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NUAT: Utilizing Knowledge Acquisition Techniques to Aggregate Data for Analysis and Automated Reports Generation

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Abstract. Educational institutions are now slowly grasping technological advancement to aim for a more productive and efficient environment for their employees and students. The purpose of this system is to provide a digital environment for the college applicants of National University for their Admission Application and Admissions Test, and have the data collected to be kept organized and safe from external causes of data destruction. All other important functions for the administrator includes reports generation, item analysis (from the Admissions Test) and notification for the applicants regarding their Examination Code and Status. In order to gain more knowledge and output, the researchers utilized the Agile Development Model which allows for iterative cycles with their client. To further support the data this paper gathered, interviews and surveys has been conducted.

Keywords: automated reports, data analysis, item analysis, examination code, examination status, knowledge acquisition and processing.

1. Introduction

Collecting data has been a central point of the today's currently growing economy. It keeps an institution continually at pace and in circulation. However, increasing population is equivalent to increasing data. Manually handling it would not suffice and would require the need for computers. As such, varying data-gathering techniques are created to answer common problems in manual transaction and to make data handling easily. In a case to case basis, computers generalize reports and documentations into an ordered sort—something an organized company would like to have as a boost for efficiency.

Educational institutes are also following this trend. Most of them have their systems installed online like the most commonly used Student Information System (SIS) that covers student registrations, stores student transcripts, checks student attendance, and many more. Other systems include a student admission where the basic function of the system is to accommodate students about their queries and applications and be given a schedule for an examination and shall be evaluated on their abilities such as: understanding of concepts, sharpness of mind and knowledge. These common exams are especially designed to test special characteristic of students to measure their potential and define a career path. Through entrance examination, most schools can choose the best from all the examinees. On the other hand, the information taken from the applicants then, would be available to the school for the sole purpose of monitoring student-related activities, such as their attendance, test results, and scheduling. It cuts down a massive usage of papers and hasten the processes too.

This paper intends to contribute to National University and its applicants by processing the exam results and producing course suggestions based from extracted information.

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2. Literature Review

2.1. Computerized School Systems

People tend to make mistakes over piles and piles of paper; these simple mistakes could prove fatal for the welfare of both the employee and company. Today, automated systems, online or not, are the current trends of businesses because of the outcome benefits. Universities and colleges in the Philippines are one of those leaning towards this trend.

These advantages are not only to *'s*how off' a school's capability to be technologically-inclined. It shows the readiness of accepting a more systematized way of organizing Examinations, too, are finally adopting an electronically-based one to make it accessible for their respective students anywhere with just a personal computer or device and for their teachers and professors to easily evaluate the results. Enoch Morisson defined the advantages of computerized examination to the students, the school, and their personnel: (1) is it greatly speeds up the process of scoring the examination of hundreds or thousands of students and reduces the possibility of human-created errors, (2) it is efficiently in both time and cost from both parties (students and the school), (3) it can accommodate students with disabilities with the use of additional technologies like braille keyboards or screen readers, (4) schedules for the examination can be handled flexibly, (5) Modifications, revisions, and updates are instantaneous [5].

Automated systems are also integrated into college admissions. This is a time where students must decide what profession they are fit for and increase their potential to get accepted to their desired university or college. For the schools, college or university alike, this time is also a deciding factor whether the student applicant gets to have a change in their respective school or not. If yes, it would have a series of registration forms, long lines of students, and a lot of human-errors over their non-automated methods [6], [7].

But there are still many schools that are still handling examinations with traditional methods—in which recurring errors appear often due to the increasing numbers of students every year [8]. Aside from that, precious time, patience and effort gets lost while waiting in a long line just to have their registration forms and entrance examinations.

2.2. College Entrance Exams and Major's Criteria

College entrance exam (or Admission Exam) is a common standard to everyone planning to go into the tertiary level of education. Along with the initial requirements of the school, this type of examination helps a college institution to evaluate students who came from different high schools and create a profile about their learning environment, academic prowess, and expectation [9].

