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Degree Synthesizer

Portable Pre-Assessment Exam for Incoming College Students in New Era University by Means of Genetic Algorithm

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Abstract— **Educational resources with the use of modern technology are powerful tools to elevate learning. In this modern era, mobility is not an issue any longer. Almost everything can be accessed through the palm of our hands. The paper reports on efforts to deepen the analysis of freshmen students in choosing an appropriate college degree by the use of a mobile-base pre-assessment exam and examines the predicted future advancements of this mobile application. In this paper, genetic algorithm can be used to generate better solution to an optimization problem.**

Keywords- Genetic Algorithm, Mobile-based Pre-assessment exam, mobile application

I. INTRODUCTION

The use of mobile devices is distinguished in the present time. This can be a powerful tool that will help organizations to be efficient and productive. Even educational institutions adopt this innovation for the benefit of the students. Some institutions are embracing the opportunity to make new mobile applications that are handy. Through this effort, both students and professors benefit the joy of learning.

Choosing the right path to take on college is challenging. Most incoming freshmen students struggle in deciding which degree is the most suited for them. Wrong decisions can lead to many negative results. If this can be barred ahead of time, the results can steer to a positive outcome.

National Career Assessment Examination (NCAE) is one of the qualifying exams in the Philippines' higher education curriculum. This exam aims to know what a students' strength in different careers. It will help the students determine which college degree is the most suited for them in college. The exam shows results on how the student excel in a certain subject but takes days in getting the result. A pre-assessment exam will be a better platform to assure the success in the chosen degree because the results will be posted immediately.

This Pre-Assessment Exam is consists of questions that can test the students' knowledge and skills. The exam is consists of different subjects and then after taking the exam, the result is automatically provided. In the result, it will give suggested degree for the student to choose from before getting an Entrance Exam. It will be presented in percentage form. Example: The student is excellent in Computers then the suggested degree can be BS Computer Science or other computer related degree.

This application is different from any assessment or evaluation exam applications due to the use of genetic algorithm as an optimization technique for the results to be more comprehensive. Genetic Algorithm is proven to be very effective and constant in finding for ideal solutions. To identify the best solution, genetic algorithm implements the operators such as selection, crossover, and mutation for employing the chromosomes in a population [7][11].

It does not make any difference on how the advancements of the technology has been categorized, or if the particular innovations are supplanted with ideas that we know of or being used to date. The idea is that mLearning in the future will help to improve a learner-centered approach that will progress student motivation, commitment with the subject matter, and help increase their optimistic attitudes about their education [5-6].

II. OBJECTIVES

This paper aims to provide a system program that automatically evaluate results and suggest degree that can help the incoming freshmen students to choose their appropriate degree using their mobile devices. This paper is less time consuming and lessens space on a test room.

Incoming students, especially fresh High School graduates tends to gather information about the university that they want to be in the next four year of their study. What they want is the proficiency on how the process would be when it comes to entrance examination, enrolment and other related matter.

The idea of being complacent takes place when every incoming college students can use this application.

III. RELATED WORKS

Mobile devices have become some of the fastest advancing communication gadgets. Their ease of use, reduction in the use of paper, low cost, mobility, portability, interactivity, flexibility and ubiquity, are some of their

characteristics that make them so popular among students [1]. The integration of mobile devices in learning leads to a new learning mode called mobile learning. Mobile technology provides greater possibilities for learning to be situated in a real world context and guide students to construct knowledge from these experiences. [3-4].

Conducted research (Karadeniz, 2009) realizes that mobile learning and its applications may use as a platform for us acquire knowledge by means of technology. Getting information regarding schools' information systems, discussion forum and tests by using mobile phones is one innovative idea behind the excellence of using wireless campus. Researcher said that it is a great opening for the students to access easily at any area of the campus using their laptops. In addition, with the advancement of several mobile devices as a learning platform, the number of approaches which deals with devices has increased in their universities [2].

Educational recreation like museums, art galleries and other related can be one of the learning material when it comes to studying real-life artifacts. The researchers (Hwang and Chang, 2011) uses the temples' as their material that leads them in making a mobile application. The application they uses is called FAML, (Formative Assessment-based Mobile Learning) which is developed for guiding a cultural learning method with wireless network. In their said study (Hwang and Chang, 2011), a formative assessment-based learning guiding mechanism is proposed, and a mobile learning environment is developed accordingly. In addition, a mobile learning activity has been conducted to evaluate the effectiveness of our approach by comparing the learning achievements, cognitive load and learning attitudes of the students who learned with or without our approach in such a complex learning scenario. The results show that the formative assessment-based approach is helpful to the students in improving their learning achievements in the mobile learning environment [5].

There are many ways of implementing genetic algorithm, one of the researches (Pillay and Banzhaf, 2010) uses gene encoding which involves solving the exam timetabling problem, a GA based model has been designed and implemented with the use of the following genetic algorithm methods [8].

Fitness function is also one of the most important part of genetic algorithm, because it decodes the chromosome into timetable and calculates a fitness value of each chromosome that points out how well it solves the problem under study. In their research (Kalayci and Gungor, 2012), the fitness is formed in order to maximize students' success. There are many students who share the same exam schedule at each term. Instead of checking each student's schedule separately in the database, we preferred to group students based on chains and shared exams. Thus, sub chains and their connected shared exams represent a group of students who have the same exam schedule [10].

A new crossover operator and probability selection technique is proposed based in the population diversity using a fuzzy logic, using these crossover operator can help to solve problem easier. Researchers (Wang and Si, 2013) created a Hybrid Genetic Algorithm with the use of Particle Swarm Optimization. PSO often locates nearly optimal solutions at a fast convergence speed, but fails to adjust its velocity step size to continue optimization in the binary search space, which leads to premature convergence. In contrast, research has shown that genetic algorithms can adjust its mutation step size dynamically in order to better reflect the granularity of the local search area. This indicates a potential to surpass the performance of PSO (Particle Swarm Optimization) in term of solution quality. However, GA suffers from a slow convergence speed. Therefore, hybrid GA PSO has been proposed to overcome those problems and combine advantages of PSO and GA [12].

