A Review on Automated Examination Question Paper Template Generator

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***Abstract*— In education field, the importance of education system is the part of the most significant aspect of our social orders at all levels. Thus, a student's performance can only be tested by providing them with an examination or assessment. Examinations are very crucial as it is an activity which is performed to evaluate the performances of students. Besides students performances, the quality of the examination questions prepared would also determine the quality of the students but the most important yet challenging task is the creation of the examination questions paper which is known to be very tedious, time consuming and expensive therefore it should be prepared with full focus, right formatting and with the right selection of questions.**

Keywords—automation; template; generator; formatting; questions; examination.

I. INTRODUCTION

At current, there appears to be various kinds of automated template generator systems available with different types of services to ease user's workload. These template generator systems can be found in either online or offline mode. Some of the generators are developed as a software whereas some are web-based. Template generator systems are built to provide a consistency of well formatted, creative and accurate template.

The Automated Examination Question Paper Template Generator from this proposal suggests that it serves as a tool to assist lecturers in creation of examination question paper by automatically generating a template in a well formatted way to accommodate the provided questions without the hassle of making multiple changes to the format. Lecturers are able to create random question paper with this software anytime and anywhere within such a short time [1].

This system would definitely be used widely in this institution as examination papers are one of the most often created documents during the end of every semester for students to sit for their final exams. Lecturers can then say goodbye to the old method of creating examination questions and spending way too much time editing the format on every page.

This project is set out to provide a trouble-free experience for lecturers while setting up examination questions papers. Knowing that the creation of examination question papers are tedious in terms of format errors and consumes a long duration of time, this system is built to tackle those issues by providing a more consistent format setting which will never be changed unless altered in certain cases. Apart from that, a database would also be implemented to serve as a question bank storing previously used questions to reuse them again in the coming examination questions if needed. Lastly, this system would also help lecturers save a lot of time finding and fixing any format errors made.

II. PROBLEM STATEMENT

Manual preparations of exam question with formatting are prone to human errors and often detected after printing of the document.

Making alterations to existing formatting sometimes do not change the formatting on all pages instead some of the pages will not follow the same alteration made on a single page.

In certain cases, the need to locate and re-type some of the previously used questions form past year examination papers.

III. OBJECTIVE

There are three objectives set for this this project. The first objective is to reduce human error in preparation of the final exam question papers. The second objective is to produce a consistent MSU final examination paper format setting for ever page available. The last objective is to provide a question database to server as a storage and for future exam question selection.

IV. LITERATURE REVIEW

A. Advanced Question Paper Generator Using Fuzzy Logic.

In this paper, the system is presented as a standalone application known as Advance Question Paper generator which was designed solely for educational organization in which generated questions papers come with a set of predefined questions from the database. There are several available operations available for use such deletion, insertion, modification that makes this system dynamic. In addition, with the use of Fuzzy Logic, it is said that every time the question paper generates it would turn out to be unique. With the help of this system, even on the examination day it is able to generate the question paper which in return lowers the risk of leaking question paper to the public [2].

Figure 1 shows the overall framework diagram of using fuzzy logic for question paper generation. It begins with

registered users accessing the question database to determine what subject and questions to use hence proceeds to the fetch stage which fetches the user's selection and directly goes into the fuzzification phase which decides fuzzy sets values. After that it moves into the inference engine phase which applies the fuzzy rule (if then rules and predefined rules) base for decision making. Once complete, it then proceeds onto defuzzification phase which finally confirms the difficulty level of the question. Lastly the decision maker determines if the question is accepted or rejected based on the defuzzification process.