One of the more prominent entrance examinations in the Philippines like the UPCAT (University of the Philippines College Entrance Test) has a University Predicted Grade which computes 40% of the high school grade and the 60% from the UPCAT itself. If an applicant's UPG passes the cut-off grade required, then they will be eligible to enter the university and choose a degree program (under the condition that the applicant's UPG passes their chosen degree program and that the slot is available) [10].

On an international level, admission exams are standardized like the SAT (Scholastic Assessment Test) and ACT (American College Test) for the undergraduates. Passing these exams makes the applicant eligible to enter a university and choose their preferred major, as long as it meets the average requirement of that degree [11].

2.3. Factors Affecting Student Decision

Decision-making deals with choosing and determining choices according to the values and preferences of a decision maker. It is about the doubts in choices or alternatives allowing a reasonable alternative to be made from continuous process of efficiently minimizing uncertainties. That is to say that every decision we make has far reaching consequences [15]. Krantz and Kunreuther applied the theory that the context provides the situation for the decision that needs to be decide upon; goals and resources, influenced by the circumstances or conditions, contribute to the development of reasonable plans; while the decision-making rules are executed and influence the plan that is primarily chosen.

3. System Framework

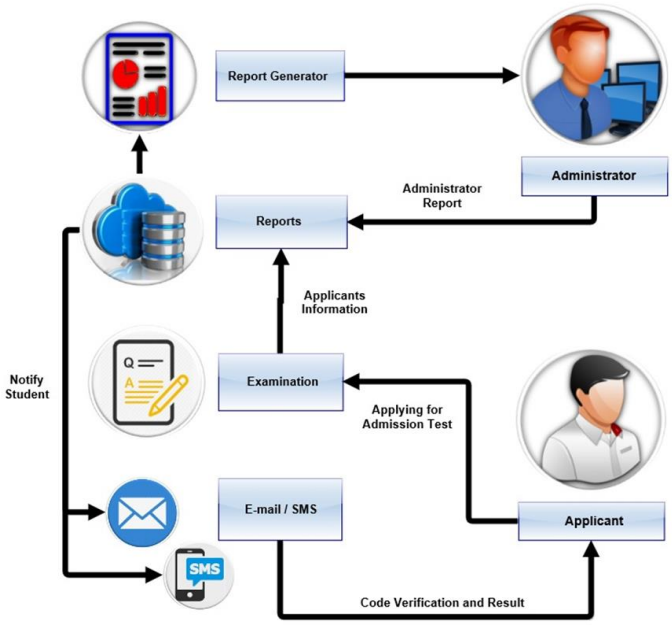

Fig. 1: System framework.

System Framework illustrates the interactions between the modules from the web and the database. In figure 1, The Applicant applying for the Admissions Test is required to fill up the information (Personal Information, Educational Background, Family Information, Degree Programs and Survey) once done, the system will send unique code via SMS and/or Email that will be used to take the Admissions Test. Informations acquired allows automated generation of reports and item analysis.

4. System Features

The following are the modules of the system:

Applicant Side

The applicant side caters the following modules: application module, for gathering of applicants personal information; examination module, for the assessment of the applicants; and schedules module, for the applicant's exam date, time and place.

Administrator and Staff Side

This side includes the following modules: login module, to grant necessary access to the user; dashboard module, to display the most recent summary of reports in graphical form; student module, for the viewing of applicant's information and notifications; reports module, for reports generation; examination module, for adding, editing and viewing of examination questions; settings module, allows editing of different access to other modules; user management module, to add, update and view users; activity logs, to display system activities; degree programs module, for adding, editing and viewing of degree programs; schools module, for viewing and adding of schools available in the system; help module, to show basic navigations in the system; and notifications module, shows requests to add school names.

