

## Development of scholarship automation system for student qualification program applied to college universities using regression analysis

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### Abstract

This season's technological advancements have led to the automation of the scholarship application procedure and the development of the qualification assessment program. To create a system that is both efficient and easy to use in order to assist the automation system of any scholarship program. The main analytical tool in this study that illustrates the creation and assessment of a Development of Scholarship Automation System for Student Qualification Program Applied to College Universities using Regression Analysis. It is hoped that the system's goal will benefit the scholarship selection committee as well as the candidates.

The committee's administrative burden will be reduced by the technology, freeing them up to focus on assessing the most eligible applicants. In general, colleges and other organizations will find the Scholarship System to be a helpful tool in managing the increasing volume of scholarship applications and guaranteeing that the most deserving individuals receive scholarships.

A few of the ISO25010 sub-characteristics that are suitable for assessing the scholarship system are used by the researchers. The researchers used the confusion matrix with the aid of the Weka Software tool, using the scheme of Weka. classifiers. bayes. Naïve Bayes Updateable. The evaluation on the training set has a summary of Correctly Classified Instances of 93% and Incorrectly Classified Instances of 7%, indicating that the application has an accurate algorithm. After evaluating the Scholarship system, the sub-characteristics of Functional Suitability received an overall weighted mean of 4.55. Performance efficiency had a score of 4.72, Usability had a score of 4.68, Security had a score of 4.55, and Portability 4.58.

**Keywords:** Scholarship; Regression Analysis; Qualification Program; Automation; College University

### 1. Introduction

Having recourse to new technology will be advantageous to a company or a group. People can save time and effort while working because things will be more convenient and straightforward. If done in a modern fashion rather than a traditional way, a process like sorting and organizing information will be a piece of cake. Traditional methods of performing the same task need a lot of personnel and labour, not to mention the wasteful use of time to complete the task or produce the desired result when it can be done much more quickly and without any problem.

Furthermore, utilizing new technology can also lead to increased accuracy and precision in performing tasks. For instance, using automated systems for data analysis can significantly reduce the chances of human error, thus improving

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the reliability of the results. Additionally, with the use of technology, tasks can be done in a more standardized manner, leading to more consistent outputs. This is particularly crucial for businesses that operate in industries where quality control is critical, such as pharmaceuticals or food production. By adopting new technology, companies can ensure that their processes and outputs are consistent and meet the necessary standards, which can ultimately lead to increased people's satisfaction and loyalty.

The scholarship automation system for the qualification assessment program is anticipated to help both the candidates and the scholarship selection committee. The technology will lessen the committee's administrative workload, allowing them to concentrate on evaluating the most qualified candidates. The method will offer a more unbiased and transparent evaluation procedure for the applicants, which will aid them in understanding their strengths and flaws and increase their chances of being awarded scholarships. The Scholarship Automation System for Qualification Assessment Program will, in general, be a useful tool for universities and organizations to handle the growing number of scholarship applications and make sure that the worthiest candidates are awarded scholarships.

### **1.1. Statement of the Problem**

Problem #1: The scholarship application process is time-consuming and requires a significant amount of manual effort to screen applications and evaluate candidates, resulting in delays in the selection process.

Problem #2: The current system struggles to provide frequent application updates due to the lack of a centralized platform, causing slow responses and application pending.

Problem #3: Inefficient data management can lead to misplaced or lost documents, incorrect data entry, and inconsistent evaluation results.

### **1.2. Objectives of the Study**

#### *1.2.1. General Objectives*

The general objective of this study is to make the scholarship application and selection process simpler while maintaining data security and ensuring that only the best candidates are awarded scholarships. To this end, an automated system has been developed for the student requirements, which will save time and be more convenient for the students who want to be scholars.

#### *1.2.2. Specific Objectives*

To automate the screening process and reduce the time required for the selection committee to review and evaluate scholarship applications.

- Online Scholarship Application
- Student's qualification assessment for online application
- Application Review
- Create a consolidated application dashboard for applicants to track their status and progress, providing comprehensive visibility into the evaluation process and effectively managing notifications.
- History data tracking
- User Data Monitoring
- Data Profiling

A unified database of scholarship applicants can be provided through an automated system, making it simple for administrators to track and handle applications and lowering the possibility of mistakes or discrepancies.

