university campuses such as Erçevik and Önal (2011). Their study analysed student evaluation of social spaces and compared different university campuses in Turkey. Their results showed that students were unsatisfied with the social spaces of intracity campuses as opposed to campuses on the outskirts of the city.

Gürdoğan (2016) has found that students have no information regarding the campus of the university they have selected and that they have no prior knowledge of the university.

Many other studies have been made in order to gather information on which factors students give importance to when selecting a university such as Korkut-owen et al., (2012); Mbawuni and Nimako, (2015); Naralan and Kalel, (2012); Şahin et al., (2011); Temple, (2009); Thakur, (2007); Gültepe et al. (2014); Briggs and Wilson, (2007); Yamamoto, (2006).

Studies have been held in order to determine what academic excellence is and how it affects the decision-making process such as Baker and Brown, (2007).

Studies to identify the best method of multi-criteria decision making to use when ranking universities have also been held such as Göksu and Güngör, (2008) which uses fuzzy AHP to rank universities.

Methodology

The criteria used in this study was obtained from several surveys held within other studies to students currently enrolled in a university program or currently in the process of choosing. The alternatives were chosen from the list provided by the Assessment, Selection and Placement Centre of the previous years base points (ÖSYM 2015). Five universities that have a department of architecture with a base point within the same range were chosen for ranking. These universities and the cities they are based in are Gazi University (Ankara), Izmir Institute of Technology (Izmir), Anadolu University (Eskişehir), Uludağ University (Bursa) and Akdeniz University (Antalya).

The following criteria were chosen for this paper: Academic performance rank, Innovator and Entrepreneurship rank, Liveability of the city the university is located, Location of the campus and Campus Facilities.

The innovator and entrepreneurship rank data for each university was obtained from TUBITAK's 2015 Innovator and Entrepreneurship University Rank (TUBITAK 2016). The liveability of each university city was obtained from the city life index of 2015 (Türkiye İstatistik Kurumu 2016). Location of campus and campus facility data were obtained from the respective universities websites.

As PROMETHEE does not provide a clear method by which to assign weights (Velasquez and Hester, 2013), AHP pair-wise comparison has been used to assign the weights to the criteria. After, PROMETHEE has been used to make the final ranking.

AHP

In this paper, each criterion was calculated by student evaluation through the AHP pair-wise comparison method. In order to make comparisons, the scale of numbers shown in Table 1 was used to indicate how many times more important or dominant one element is over another element with respect to the criterion to which they are compared. (Saaty, 2008).

A survey was held regarding these criteria and each student was asked to compare the criteria based on the given scale.

Table 1. Fundamental Scale of Absolute Numbers.

<i>Intensity of Importance</i>	<i>Definition</i>	<i>Explanation</i>
1	Equal Importance	Two activities contribute equally to the objective
2	Weak or slight	
3	Moderate importance	Experience and judgement slightly favour one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgement strongly favour one activity over another
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favoured very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
Reciprocals of above	If activity <i>i</i> has one of the above non-zero numbers assigned to it when compared with activity <i>j</i> , then <i>j</i> has the reciprocal value when compared with <i>i</i>	A reasonable assumption
1.1–1.9	If the activities are very close	May be difficult to assign the best value but when compared with other contrasting activities the size of the small numbers would not be too noticeable, yet they can still indicate the relative importance of the activities.

Source: (Saaty, 2008)

Table 2. Pair-wise Comparison Matrix for Student A

Criteria	A.P.R	I.E.R	L.o.C	Campus Location	Campus Facilities
Academic Performance Rank	1,00	0,33	0,20	0,33	0,33
Innovator, Entrepreneurship Rank	1,00	1,00	1,00	0,33	1,00
Liveability of City	9,00	1,00	1,00	1,00	3,00
Campus Location	1,00	0,11	1,00	1,00	1,00
Campus Facilities	5,00	1,00	0,33	1,00	1,00

Table 3. Weights of Criteria for Student A

Criteria	Weight
Academic Performance Rank	0,071148
Innovator, Entrepreneurship Rank	0,176194
Liveability of City	0,369833
Campus Location	0,160944
Campus Facilities	0,22188

As can be seen from the pair-wise comparison matrix of the criteria, this particular student attributes the most weight to the liveability of the city the university is in. The academic performance ranking has been given the least weight.

Consistency was measured using the consistency ratio used in the AHP model. The consistency ratio for this student's criteria was 0,059 which is under 10%, so it can be said that this student's comparisons are consistent.

