Examining International Students' Satisfaction at UK Universities

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Examining International Students' Satisfaction
at UK universities
Using the Weka Data Mining Tool

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Abstract

Higher Education Institutions (HEIs) are increasing rapidly worldwide, with a great competition for attracting more students which require ensuring students' satisfaction, understanding students' needs, problems and expectations. Students' satisfaction (SS) is an essential element to students' recruitment and has big impacts on both students and universities. Students' satisfaction affects students' fulfillment, achievements and success, and evaluates universities' reputation, teaching and learning facilities, and measures the quality of services provided at universities. Successful universities acknowledge the significance of measuring SS and determining the aspects that affect students' satisfaction level.

Much research conducted studies on examining students' satisfaction in UK. However, those studies did not focus on International Students' Satisfaction (ISS) which plays an important role in HE such as increasing universities' financial capacity and providing universities with prestigious profession labels such as "International University of the Year". Therefore, this research aimed to address the gap in earlier studies by measuring international students' overall satisfaction and investigating the aspects that influence ISS at UK universities. This aim was achieved by conducting an online survey to collect data and extensively using Weka to measure the ISS level and determine the factors that influence ISS. Also, conducting four case studies with international students through semi-structured interviews to gain more specific information and valuable knowledge regarding their academic and social experiences. Consequently, based on the outcomes, some recommendations with some suggestions are proposed to help in increasing the welfare and fulfillment of international students and improve the quality of teaching and learning experiences.

Keywords: International students' satisfaction, Higher Education, Academic and Social Integrations, Data Mining, Machine Learning, Classification, Weka.

1 Introduction

Students' satisfaction acts as an indicator of educational institutions' success and future performance. HEIs are rapidly becoming more conscious about the significance of students' satisfaction as it impacts on universities' reputation, success and achievements worldwide. However, students' satisfaction does not impact on universities only; it reflects students' motivation, performance and achievements within HE (1). Much research measured students' satisfaction in the UK; however, a few studies had a specific focus on international students. Thus, this research aims to examine international students' satisfaction and investigate the factors that affect ISS.

Studying abroad is a challenging endeavor for most international students; this challenge needs sufficient support and inspiration beyond self-motivation. This is because of some factors such as language, ethnicity, multiculturalism, and socialisation act as barriers toward international students' success. For these reasons, universities should provide a greater focus on understanding international students' requirements and problems in order to attract more international students by insuring their overall satisfaction.

2 Research Aims and Objectives

This thesis extensively aims to examine international students' overall satisfaction and observe the factors that impact international students' experiences at UK universities using Weka. These aims are accomplished throughout the following objectives with some hypothesis (H) that were tested:

2.1 Reviewing Earlier Studies

Reviewing previous studies to state the significance of ISS, identify the overall ISS, and understand ISs problems and challenges by exploring the existing factors.

2.2 Conducting a Comprehensive Online Survey

Designing a self-administered online survey and distributing it via email and social media accounts among anonymous international students at UK universities to collect up-to-date data for measuring their overall satisfaction and investigating the factors that affect ISS, regardless the age, nationality and degree. This objective is associated with some hypotheses (H) that were tested through the different data collection methods that have been used in this paper.

H1: Homesickness and social dissatisfaction have a significant impact on academic satisfaction and achievement.

H2: Accommodation and multiculturalism

H3: Marking scheme, students with no objectives.

2.3 Creating the Dataset

Participants' responses on the online survey were used to create the dataset of this paper and apply different Machine Learning classification algorithms such as J48, NB, IBK, MLP to develop predictive models to measure the ISS level.

H4: ML algorithms generate predictive models that facilitate making decisions.

2.4 Comparing the Outcomes

Results were analysed and the ML algorithms were evaluated by observing if similar or different results are obtained while applying different ML algorithms on the same dataset.

2.5 Proposing Recommendations

Based on the ML results and participants' feedback to the open questions of the online survey and the case studies, we have proposed some recommendations for international students and universities.

3 Literature Review

International students travel thousands of miles to complete their higher education assuming with high levels of achievements and success, and looking for high-quality schools and programs which support their interests, expectations, career ambitions and opportunities as well as linguistic skills. Understanding international students' requirements and problems, and examining their satisfaction within HE, are essential tasks that cannot be ignored. According to (2) measuring ISS has to be one of the main priorities and strategies of higher education because HEIs aim for global dimension and intercultural integration which involves knowledge, skills and experiences as well as a business advantage. Besides that, Internationalisation supports branch campuses, supplies cross-border collaborative engagements, and programs for international students such as English programs (3). ISS is a critical component used to increase the academic performance quality, assess universities' success and quality assurance, and boost universities' brand worldwide for attracting more students (4).