- Access control for authorized individual
- Notifications
- Back-up recovery plan
- Scope and Delimitations
- Scope

The scope of Scholarship Automation System for Qualification Assessment that can quickly and accurately evaluate scholarship applicants' qualifications in accordance with a set of specified criteria would fall under the purview of a scholarship automation system for qualification evaluation. The program would need to evaluate each applicant's

qualifications, including their academic standing, extracurricular activities, volunteer work, and other relevant experiences. It would also need to have the ability to evaluate and rank all of the applicants' qualifications in order to determine which candidates are most deserving of the award. The study's scope would also include creating a database to house the qualifications and information of the candidates. Creating a user interface that enables applicants to enter their information and enables managers to access and analyze the data. To ensure the system's accuracy and effectiveness, a sample group of candidates will be used. Evaluating the system's data output to ascertain how well it evaluates applicants for scholarships. Supplying suggestions for any system tweaks or upgrades that may be required. For the most part, the scholarship automation system for qualification evaluation would be a helpful tool for scholarship providers to swiftly and accurately assess applicants' qualifications and select the best candidates for their awards.

### 1.3. Delimitations

The scholarship automation system for qualification evaluation study would be limited to designing a computer program to evaluate scholarship candidates' qualifications in accordance with predefined standards. It wouldn't include giving out scholarships in the traditional sense. It wouldn't look into other standards that might be used to judge eligibility for scholarships. Only testing the system with a representative sample of applicants would be done as part of the study. It wouldn't entail broad-scale system implementation or long-term effectiveness testing. The financial viability of deploying the system would not be examined in the study.

## 2. Methodology

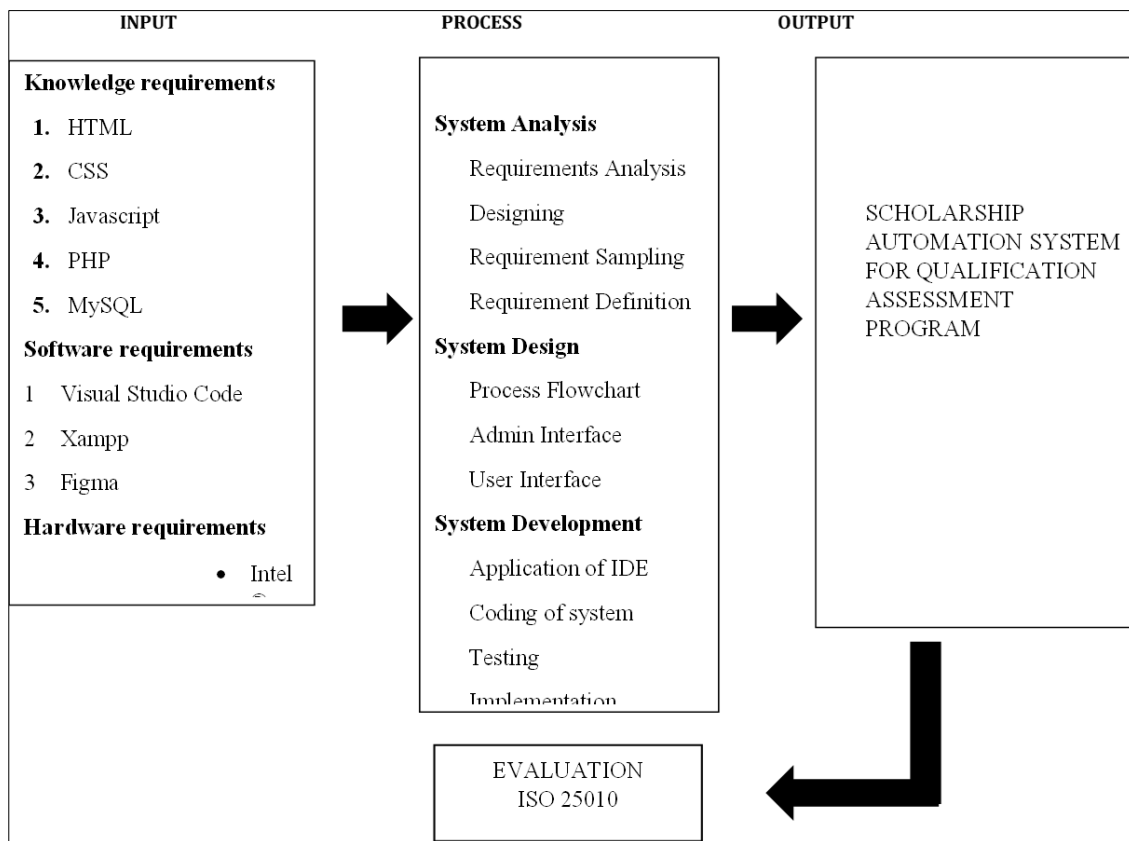


Figure 1 Conceptual Framework

## 2.1. Prototype



Figure 2 Home Section

The figure displays various sections of the MLALAF application form, including personal information, educational background, and document upload requirements.