Table 4. Pair-wise Comparison Matrix For Student B

Criteria	A.P.R	I.E.R	L.o.C	Campus Location	Campus Facilities
Academic Performance Rank	1,00	0,33	0,20	0,20	0,20
Innovator, Entrepreneurship Rank	3,00	1,00	0,20	0,33	0,20
Liveability of City	5,00	5,00	1,00	1,00	0,33
Campus Location	5,00	3,00	1,00	1,00	0,33
Campus Facilities	5,00	5,00	3,00	3,00	1,00

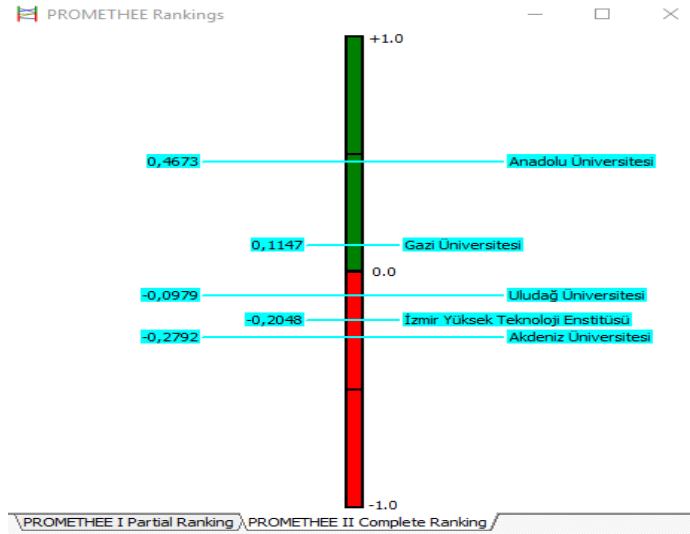
Table 5. Weights of Criteria for Student B

Criteria	Weight
Academic Performance Rank	0,049169
Innovator, Entrepreneurship Rank	0,084343
Liveability of City	0,227839
Campus Location	0,199932
Campus Facilities	0,438718

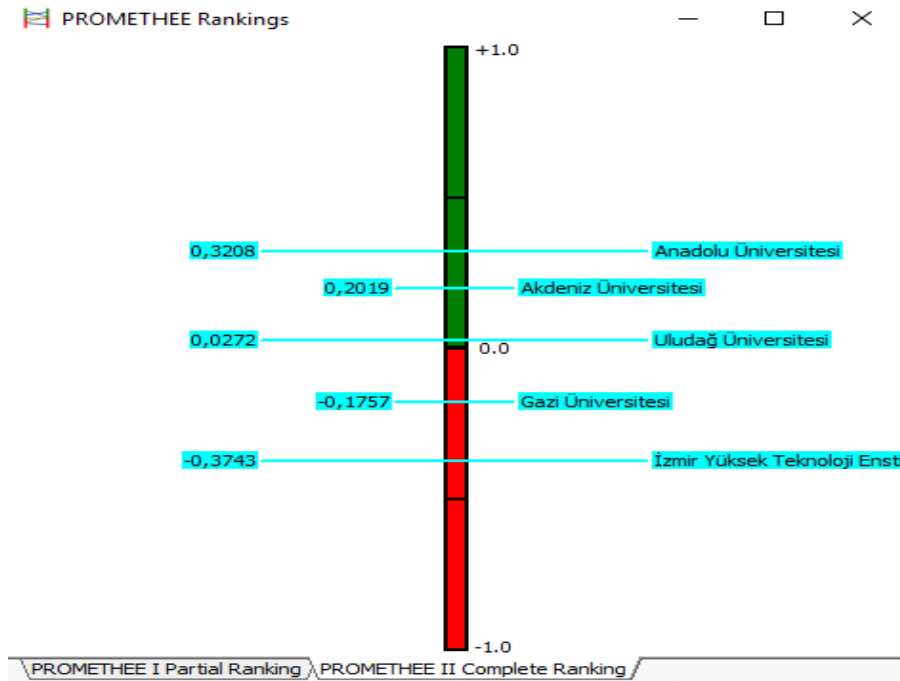
Student B has given the most weight to campus facilities. The consistency of this students' comparison was also calculated. The result was 0,077907 which is also below %10, therefore deemed consistent.

PROMETHEE

In this stage, the weights taken from the pair-wise comparison matrix from student A and student B were entered into the Visual Promethee software along with the data regarding these criteria for each university and the final ranking for student A was procured as below:

Figure 1. Promethee II Complete Ranking (Student A)

According to the student A's attributed weights of the given criteria, Anadolu University is the best choice to enroll.

Figure 2. Promethee II Complete Ranking (Student B)

Anadolu University is also ranked first according to the weights given by student B. The overall ranking is slightly different, as Akdeniz University is in second place whereas it was ranked last in student A's ranking.