Students' satisfaction is a multidimensional process influenced by several factors. Defining the determinants of students' satisfaction varies among students as well as institutions, and they depend on both students' expectations and the quality of services provided at universities (5). (2) had stated that when the focus comes to international students' satisfaction; universities have to rethink the determinants and recognise that international students have specific requirements. According to (6) the features that influence students' satisfaction have to be classified into two groups such as personal and institutional factors. Personal factors involve students' age, gender, background, ethnicity, learning style and students' GPA (Grade Point Average). Institutional factors consist of teaching quality and style, quality of courses, projects clarity, and the speed of receiving instructors' feedback. Besides that, (7) reported the size of classrooms, course content and learning materials quality, lecturer student relationship, interaction and collaboration with fellow students, and library facilities have a big impact on students' satisfaction. Moreover, according to (8) and (2) the following are the most general determinants impact ISS:

➢ Teaching and courses content quality
➢ Library facilities (books collections and return services)
➢ Student research facilities (online library research websites)
➢ Campus infrastructure
➢ Sufficient availability of spaces/rooms for group discussions.
➢ Sports programs and trips.
➢ ICT (enough PCs and high-speed Internet connection) facilities.

(2) measured factors that are applied to all students generally, not only international students. Once we focus on IS, we have to be specific and precise. For example, IS may experience challenges and difficulties with weather condition, accommodation (e.g. location, price, facilities), life expenses (e.g. study fees, materials prices, transportation) and types of food (e.g. Halal, vegan, free type). Also, academic experiences such as instructors' directions and support, courses and exams timetable, and students' interaction with instructors and fellows. All these specific factors provide strong outcomes that can be used to measure their impact on ISS.

Besides, international students travelling for the first time have to be given an opportunity for living in a welcoming environment which gives them peace of mind and makes them feel secure and relaxed. Afterwards, they can be given a variety of options with accommodation locations, costs and facilities. Also, some international students (e.g. Muslim, Christen) will be looking for special facilities for prayer rooms.

4 Methodology

4.1 Online survey

The initial dataset of this paper was obtained by conducting a self-administrated online questionnaire and distributing it among anonymous international students at different UK universities. The online survey was designed using the survey-monkey software and it was divided into two parts, the first part involved scaling questions and the second part involved three open questions. The open questions enabled participants to add more values to the survey by providing useful comments and valuable suggestions. The link of the survey was sent via university email with the help of students' service center at our university and through social media accounts. The survey was available for two months, once it was filled; participants' responses were collected automatically through the survey-monkey website and the dataset was created.

4.2 Case Studies
It was challenging to find an existing dataset to be used and compared with the results of our created dataset. So, we used a Hybrid data collection technique

where both quantitative and qualitative research methods are applied for collecting rich, real and up-to-date data for measuring ISS. Case studies are highly flexible learning research methods which enable researchers to acquire precise and detailed information and feedback from participants and develop analytical skills (9). For this paper, four case studies were conducted through semi-structured interviews which are also known as Hybrid or Combined interviews with four PhD international students with different backgrounds, major, experiences, countries as well as different universities and educational/PhD level. For data analysis and decision making, Machine Learning classification algorithms such as J48, Naïve Bayes, Neural Network (MLP), K-Means and Nearest Neighbor were performed using the Weka Data Mining tool.

4.3 Data Mining and Machine Learning

Data mining is knowledge discovery and extraction of meaningful data or insights form a massive dataset. Machine learning is a data mining approach which is used for data mining tasks such as data classification. Data classification is the organization and categorization of data for its most efficient and effective uses (10). Weka is a data mining tool which involves different Machine Learning algorithms that generate predictive models and tables, and identifies the accuracy of each algorithm.

5 Discussions and Evaluation

Data mining techniques are not simple input-output mechanisms; they require lots of research, study and understanding for an accurate use and to obtain accurate outcomes. Table 1 shows the comparison among the different ML algorithms that were used on the dataset of this research paper.
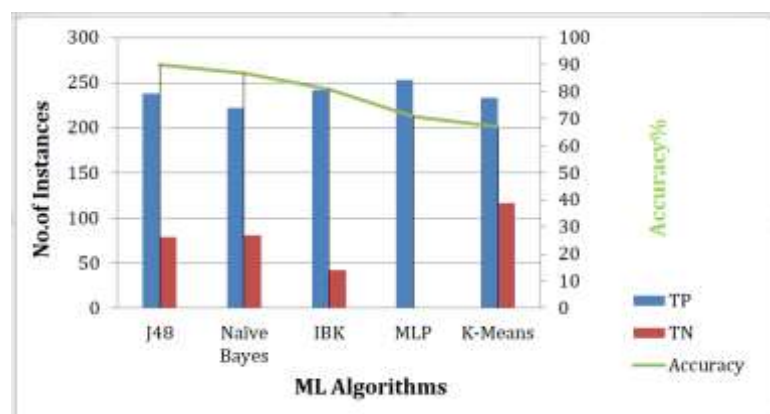