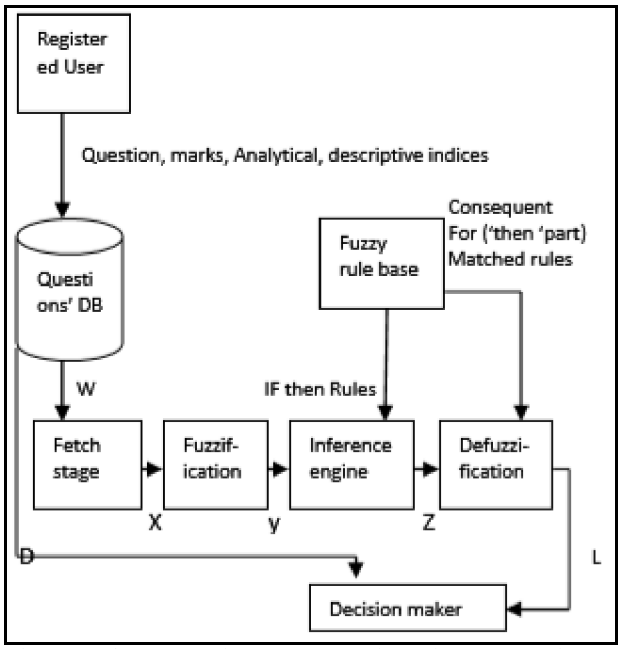

Figure 1: Advance Question Paper Generation Using Fuzzy Logic Framework.

B. *A Framework for Automatic Exam Generation based on Intended Learning Outcomes.*

This research mentioned that one of the possible ways is to come up with a way that would standardize the exams that is based on education taxonomies. This paper has presented a framework that would allow educators to map exam questions to intended learning outcomes which is based on Bloom's taxonomy. Apart from that, it is also said to assist with the improvement of alignment for assessment with learning outcomes, moving on with classifying different questions which is to be retrieved from a source such as the Learning Management System (LMS) by automatically using certain classification algorithms known as Support Vector Machine (SVM), Naïve Bayes (NB) and k-Nearest Neighbour (k-NN) or else by directly combining all these algorithms together [3].

C. *Question Paper Generator.*

An integrated automated system that is designed to generate question papers thus managing related data would be essential within an education institute. The system generates random questions but is even plus it covers most of the chapters from a subject with added difficulty level options within seconds. From this paper, the integrated automated system which stores past year questions for all subjects and prints out questions papers which are based on its respective syllabus and curriculum. The mentioned system is aimed to provide fast operations, high security and data storage [4].

D. *Automated Question Paper Generation System.*

From this paper, the automated model to generate question paper is said to be implemented as a real-time application in Samnx Pvt. Ltd, Belapur, Navi Mumbai. It is described as an automated system which progresses from the traditional way of generating question paper to an automated method. This works by providing a controlled access to the resources. Apart from that, the automated process also focuses on the importance of randomization of questions during generation. The system is said to deploy an efficient algorithm which can totally randomize questions and avoid any form or repetition [5].

Figure 2 explains that the system is entirely governed by a login screen. Here the user is required to login using their credentials. Upon successful login, various options are available to the user depending on his/her role in the hierarchy. For e.g. The administrator has data entry options as well as paper generations option. However, the paper generator can only access the paper generation option. A data entry user (or the admin) can enter various types of data and customize the system according to the organization. All available courses, syllabus, patterns and questions can be entered and stored accordingly in the database. The system would then be able to generate the paper for any course, examination and year.

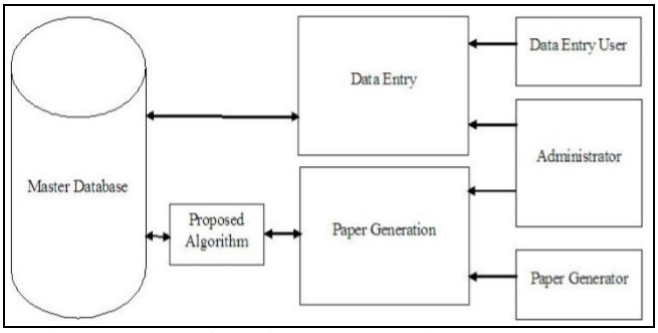

Figure 2: Automated Question Paper Generation System Framework

E. *Exam Paper Generator For Multi-Platform Mobile Application Optimized By Cloud-Based Web Service Composition.*

This paper discussed about the implementation of using cloud-based web service composition for the exam paper generator system. It is mentioned that their main objective is to be able to access the exam paper generator through all types of mobile platform available. With this solution, they

can improve in preparation of the exam papers hence reducing formatting settings which still uses the traditional word processing program. Apart from that, the mobile resources are saved and done using cloud environment. With the implementation of exam preparation through mobile platform, it is convenient for lecturers to prepare exam papers thanks to mobility [6].