IV. SYSTEM ARCHITECTURE

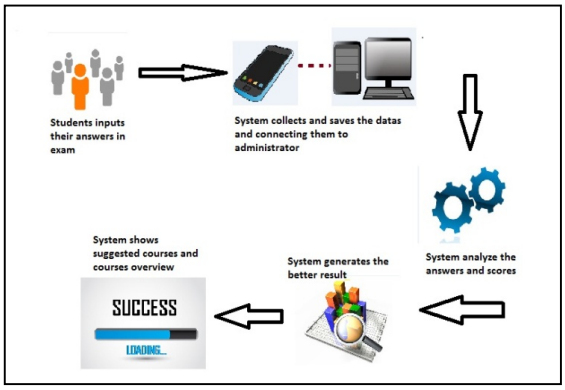

Figure 1: Mobile-based pre-assessment exam system

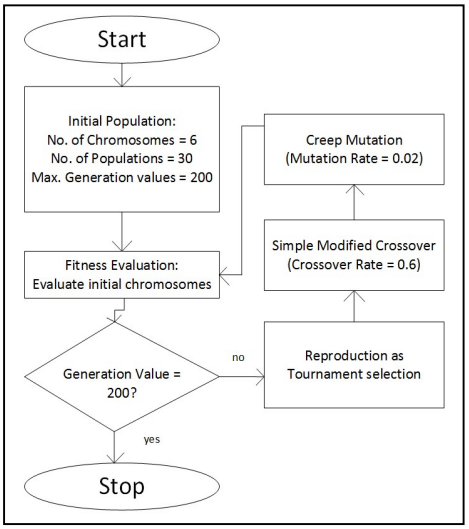

Figure 2: Genetic algorithms within the system

The Figure 2 shows the basic process for a genetic algorithm.

Initialization takes place wherein it creates the beginning population of solution candidates. Creating population with random values for the solution to use is necessary in this phase.

Once the population has been initialized, then evaluation occurs. During evaluation process, the fitness value is deliberated on how well it fits with the preferred requirements. Then, generation value analyzes if it meets the requirement.

If the generation value is not equal to 200, reproduction occurs, wherein we uses tournament selection, where each parent is the best fit of two individuals pick at random from the population.

Crossover is the most important evolution operation. Using 0.6 of crossover probability is way more consistent than the other probability rate, the population size is chosen to be at 30 and algorithm was run for 200 generations, identifying the next process to be mutated.

Mutation probabilities are expected to be low. In this algorithm, we used creep mutation that on decoded individual and 0.2 rate since high values may cause strong disruption and steer the algorithm away from the expected value.

V. Results and Discussion

TABLE I. Pre-assessment exam vs. Entrance exam

Table I shows the representation of the result of the pre-assessment exam of the students versus the possible results of the entrance exam. The table shows the degree the student can take upon entering the university. The expected score on the pre-assessment exam will be compared to the score in the entrance exam producing an observed value. An error value will be produced if the student that took the pre-assessment exam and produced a result but enrolled on a different degree. A student can choose if the degree that is the result of the pre-assessment exam is the one he/she will take upon entering college.

Pre assess-ment	**Entrance Exam**				**Total**
	Computer Course (C)	***Educa-tion (Ed)***	***Science (S)***	***Engineering (Eg)***	
C	Expected = 100% Observed = 70% Error =30%	0	Expected= 0% Observed= 20%	Expected=0% Observed=20%	100%
Ed		Expected= 100%	0	0	100%
S			Expected= 100%	0	100%
Eg				Expected= 100%	100%

TABLE II. Responses of the students

Responses	**Is it helpful to the students?**	
	Frequency	***Percentage***
Yes	278	92.6%
Neutral	15	5%
No	7	2.3%
Total number of reponses: 300		100%

Table II shows the responses of the student on how useful are the pre-assessment results in the entrance exam of freshmen and how it lessen the space in test room. Involving 300 students in this survey, answers the question aforementioned. Each students has a choice if it is helpful or not in their entrance exam. Gathering 2.3%, 7 students says that it is not helpful in their entrance exam. With 5%, 15 students says it quite help them choosing the right degree in college. In a total of 278 students and 92.6%, students says that it really help them in selecting the degree they want to pursue.

VI. Conclusion

Portable Pre-Assessment Exam for incoming college students of New Era University using Genetic Algorithm is designed to help the incoming students to have a more concrete choice in the degree they want and more appropriate to take in college based on the results generated by the application.

Throughout this whole research some suggested problems are already said, e.g. it can minimize the time in enrolment phase, neglects dilemma within the students and many more. Amends this type of situation, the use of this application can deliver a great milestone in the technological aspect of New Era University.

It helps to make up their own mind when it comes to the degree they want to pursue. Smart phones is one the main connection with the student and the application itself. Thus, everyone especially students can assess within the touch of their fingertips whenever, wherever.

VII. Future Works

The availability of this application may be available online, this is exclusively for New Era University only to avoid those quite nuisance regarding enrolment period. Enhancing these application can really help different students around the world on what degree they want to pursue.

By the time the results are obtained or the degree suggested that the student can take, we can apply and proceed to the next step which is the entrance exam to diminish the time a student needs in enrolment phase. Applying these new function in this mobile based pre-assessment exam can elevate the innovation of the technology that New Era University has. The demand of the new students will increase due to availability of this new type updates for the future works.

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