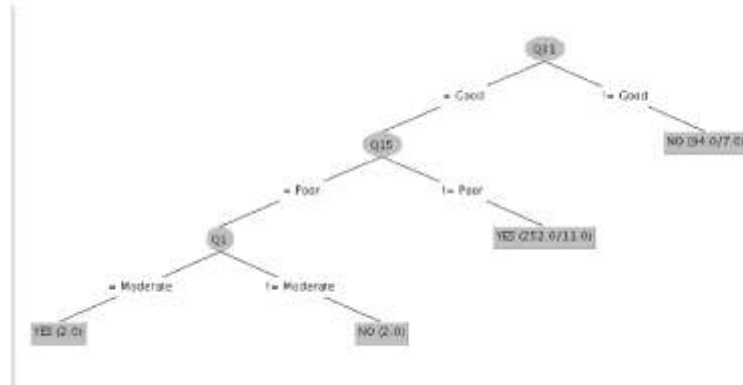**Table 1: Comparison of ML Algorithms' Results**

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Figure 1: J48 Binary Tree Model

## 5.1 Performance and Predictive Models
In terms of performance, the results of high accuracy indicate that entirely all ML algorithms worked-well and predicted accurate results according to the dataset distribution. Comparing all ML algorithms, the J48 classifier was the most successful algorithm which gained the highest accuracy and generated an interpretable and predictive model that can be analysed to make decisions. Besides, the J48 tree is an understandable model which even shows the number of values associated within each instance of the Online survey question as shown in Figure 1, while other ML algorithms are not applicable to show the attributes that are assigned to a particular class or the number of values associated to each instance within the dataset.

5.2 Confusion Matrix
In terms of the confusion matrix, Table 1 shows that ML algorithms relatively produced good results which strongly suggest that about 70% of international students have a good satisfaction level, where most instances were assigned to the **TP** comparing to the **TN.** This predicts the success of UK universities in ensuring ISS by providing good academic facilities and services that meet international students' needs and expectations. However, it cannot be overlooked that there are few numbers of instances (e.g. **TN**) are remained to experience some difficulties and challenges that are affecting ISS level.

5.3 Factors that influence ISS
According to our dataset (*participants' responses*), all ML algorithms showed that the highest number of instances belong to the class YES. However, it was challenging with some ML algorithms such as IBK and K-means to identify the attributes that influence ISS. While, the J48 and NB displayed the attributes that mostly satisfy international students as shown in Table 2.
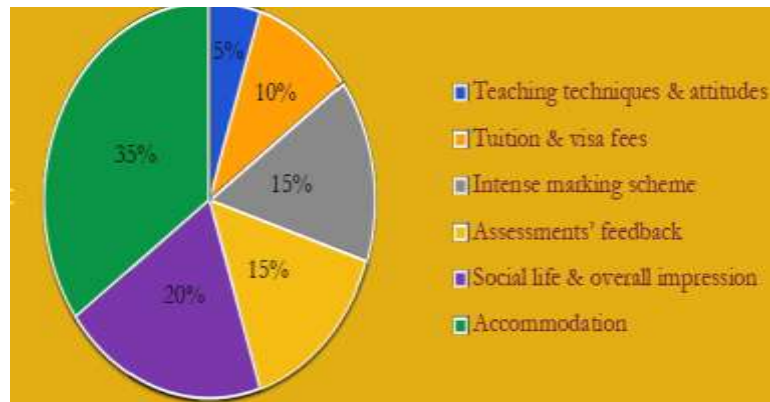
Table 2: Factors Influence the ISS level

5.4 Case Studies Analysis and Evaluation

Interviewees' responses stated that generally, international students are satisfied and are grateful for having experienced supervisors, availability of both online and offline resources and services, and tutorial sessions and field trips. However, international students are dissatisfied with tuition and visa fees, marking scheme which is strict and intensive, assessments feedback are unfair and unhelpful, and international students need special prayer rooms with good facilities, and well-spaced PhD offices. Beside these comments, a list of recommendations has been proposed to International Students for increasing the satisfaction level. For instance, before the travel, students should contact with other ISs to learn from their experiences and avoid unrealistic expectations. Also, students should try to adapt themselves to the new culture & LE; as studying abroad definitely has some challenges and difficulties and requires lots of efforts and hardworking as well as time management and good planning. Finally, inspiring, hopeful and encouraging supervisors and the one of the keys of success and self-improvement.

6 Conclusion

Higher education is rapidly increasing worldwide, and it aims to maximise the commercial advantage of HE in the competitive market by attracting more students. Attracting students is associated with engaging students and ensuring their level of satisfaction in HE by understanding students' need and expectations. As discussed earlier in this paper, many studies have been conducted to examine SS in the UK; however, a few studies focused on ISS. Hence, this thesis aimed to examine the overall level of ISS at UK universities, and acknowledge the

factors that influence ISS and propose recommendations. The project originality was accomplished, aims and objectives have been achieved successfully; as we reviewed and evaluated existing studies measuring both SS and ISS, a comprehensive online survey was conducted to create the dataset of this paper and apply ML algorithms. Besides that, the results were analysed and discussed, ML algorithms were evaluated, and some recommendations were given.

However, some ML algorithms (e.g. NB, IBK, MLP, K-Means) did not provide predictive models or analytical tables that could show the classification of each attribute of the dataset. Overall, it was interesting to acknowledge that international students are overall satisfied. Besides, participants' responses to the open questions of the online survey, and the case studies brought out precise knowledge and experiences that helped us to test our hypotheses as well as to propose recommendations.

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