Figure 3 Application Section



Figure 4 Renewal Section



Figure 5 Tracking Section





Figure 6 About Us & Contact Us





Figure 7 Admin Interface



Figure 8 Application Admin Interface



Figure 9 Settings Section

## 2.2. System Development



Figure 10 Agile Methodology

The Agile methodology is a way to manage a project by breaking it up into several phases. It involves constant collaboration with stakeholders and continuous improvement at every stage. Once the work begins, teams' cycle through a process of planning, executing, and evaluating.

Agile methodology is a useful project management method due to allowing for changes in direction to be incorporated even late in the process. This flexibility also benefits the software to development team by accounting for continuous stakeholder feedback.

### 2.3. Instrumental Used

The researchers use Descriptive Research as instrument use and the key method by which the researcher's obtained information and opinions from a corporation regarding the Scholarship Automation System for Qualification Assessment Program was a survey interview. A well-crafted set of questions specifically intended to explore different facets of the system that is being developed were included in the interview. With the help of this tool, the researchers were able to gather insightful information from a wide range of respondents, illuminating their perspectives, experiences, and approaches to the scholarship system. The survey interview made it easier to collect thorough data, viewpoints, and opinions regarding the difficulties, solutions, and ideal procedures related to the Scholarship Automation System for Qualification Assessment Program. In general, the survey interview was successful in obtaining critical information on Scholarship Automation System for Qualification Assessment Program, enhancing the researcher's contribution to the existing body of knowledge in this area.

## 3. Results

In this section, the researchers delve into the outcomes of their comprehensive research and engage in a detailed analysis of the data and findings. The primary objective of this portion is to not only present the results but also to provide an in-depth interpretation. Data are collected from a total of fifty (100) respondents comprising students and coordinators in Global Reciprocal Colleges. The selection of subjects is based on their affiliation to the scholarship program.

**Table 1** Demographic Profile of the Respondents

Type of Respondents	Number of Respondents	Percentage
Coordinators	2	2%
Students	98	98%
TOTAL	100	100%

Table 1.0 shows the demographic profile of the respondents according to the type of respondents. The researchers are able to gather evaluation from coordinators with total respondents of 2 or 2% and students with total respondents of 98 or 98%.

Assessing the Scholarship Automation System for Qualification Assessment Program in terms of Functional Suitability, Usability, Performance Efficiency, Security, and Portability.

The evaluation of the Scholarship Automation System for Qualification Assessment Program was conducted using the ISO25010 evaluation model as framework. This assessment covered Functional Suitability, Usability, Performance Efficiency, Security, and Portability. To evaluate the system, a Likert Scale was employed in the survey. The questionnaire utilized a five-point scale for respondents to rank their answers.

**Table 2** Verbal Interpretation of ISO25010 criteria

Scale	Range	Verbal Interpretation
5	4.21-5.00	Very Satisfied
4	3.41-4.20	Satisfied
3	2.61-3.40	Neither satisfied nor dissatisfied

2	1.81-2.60	Dissatisfied
1	1.00-1.80	Very dissatisfied

### 3.1. Evaluation of Respondents according to ISO25010 criteria

**Table 3** Respondents Evaluation according to Functional Suitability

Functional Suitability	5	4	3	2	1	W.M	V.I
1. The system allows the user to handle, access and maintain the scholars' profile.	100	0	0	0	0	5	Very Satisfied
2.The system is well suited for its intended use and successfully fulfills its intended function.	38	62	0	0	0	4.38	Satisfied
3. The system can generate scholars' reference number accurately without any problem.	41	58	1	0	0	4.4	Satisfied
4. The system is able to be transparent and updates the users.	43	56	1	0	0	4.42	Satisfied
Weighted Mean						4.55	Satisfied

