Course Recommendation Based on Academic Qualification And Personality Type Using Rule-Based Technique

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Abstract: Choosing the right course that suit student academic results and personality is a highly challenging task. A course recommendation system based on academic qualification and personality type is design and develop to recommend the most suitable course for students who wanted to pursue their studies at university. This system is proposed for high school graduate students who are applying for academic courses offered by Universiti Sultan Zainal Abidin (UniSZA). This system aims to assist students who faced difficulties in making decisions during the academic course selection due to lack of experience and difficult to get an appropriate suggestion from parents or friends. This system utilizes rules-based technique for course recommendations. Examination result of Sijil Peperiksaan Malaysia (SPM) and personality type is incorporated with rule-based technique to provide the recommendations. Students required to answer a personality test in order to determine their personality type. A personality test is designed based on Holland J. Theory in determining the personality of the person. The six personality types that proposed by Holland J. are Realistic, Investigative, Artistic, Social, Enterprising and Conventional. The course recommendation system is able to suggest the most suitable academic courses for students based on their academic results and the personality types.

Key words: Course recommendation system - Holland Theory - Personality Type - Rule-based technique

INTRODUCTION

Higher learning institution such as Universiti Sultan Zainal Abidin (UniSZA) is an important platform for students to continue their studies either in diploma or bachelor's degree. Finding the best course that fit with your academic qualities and your personalities has never been an easy task. Every student must choose the suitable course for them so that they are more confident and able to finish their studies on time. However, the undergraduate's prospects are often faced difficulties in making a good decision during course selection due to lack of experience or knowledge and also hard to get a good suggestion from parents or friends [1, 5]. The student can apply any courses that they are interested, but sometimes student ends up with choosing unsuitable courses. In addition, every course that is offered may not necessarily suitable for every student since everyone is different in the academic abilities and personalities. Choosing an education program that fits the student’s personality is a vital step to ensure good grades and graduating on time. Furthermore, it is important to make sure that you have made a good choice because it also prepare you for the career you want in the near future.

In this project, we have design and develop a course recommendation system which aims to make recommendations for the suitable course. The proposed course recommendation system is based on academic qualification and personality type of the applicant and eventually will recommend the most suitable course for them. A personality test that employed in the system is based on Holland J. Theory to determine the personality type. A rule-based technique is designed to combine the academic qualification and personality type in suggesting the most suitable course for students. The systems will also rank the courses based on the score of the rule-based technique.

Holland J. Theory for Personality Test: Recent studies show that the degree of match between students’ interests and college course contributes to the student graduation. Holland’s theory places equal emphasis on
both psychological and sociological considerations in an effort to understand vocational and educational stability, satisfaction and achievement. Holland’s theory also based in both genetics and environment [16]. It leads to a differentiation of skills, interests and competencies. These interests also correspond with personal values to create a distinct personality type, which Holland believes to exhibit characteristic behaviors and traits [16].

**Rule-Based Technique:** Rule-based systems use of human expert knowledge to solve real-world problems that normally require human intelligence [11]. The main principle of rule-based systems are reasoning with If-Then rules, that create new knowledge [4, 11]. To create a rule-based system need a set of facts, a set of rules and a condition that determines that a solution has been found or that none exists.

This is how rule-based technique works in course recommendation system. Firstly, the examination result is compared to the academic requirements for the selected courses. For example, academic requirements for diploma program required pass in the Mathematics and English subjects. Second, the personality type of the student is compared with the Holland code that has been preassigned for certain courses. Lastly, the suitable course is recommended for the student.

The advantages of rule-based is that it tends to increase the functionality and reliability of the system since they minimize errors that humans are prone to [2]. It has an ability to develop a system with more consistency than human experts and solutions can be developed faster than human experts [11]. Moreover, the benefits of deploying recommendation technology is to assist user in finding relevant items [13, 14]. The course recommendation system helps students to find a major where they can succeed and graduate on time [4].