F. Automatic Generate Examination Question System to Enhance Preparation of Learning Assessment.

This system is said to be another alternative when it comes to advance preparation for learning assessment which enables academic staffs to perform their tasks faster than usual at anytime, anywhere and at their own pace. It is a web-based system which contains user interface system for generating, managing, storing and retrieving the examination questions. The system can generate different sets of examination questions by integrating the capability of open source software (i.e. javascript) which then selects random selection of examination questions available in the test bank. The output is available in either a text or pdf file which can be viewed in Acrobat Reader or the web browser. The users are allowed to print, save or edit the examination questions. It is also possible to edit the existing template by adding or deleting questions and resetting the parameters [7].

Figure 3 shows the flow of the system. It consists of three main modules as described below:

1) Question specification: user needs to provide related information regarding the examination questions

2) Question bank selection: user needs to create a pool of examination questions and choose the examination questions from the test bank for the learning assessment.

3) Question generation: the system will then automatically generate various sets of examination questions or for different groups of students depending on the user preference. There will only be two types of the output format which is either pdf file or text file as selected by the user.

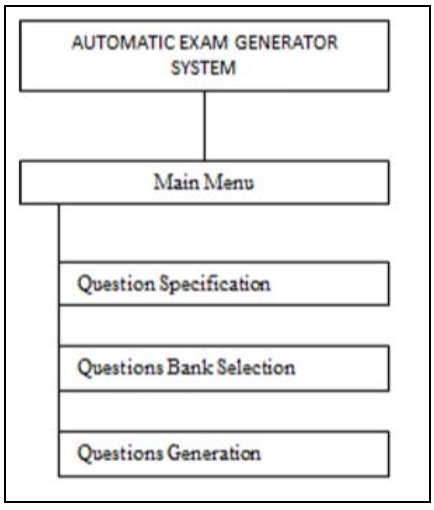

Figure 3: Automatic Generate Examination Question System Framework

G. A Implementation of an Automatic Examination Paper Generation System.

The automatic examination paper generation system functions by using J2EE tools that includes JSP, JavaBean and Servlet. It then calls a JSP page through a Tomcat server. The main characteristics of this systems focuses on its openness, convenience and flexibility. Users can act according to their own demands and extract each kind of questions from an existing question bank which suits the examination paper according to the user's needs. The examination paper's difficulty level is also determined by the user's preference. While generation the questions, a model answer will also be produces. Simultaneously, the question paper and answer will be recorded and saved in the library for any further analysis [8].

Figure 4 shows how the system functions by having to input the test into the temporary library for approval. Once approved, the paper will then be stored in the test database for further viewing and analysis. The final paper would depend on the automatic generation done by the algorithm. The user can output the test paper along with the answers in a document file. It is mentioned that the system uses B/S, the MVC pattern in JSP view, JavaBean models, Servlet Controller and MySQL for the database. The system's page uses the scheme of DIV with CSS as the page design layout. Lastly, JavaScript is also used to help support the page details.

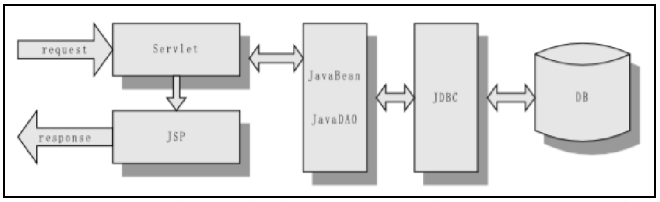

Figure 4: Automatic Examination Paper Generation System Framework.

Table of advantage and disadvantage regarding all related literature:

Table 1: Advantages and disadvantages on the existing frameworks

Title	Advantage	Disadvantage
Advanced Question Paper Generator Using Fuzzy Logic.	1. Make some improvements based on DPDP model 2. Complexities of server and client side are reduce	1. Performance evaluation needed three aspects computational complexity, communication, complexity and additional storage.
A Framework for Automatic Exam	1. System gives full control to the	1. Takes quite some time for the

Generation based on Intended Learning Outcomes.	users.	users to do the mapping process between the learning topics, questions and the ILOs.
Advance Automatic Question Paper Generator.	1. Secure data from unauthorized person. 2. Common secret key for participants.	1. Verification object should be small
Automated Question Paper Generation System.	1. User can generate test papers randomly and instantly, thus saving a lot of time. 2. The algorithm enables randomization of questions. 3. A new question can be added to the database at any instance	1. Questions once selected may be repeated in subsequent papers
Exam Paper Generator For Multi-Platform Mobile Application Optimized By Cloud-Based Web Service Composition.	1. No repeated questions are selected. 2. Accessed through any mobile platform 3. Information saved in cloud environment	1. Levels of difficulty are limited.
Automatic generate Examination Question System to Enhance Preparation of Learning Assessment.	1. Information storage and retrieval 2. Security, performance, data encryption	1. System improves storage utilization
A implementation of an Automatic Examination Paper Generation System.	1. Easy operation, good interface, and good usability, 2. High security, high stability, and reliability.	1. Error may occur in the algorithms