**Table 4** Respondents Evaluation according to Usability

Usability	5	4	3	2	1	W.M	V.I
1.The system is user-friendly and easy to use.	44	56	0	0	0	4.44	Satisfied
2.The system provides functions helpful to the user.	100	0	0	0	0	5	Very Satisfied
3.The system provides easy to understand icons.	45	55	0	0	0	4.45	Satisfied
4. The system provides a not eye-straining design.	99	1	0	0	0	4.99	Satisfied
Weighted Mean						4.72	Satisfied

**Table 5** Respondents Evaluation according to Performance Efficiency

Performance Efficiency	5	4	3	2	1	W.M	V.I
1. The system provides rapid data in processing and accessing information.	46	51	3	0	0	4.43	Satisfied
2. The system runs smooth on low specs computer.	41	58	1	0	0	4.4	Satisfied
3. The system remains accessible even when it becomes unresponsive.	42	56	2	0	0	4.4	Satisfied
4. The system effectively handles records.	98	2	0	0	0	4.98	Satisfied
Weighted Mean						4.5525	Satisfied

**Table 6** Respondents Evaluation according to Security

Security	5	4	3	2	1	W.M	V.I
1. The system guarantees the privacy and security of the scholars' data.	41	59	0	0	0	4.41	Satisfied
2. The system provides access control based on different roles.	100	0	0	0	0	5	Very Satisfied
3. The system offers authentication and verification of the account of the user.	43	57	0	0	0	4.43	Satisfied
4. The documents are organized and protected from unauthorized entry.	40	59	1	0	0	4.39	Satisfied
Weighted Mean						4.5575	Satisfied

**Table 7** Respondents Evaluation according to Portability

Portability	5	4	3	2	1	W.M	V.I
1. The system runs on a low specs computer.	43	57	0	0	0	4.43	Satisfied
2. Users can also access the system using mobile phones.	44	55	1	0	0	4.43	Satisfied
3. The system can be operated in lower-level operating system.	100	0	0	0	0	5	Very Satisfied
4. Data within the system can be easily back up	49	51	0	0	0	4.49	Satisfied
Weighted Mean						4.5875	Satisfied

**3.2. Summary output**

**Table 8** Regression Statistics

Regression Statistics	
Multiple R	0.480303
R Square	0.230691
Adjusted R Square	0.18977
Standard Error	1.780692
Observations	100

**Table 9** ANOVA

	Df	SS	MS	F	Significance F
Regression	5	89.37888009	17.87578	5.637511	0.000137178
Residual	94	298.0611199	3.170863		
Total	99	387.44			

**Table 10** Multiple Linear Regression Analysis Table

	Intercept	Functional Suitability	Usability	Performance Efficiency	Security	Portability
Coefficients	19.21598	0.197329	-5.71472	5.132529	1.347585	-0.56154
Standard Error	4.241155	0.868242	1.253683	1.32658	0.922184	0.931667
t Stat	4.530836	0.227274	-4.55835	3.868994	1.461298	-0.60273
P-value	1.73E-05	0.820704	1.55E-05	0.000201	0.147269	0.548141
Lower 95%	10.79507	-1.52659	-8.20394	2.498574	-0.48343	-2.41139
Upper 95%	27.6369	1.921243	-3.22551	7.766484	3.178602	1.288305
Lower 95.0%	10.79507	-1.52659	-8.20394	2.498574	-0.48343	-2.41139
Upper 95.0%	27.6369	1.921243	-3.22551	7.766484	3.178602	1.288305

The multiple R (correlation coefficient) measures the strength and direction of the linear relationship between the independent variables and the dependent variable. The Multiple R of 0.480303 indicates a moderately positive linear relationship between the variables. Additionally,  $R^2$ , also known as the coefficient of determination, explains the proportion of the variance in the dependent variable explained by the independent variables.  $R^2$  is 0.230691, meaning that approximately 23.06% of the total variance in the dependent variable is accounted for by the independent variables. In addition, the adjusted  $R^2$  is similar to  $R^2$  but considers the number of independent variables, suggesting that the model's fit has not significantly improved.