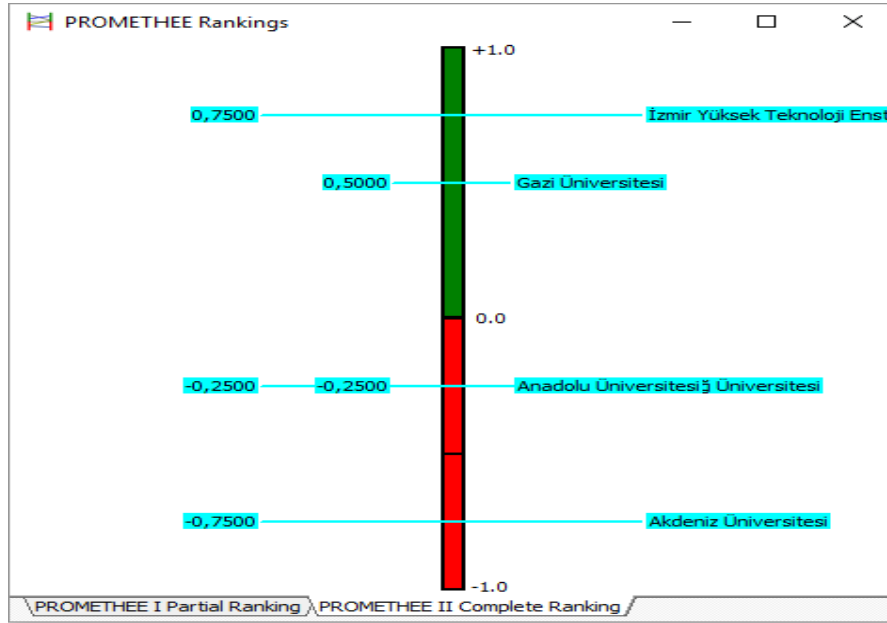
Figure 3. Promethee II Complete Ranking using only academic indicators

Figure 3 shows the complete ranking of the five universities using only the academic performance sub-criteria; academic performance rank and innovator and entrepreneurship rank. As a result, the university that was ranked last in the addition of other indicators is ranked first with regard to only the academic indicators.

Limitations and Future Work

The lack of a national university ranking system in Turkey was the pretext for this study. With the comparison of different criteria based rankings, it is clear that there are significant differences. Therefore proposing a wiki-type web platform for students to add criteria they think significant to the selection of a university and weight the criteria according to their own bias and make a more informed decision is seen as the best approach.

This paper can be taken as a preliminary study as the main goal is to provide students with a wiki-type page. With this platform, students can contribute their own information regarding the university they are currently enrolled at, therefore help students selecting universities to gain inside information from their peers. All information regarding the universities can be reached from a single platform making it easier for students to gather information in order to make their final decision. This, in turn, will also help universities market their departments to students as they can gain insight to which criteria has been given the most weight from students, helping them build on the factors they may lack in.

A follow-up survey will be made for students who have used the developed platform to determine whether it has benefited their decision. A sign-up feature could be added in order to gain more information on the different student profiles which in turn can help better analyse student behaviour and trends regarding university enrollment criteria.

As with all studies, there are some limitations. The wiki-type platform enabling students to make pair-wise comparisons of the criteria and to attribute weights to them can be difficult consistency-wise. The more the criteria to weight, the harder to remain consistent. This can be solved by triggering a warning should the consistency ratio be above 10% and showing which comparisons need to be adjusted in order to lower the ratio.

Another limitation is the demographic of students who have taken the survey. The students were mostly from Izmir, so the future study should have a larger demographic which could also give us further information. This study should also be carried out for more departments in order to determine if the difference is actually significant in all fields. The consistency problem also led to data reduction as inconsistent comparisons could not be taken into account.

As wiki is based on collaborative modification, the quality and reliability of the data entered needs to be monitored on occasion.

Conclusion

A better future for the world begins with a happier society which can only be obtained by people working on the topics they are the most passionate about. Earning money by doing the thing you love is what is lacking in our country due to the unstructured education system and absence of guidance and counselling for students regarding the university system and departments.

Success is only attributed to a few institutions whereas while a reputation of a school is important, any university cannot be successful in every field. Each institution has its strong and weak fields. The key is to inform students of new universities and departments that have been pushed back due to the few in the spotlight.

The objective of this paper was to show how non-academic criteria affect the final ranking of universities according to each individual student. This paper has been able to show that there is a significant difference in ranking using only academic criteria over other criteria. Therefore it is safe to say that Turkish students are in need of the proposed wiki-type platform in order to be able to obtain the information they need to make an informed decision regarding what is to be one of the most important decisions that will shape the rest of their lives.

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