Table 2: Question paper generation summary

Title	Summary
Advanced Question Paper Generator Using Fuzzy Logic.	In this system the concept of Fuzzy Logic in soft computing is used which allows to generate a paper every time uniquely.
A Framework for Automatic Exam Generation based on Intended Learning Outcomes.	Classify different questions based on difficulty, that can be retrieved from a Learning Management System (LMS).
Advance Automatic Question Paper Generator.	Question category can be knowledge-based, Memory-based, Logic-based, or application-based
Automated Question Paper Generation System.	Automation means to replace the manual operations with computer procedures and other machines.
Exam Paper Generator For Multi-Platform Mobile Application Optimized By Cloud-Based Web Service Composition.	Implements the use of cloud-based web service composition for the exam paper generator system. Able to access the exam paper generator through all types of mobile platform.
Automatic generate Examination Question System to Enhance Preparation of Learning Assessment.	Web-based user interface system for generating, managing, storing and retrieving the examination questions. Processing phase uses JavaScript while output phase results in executing either Acrobat Reader or Web Browser.
A implementation of an Automatic Examination Paper Generation System.	System is web-based which uses J2EE tools such as JSP, JavaBean and a Servlet. It is connected to a Tomcat server.

V. METHODOLOGY

In this section, the development methodology chosen to develop this system is by using Software Development Life Cycle (SDLC) as seen in Figure 4. With the use of SDLC, this process could help produce software which is high in terms of quality however lowest the cost in a shorter duration of time. The SDLC process consist of a very detailed plan when it comes to developing, altering, maintaining and replacing a software system. There are several phases within the process of SDLC which includes analysis, design, implementation, testing and evaluation.

A. Analysis

During the analysis stage, it would be a question of "What we want?" This is where the team would define all necessary requirements of the software hence determining the costing needed along with the required resources. As for this project, begin by planning the input and output functions of the system which is to generate a well formatted question examination document by automation. In addition, planning of how the user interface would look like and what components should be added. Along with that, which programming languages are to be used in the back and front-end programming. Finally, planning on connecting the system to a database for storage and retrieval of past year questions.

B. Design

During the design stage, it would be a question of "How will we get what we want?" This is the phase whereby SDLC will initiate software specifications into a plan known as design specification. The developers and stakeholders are advised to go through this design plan and provide feedback along with suggestions to make any alterations. As for this project, the design plan in terms of the interface and functions are to be discussed and plan. Since it is web-based, the design plan would include certain aspects such as the main page, headers and footers, content, menu bars along with other elements to be applied onto the webpage.

C. Implementation

During the implementation stage, it would be a statement such as "Let's create what we want?" This phase is when SDLC actually starts developing the software by applying and generating all the codes. As for this project, using a suitable IDE to start generating the codes using coding language which was planned earlier to create the website as well as connecting it to the database.

D. Testing

During the testing stage, it would be a question of "Did we get what we want?" From this phase, developers will initiate testing to check for any errors and defects. A fix will be formed by the team to overcome any deficiencies until the product is able to meet the correct specifications and move on to the next step. As for this project, to check if the website can operate smoothly without any error pages or codes. Thus, the database is connected correctly, and data can be stored and retrieved without any issues.

E. Evaluation

During the evaluation stage, it would be a statement of "Let's use what we have?" This phase of SDLC is where the developer team would allow users to use the product and wait for user feedback in order to make any needed adjustments. As for the project, the users are able to use the website at their ease hence if they have any dissatisfactions or concerns they could voice it out to the team and the team will accept that feedback and perform adjustments towards the website.