The proposed Course Recommendation System is comparable to the University Course Recommendation System using Personality Test [1] developed by Yeun-Kae Ngow And Min-Hooi Chuah, however the personality test that implemented their system does not employ systematic calculation to measure and identify personality types. It also difficult to identify personality types for a new course and the number of the personality test questions needs to increase.

Another existing system that similar to the proposed system is iMASCU, that can be found on http://upu.semaksyarat.info/. This system makes recommendation for all courses in the higher learning institutions in Malaysia but the recommended courses only based on the examination result of SPM and STPM. Therefore, our proposed course recommendation system is to complement and improve the existing system by applying personality test and rule-based technique so the result of recommended courses will be more accurate and precise to the student ability and personalities.

**MATERIALS AND METHODS**

There are two types of main users of the system, the system administration and the student. The system administrator can access the system to manage courses, manage academic requirements, manage questions for the personality test and manage course Personality Type. Manage courses that consist of add course, update course and delete course. The system administration able to add questions, update questions and delete questions. Admin can manage admission requirements by add, update and delete. Course Personality Type also be able to add, update an delete by admin.

A student can access the system at any time. The system required student’s profile, examination result and personality type. Personality type is generated by the system after student completely answered personality test that provided. Student enables to re-test on the personality test and view recommended courses. Finally, the system will suggest the best course for the student. The overall system flow is described in the following Fig. 1.

Data simulation is a graphic flow that use to represent the logical process of this system. It will explain step by step the implementing of the system in processing the input and generate the output. For this system, it consists of four phases. Started with student details, match course based on academic requirement, generate the personality type and match the personality type with suitable course.

**First Phase – Student Details:** There are three modules for student details which is student profile, examination result and a personality test. These modules require input from students.

**Second Phase – Match Examination Result with Academic Requirement:** In this step, the students results is checked against academic entry requirements, if type of subject is compulsory, all subject must be pass. If type of subject is option, minimum match is based on requirement number of subject. Others type is a list of subject that does not match yet with compulsory and option.
Fig. 1: Overall System Design and Flow

Fig. 2: Phase 2
Fig. 3: Phase Three

Third Phase – Generate Personality Type: The system will calculate and generate personality type from the personality test that completely answered by the student. For example, the personality type is the IEC (Investigative, Enterprising, Conventional). These personality types will be used in the next phase.

Fourth Phase – Generate Recommended Course: Table 1 shows that coursecode are sorted based on percentage of code matched. The percentage is assigned at least two codes matched. If the two codes match, it assigns to have 75% and three codes match is assigned to have 100%. Finally, the result of sorting the percentage of code match is a list of recommended courses for students.

RESULTS ON MODEL COMPARISONS

Fig. 4 shows generally how the process of find the matched courses. Examination result of student is checked with academic requirement based on university policy. Grade listed in the academic requirement table is at least requirement which means for course Diploma Teknologi Maklumat (DTM), Bahasa Malaysia (BM) in Sijil Pelajaran Malaysia (SPM) should be at least grade C. The output of this process is a list of matched course according to examination result. The matched courses based on the examination result are D2801, D2802, D2210 and D2211. Course D2150 (TESL) is not a match course, because Bahasa Inggeris (BI) in the examination result is C and not achieve the requirement for the Bahasa Inggeris (BI) is at least A-.
CONCLUSION

The proposed course recommendation system is to overcome the problem that faced by many SPM leavers who are planning to pursue their studies. They have difficulties in making decisions during course selection due to lack of experience and unable to get a good suggestion from parents or friends. The objective of the project is to propose a course recommendation system based on the academic qualification and personality type, then design and develop a proposed system for high school graduate student and finally test and evaluate the functionality of the developed system. The Holland Theory is used to determine the personality type of students based on a personality test. The Rule-Based Technique is applied to recommend a suitable and best course for the student based on their personality type and academic qualification. The proposed system could be considered as an expert system that able to solve the problem in course selection based on academic qualification and personality type. This system has a potential to be upgraded and improved. In future work, the system should consider diploma and degree programs from all IPT in Malaysia. Hopefully, the proposed system will assist student to choose a suitable academic course and they could further their studies in the field that suit their abilities and personalities and finally will graduate on time.

REFERENCES