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## **Dynamic Alumni Analytics and Mining System**

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### **ABSTRACT**

#### **Rationale/Background of the Study**

*Higher education plays a big role in strengthening a nation's economy as it is an industry in itself and it supports the rest of the industry by providing a trained workforce. Before, the major concern for the Institutions were the decrease in the student success rate, decrease in retention of students, increase in students moving to other competitive institution and lack of counseling to students in subject selection. However, with education becoming more and more employment oriented, employment of students, graduating from any institution has become a major factor in building the reputation of the institution and hence, a major concern. The students' employability is a major concern for the institutions offering higher education and a method for early prediction of employability of the students is always desirable to take timely action.*

*Development of information systems increases the productivity, accuracy and accessibility of performing transactions in organizations. Since almost all business transactions are being done online these days, web applications are now being developed and implemented in organizations including the academe.*

*Tracer study is crucial for universities to examine the competitiveness of their curriculums in the real world. Being one of the prominent universities in Region 02, the Quirino State University recognize the need of an integrated tracer study in order to maintain the competitiveness of their curriculum to address stakeholder's needs. The institution is undertaking on tracing its alumni in which it is manually done and the remedy will aid the tracing of the alumni by having a computerization in storing and retrieving alumni information and in order to collect and provide communication to their alumni.*

*It is for these reasons that the researcher proposed a dynamic alumni analytics and mining system to secure the information of every alumni and to be able to determine the employability of graduates. This study was also proposed to establish that status of graduates is highly regarded, and it is the greatest concern of the university. Without constant communication to its alumni and the lack of tracer instruments, the university may fail to keep track of their status and fail to determine the rate of employability.*

**Keywords:** *alumni, data analytics, data mining, alumni tracing*

#### **Statement of the Problem**

The main purpose of this study is to design and develop a dynamic alumni analytics and mining system for Quirino State University.

Specifically, it was conducted to answer the following questions:

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1. What are the problems and issues encountered in tracking the graduates of Quirino State University?
2. What algorithm can be used in the development of the proposed system?
3. What system can be developed to trace the graduates of Quirino State University?
4. What is the extent of compliance of the developed application to ISO 25010 Software Quality Standards in terms of:
  - 4.1 Functional Suitability;
  - 4.2 Performance Efficiency;
  - 4.3 Compatibility;
  - 4.4 Usability;
  - 4.5 Reliability;
  - 4.6 Security;
  - 4.7 Maintainability; and
  - 4.8 Portability?
5. What enhancement can be done to improve the developed system?

## **METHODOLOGY**

A descriptive and developmental method of research was used in this study to gather relevant facts and information in order to achieve the objectives in the form of floated questionnaire. The researcher made use of Scrum framework in designing the system in accordance with the ISO 25010 software quality standards.

In this study, data were gathered from the alumni coordinator, deans and program chairs, university registrar, and alumni of the University. The main sources of data were from the alumni and graduates of the university.

**The data gathering tools used are interview, and document analysis.**

## **Results and Discussions**

The ultimate goal of the study was to analyze, design, develop and implement a feasible web application system for the alumni of Quirino State University. This included a dynamic alumni and mining system to manage the demographic profile, employment history, career plans, waiting time, employment status, employability productivity, and place of work. Based on the results of the study, the following is the summary of findings to wit:

1. The problems and issues encountered by the Alumni Coordinator, Registrar, Deans and Program Chairpersons in tracking the graduates of the University include difficulty in tracing the alumni, interaction with the alumni in their area/location requires too much time and effort, compulsory registration to be an alumnus/alumna is not initiated, difficulty in consolidating required reports, information gap is experienced between the university and the alumni which results to poor decision making, the current manual system is unsecured because it can be accessed by any unauthorized person and does not have other alternative options, the storage and location of data takes much more time, redundancy flow of information can be entered, processed, as redundancy as per demand, the university spends extra cost to find the alumni, it takes human power to perform the task, and huge amount of papers for information storage, and bulky and unsecured paper-based graduate records.

These problems were presented, interpreted and analyzed to be able to advance to the next phase of the study.

2. There are a many different techniques available in the field of data mining clustering. Algorithms are classified on the bases of performance, efficiency, complexity, scalability etc. The Clustering Method using K-Means Algorithm was used to determine demographic profile, employment history of the alumni, career plans, how long it took the alumni to be hired in their first job, employment status, and employability productivity. There were two Clusters, 0 and 1. In the demographic profile of alumni, Cluster 0 was composed of 2705 alumni and Cluster 1 was composed of 2706. It was also presented that there were 1849 male and 3562 female alumni of the University. In the employment history, the result revealed that both Cluster 0 and Cluster 1 were composed of 298 each. It was also shown that there were 531 employed alumni, 47 of them were not employed and 18 were never employed. In the career plans of the alumni, those in Cluster 0 were composed of 283 alumni and in Cluster 1 were 295. It presented that most of the alumni stayed in their first job for about one to six months. The waiting time of the alumni means how long it took them to be hired in their first job. Those in Cluster 0 were composed of 283 alumni and in Cluster 1 were 295. It has been shown that most of the alumni were hired in their first job on the category of one to sixth month after graduation. The employment status of the alumni reveals that those in Cluster 0 were composed of 279 alumni and in Cluster 1 were 252. It shows that majority of the alumni were regular or permanent employees with regards to their present employment status. The employability productivity reveals that Cluster 0 were composed of 283 alumni and Cluster 1 were composed of 295 alumni. It shows that most of the alumni's gross monthly income on their first job after College ranges from P 5,000.00 to less than P 10,000.00.