5. Results and Discussion

5.1. Data Gathering Procedure

Stratified Sampling refers to the division of population into several groups which called strata. Then a probability sample is drawn from each group. A sample of simple probability that the researchers use was Random Sampling. The researchers conducted random sampling wherein the first 50 students recognized by the Project Manager would be the one who will conduct the testing of the system. In this case, the population is 50 students and 10 administrators with the total of 60 User Evaluation, the sample is random because each

student has an equal chance of being chosen. For the IT Professionals, the researcher used Random Sampling. The researchers conducted random sampling wherein the 10 IT Professionals who were known by the researchers will be the one to conduct the testing of the system

Statistical Treatment of Data

The data gathered from the questionnaire and survey form were presented in the appropriated tabular form. It is designed to display the perceptions of most in evaluating the program software.

Likert Scale

For an accurate result, Assessment Survey, User Evaluation Form and Administrator Evaluation Form were used for data gathering. The set of questions was arranged using the Likert format with a five-point response scale.

Table 1: Likert scale

Numerical Scale	Verbal Interpretation
5	Strongly Agree/Extremely Important/Excellent
4	Agree/ Moderately Important/Very Satisfactory
3	Undecided/Satisfactory
2	Disagree/Slightly Important/Needs Improvement
1	Strongly Disagree/Not all Important/Poor

Table 1 is a rating scale that requires the subject to indicate his or her degree of agreement and disagreement or satisfaction and dissatisfaction to a statement. To this type of questionnaire, the respondents were given five response choices. These options served as the quantifications of the participants' agreement or disagreement on each question item. It quantifies the responses to the questions with the following criteria used.

Assessment Survey

The researchers conducted post-survey to assess the National University Admission Office (NUAO) in terms of technology self-efficiency, the usefulness of the system and their feedbacks with the system Intranet-Based National University Admissions Test (NUAT).

To meet the objectives, the researchers used an assessment survey for data gathering from their respective respondents. The respondents of the assessment survey were the Director and Staff of National University Admissions Office (NUAO). The survey questionnaire consists of the following questions about Technology Self-Efficacy, Perceived Usefulness and Perceived Ease of Use.

5.2. Findings

The researchers conducted a series of surveys and evaluation forms which resulted into the following data findings:

1. Based on the data gathered through, interviews, evaluations and assessment survey, the researchers were able to identify the flaws and problems with NUAO's manual process of Admissions Test. With this, the researchers develop an Intranet-Based National University Admissions Test (NUAT) to solve the problems. The system aimed to provide convenience to National University Admissions Office and applicants in taking the university's Admissions Test. The system is able to generate suggested degree programs suited to each applicant which will depend on their examination result. The process of examining students' responses to individual test items/questions is included in the system as well to be able to identify the level of difficulty of each question and the system also provides reports needed by the NUAO. All gathered data by using evaluation forms were tallied and interpreted.
2. The researchers conducted the User Evaluation which composes of four (4) statements in terms of "Functionality" with an overall mean of 4.49; two (2) statements for "Reliability" with an overall mean of 4.62, (4) statements in terms of "Usability" with an overall mean of 4.30; three (3) statements in terms of "Efficiency" with an overall mean of 4.64 and three (3) statements in terms of "Maintainability" with an overall mean of 4.30. Among the five (5) criteria, "Efficiency" comes first

with the highest overall mean of 4.62 interpreted as 'Excellent', followed by Reliability, Functionality, Maintainability and Usability. On the other hand, the Administrator Evaluation composes of four (4) statements in terms of "Functionality" with an overall mean of 3.55; two (2) statements for "Reliability" with an overall mean of 3.80, (4) statements in terms of "Usability" with an overall mean of 4.00; three (3) statements in terms of "Efficiency" and "Maintainability" with an overall mean of 4.33. Among the five (5) criteria, "Efficiency" and "Maintainability" got the highest overall mean of 4.33 interpreted as 'Very Satisfactory', followed by Usability, Reliability then Functionality.

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