F. Proposed System Design Flowcharts & Functional Block Diagrams.

As seen in Figure 5, this is the flowchart for the administrator. The flow starts with admins logging into their account with the use of correct login ID and password. After verifying the account, the administrators can perform actions related to the database such as handling users, handling subjects and handling questions. They are also able to perform modifications to the database in terms of adding, removing or updating user profiles, subjects and questions. Admins need to review the contents of the completed work given by the users/lecturers before proceeding to confirm that the document can be printed. If the document has no further issues, then it will proceed to print.

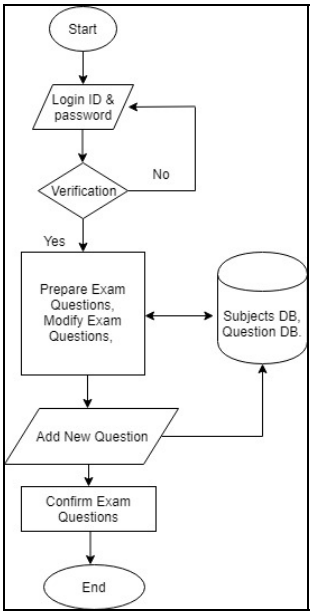

Figure 5: User Flowchart of the System

As seen in Figure 5 this is the flowchart for the users/lecturers. The flow starts with users/lecturers logging into their account with the use of correct login ID and password. After verifying the account, the users/lecturers can prepare the examination paper by inserting using the past year questions from database or modify the questions. Besides that, they are also able to add in new questions which would then be stored into the database. Once the document is completed, it will be sent to admin for confirmation before being able to proceed with printing.

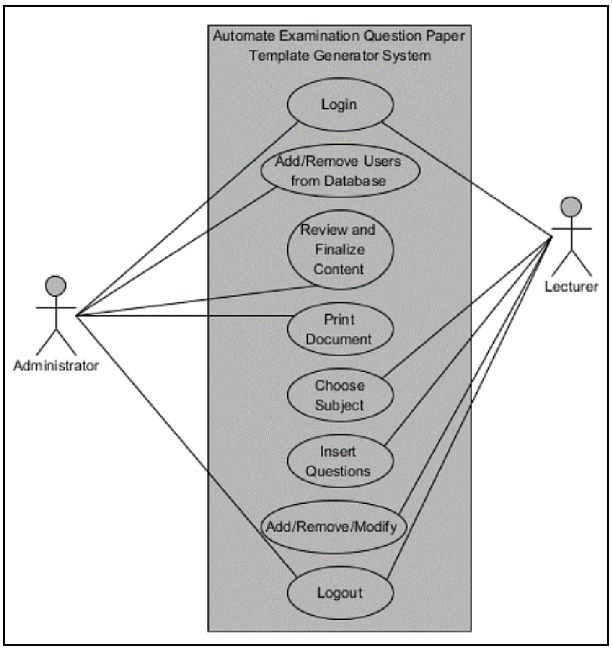

Figure 6: Use Case Diagram

As seen in Figure 6, the use case diagram shows how the system works between the administrator and the users/lecturers. They both start with the login phase and moving on to the operations phase in which administrators are able to make changes to the database such as adding or removing users, subjects and questions while users/lecturers are able to prepare the examination document by choosing subject and inserting questions. Once the examination document is completed by the users/lecturers, they need to forward it to the administrator for reviewing. Upon completion of reviewing with no issues, it is then confirming for printing. Towards the end both administrators and users/lecturers are to logout from their account respectively.

There is a total of 5 classes which includes the administrator, account, lecturer, database and main. The administrator class contains details of the admins, the account class contains details regarding the login and logout, the lecturer class contains details regarding the details of registered lecturers, the database contains details regarding the user accounts, subjects and questions and the main account contains details about the examination paper preparation.

The administrator logs in and goes through verification, after that onto operations. On the other hand, the users/lecturers log in and await verification, once done, onto operations as well. The final steps would be confirmation of the examination document and confirmation to print out the document. Both are to log out towards the end of the sequence.

VI. CONCLUSION

The implementation of a web-based examination paper template generator from this project serves to eliminate the traditional way of generating examination questions papers by replacing it with an automated function which automatically generates a template in a well formatted way to accommodate the provided questions without having to perform several changes to the format. Since it is web-based, lecturers can generate the examination question papers anytime and anywhere within a short period of time.

For future work, this project will expand its horizons by venturing into developing a larger and systematic question bank to store even more information, difficulty levels for each subject (easy, medium, hard levels) and cross platform accessibility through mobile phones and tablets.

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