3. The developed dynamic alumni analytics and mining system for Quirino State University is a web-based application system that was developed to serve as an online tool in tracking the employability of the alumni of the university and generate relevant reports. All the designs that were involved in the development of the system were visualized using UML. Activity diagrams which represents workflows of activities and actions showed the operation of the system. The Use Case diagram served as an illustration of the set of actions, services, and functions that the system needs to perform. The context diagram is drawn in order to define and clarify the boundaries of the developed system. It provided an at-a-glance look at the software system and identifies the flow of information and the ways it exchanges data with the end users. The user interfaces of the developed system were designed which every user interacts to be able to enter data into the system. With this, it was used to gather to be able data from the participants. The developed features of the system allowed the participants to interact with the system as a whole. User stories were also made to be able to push through with the system. It indicated the needs of the end users that assisted in the development of the system. User goals were also used to set goals and steps to be taken before and after using the system which can be helpful to generate insights for the developed system. MySQL was used for the back-end of the developed system because of its usability and most often associated with web applications and online publishing. An implementation and maintenance plan was also designed to specify the needed facilities and to expound further how the developed dynamic alumni analytics and mining system works.

4. The extent of compliance of the developed system to the ISO 25010 software quality standards was measured using the five-point Likert scale and was used in analyzing the result of the evaluation of the developed system. The mean assessment of the participants regarding the functional suitability of the developed system is “very great extent” with the computed mean value of 4.23. The IT experts and the target users generally assessed the developed system “very great extent” in compliance to ISO 25010 in terms of its performance efficiency with the computed mean value of 4.29. Most of the participants answered “very great extent” as to its compatibility with the mean value of 4.66. The developed system is evaluated by the participants to be “very great extent” with 4.38 as category value as to its usability. The reliability of the developed system was evaluated to be “very great extent” having a category value of 4.33. The developed system was also discovered to be “very great extent” with its security because it has the ability to prove the identity of an individual as shown in the computed mean value of 4.44. The maintainability of the developed system was confirmed by the participants as shown in the computed mean value of 4.38 which is described as “very great extent”. In the portability aspect, the participants viewed the developed system compliant to “very great extent” with a computed mean value of 4.42. With an overall category mean of 4.39 described as “very great extent”, the evaluation of the developed dynamic alumni analytics and mining system is compliant with the ISO 25010 Software Quality Standards in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability as assessed by the target users and IT experts. This means IT experts found the system to be usable, perform its perceived functions and met their needs.

5. There are enhancements done to improve the developed system. The system provides a temporary username and password and sent personally to every alumni thru SMS for them to be able to access the system. To enhance further, it was proposed that before the alumni will leave the school premises, or before the graduation ceremonies, there should be a compulsory registration for every batch. With this, there shall be a regular registering of alumni and is expected to be initiated every year. A group chat (GC) of the different batches of alumni of the University was also established in the developed system. This feature of the system should have an additional attribute of video chat for better communication and private messaging for direct messaging (DM) for a certain alumni. Information gap is presumed to be reduced if video chatting is integrated in the developed system. Each and every batch can talk to everyone online face to face. With this feature, interaction with every alumni in their area/location shall not require too much time and effort. Instead, the alumni coordinator of the university can acquire an information needed from a certain alumni immediately. The private messaging shall provide the alumni a private exchange of messages between different members. It is only seen and accessible by the users participating in the message.

## CONCLUSION

With the problems and issues encountered by the Alumni Coordinator, Registrar, Deans and Program Chairpersons in tracking the graduates of the University, the respondents expressed their interest and appreciation in developing a system as they seen its capability to significantly address these problems and issues. This is supported by the evaluation of the IT experts that the developed system is compliant with the ISO 25010 Software Quality

Standards in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability.

Based on the findings in this study, it was therefore concluded that the analysis, design, development and testing of Dynamic Alumni Analytics and Mining System, as a decision-support and management tool developed to address the prevalent issues and problems in monitoring the alumni and graduates of Quirino State University. The developed system automates the process of tracing of alumni and generation of relevant reports as well.

Furthermore, the developed dynamic alumni analytics and mining system is essential and important in feedback mechanism to have an easy and convenient storing of data. This is vital for efficient and fast retrieval in tracking the alumni of the University as it serves as a gauge in measuring the school effectiveness and success.

## **RECOMMENDATIONS**

Based from the results of the study, the following recommendations were drawn:

- i. It is recommended that the developed dynamic alumni analytics and mining system be implemented and be used by the alumni coordinator as well as the different program chairs and deans of the programs to improve the process of alumni tracing of Quirino State University.
- ii. The researcher recommends admin support while keeping stable internet connection in the concerned offices like alumni office, and offices of the deans/program chairs. The connectivity of the system must be maintained by examining the internet network connectivity, updated antivirus, checking disk usage, available disk space and hardware errors including maintaining the cleanliness of the computer unit.
- iii. The information on the alumni tracer should also be disseminated properly in order for it to be utilized well. Video chatting and private messaging is also recommended.
- iv. It is also recommended that there should be a budget allocation from the university for the implementation and maintenance of the system.
- v. Further researches could be conducted for future researchers to enhance the developed system.
- vi. Future upgrade is also recommended to cater more services of the alumni.