On the other hand, the standard error quantifies the accuracy of the model's predictions, with an outcome of 1.780692. Lower values are preferred because they indicate that the model's predictions are closer to the actual data points. Additionally, this statistic represents the number of data points or observations used to fit the regression model, and in this case, there are 100 observations. The Anova table offers valuable insights into the significance of the regression model. To elaborate, "df" represents degrees of freedom, which quantifies the number of values free to vary in the analysis. The ANOVA table is composed of three rows: "Regression," "Residual," and "Total," with the "df" value in each row denoting the degrees of freedom associated with that particular aspect of the analysis. Furthermore, "SS" indicates the sum of squares, measuring the overall variation within the data. In the "Regression" row, the sum of squares (89.37888009) vividly demonstrates the extent to which the regression model explains the total variation.

Moreover, "MS," short for mean square, is derived by dividing the sum of squares (SS) by the degrees of freedom (df). It serves as a measure of the average variation within that segment of the analysis. The F-statistic, on the other hand, gauges how effectively the regression model aligns with the data. It is computed by taking the ratio of the mean square for regression (MS of Regression) to the mean square for the residual (MS of Residual). Lastly, the significance F, commonly known as the p-value, indicates whether the F-statistic holds statistical significance. In the "Regression" row, the p-value registers at 0.000137178.

In summary, these results display the potential for improvement. The multiple R indicates a moderately positive linear relationship between the variables, suggesting opportunities to enhance this relationship. While  $R^2$  explains approximately 23.06% of the variance, efforts can increase the proportion of variance explained by the independent variables. Although the adjusted  $R^2$  currently shows no significant improvement, there may be opportunities to refine the model. The standard error, at 1.780692, leaves room for increasing the accuracy of the model's predictions, aiming for lower values to achieve even closer alignment with actual data points.

### 3.3. Naive Bayes Classifier

Attribute

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances      93            93    %



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Incorrectly Classified Instances    7      7  %
Kappa statistic                    -0.0294
Mean absolute error                0.0605
Root mean squared error            0.2235
Relative absolute error            122.059 %
Root relative squared error        157.7464 %
Total Number of Instances          100

```

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.949	1.000	0.979	0.949	0.964	-0.033	0.184	0.961	Student
	0.000	0.051	0.000	0.000	0.000	-0.033	0.077	0.016	Coordinator
Weighted Avg.	0.930	0.981	0.959	0.930	0.944	-0.033	0.182	0.942	

=== Confusion Matrix ===

a b <-- classified as

93 5 | a = Student

2 0 | b = Coordinator

The researchers evaluated the system using the bayes.NaiveBayesUpdateable algorithm from Weka to analyze a dataset comprising 100 instances and nine attributes related to age, functional suitability, performance efficiency, usability, reliability, security, and portability. The bayes.NaiveBayesUpdateable model constructed a decision tree structure to make predictions and reveal patterns within the data. The tree's decision-making process unfolds as it begins by evaluating the "USABILITY" attribute, dividing the instances based on this criterion. The tree further branches into sub-conditions, including assessments of "FUNCTIONAL SUITABILITY", "SECURITY", "PERFORMANCE EFFICIENCY", "PORTABILITY", and "AGE." Each condition represents a distinctive criterion that the model uses to classify the data.

The model's performance metrics are notably promising, with a Correctly Classified Instances 93, indicating an ironclad linear relationship between the features and the target variable. The mean absolute error of 0.0605 demonstrates that the model's predictions are close to the actual values, and the root mean squared error of 0.2235 further confirms prediction accuracy. The relative absolute error (122.059%) and root relative squared error (157.7464%) metrics offer a relatively perspective on prediction accuracy within the dataset. With a decision tree comprising nodes, this model provides valuable insights into the dataset's structure and relationships. Notably, the model was evaluated on the same training data it was built upon.

#### 4. Discussion

The Scholarship Automation System for Qualification Assessment Program has greatly reduced the processing durations. This enhanced efficiency with substantial improvements, ensuring that users, applicants and administrators will encounter no trouble with their data and information. In summary, the Scholarship Automation System for Qualification Assessment Program provides users with transparency and a user-friendly platform that authorized the applicants to submit, track and renew their applications more conveniently. It also offers the administrators a simplified and well-organized data that can help them save time and effort. Suggested actions involve continuous monitoring of the system and implementing training programs.

The Scholarship Automation System for Qualification Assessment Program is an online platform created to enhance the scholarship application and renewal processes ensuring that student's information will be kept safe and organized. The system streamlines the data collection and maintains transparency, keeping the applicants updated in their application status. It also includes user-friendly features to guarantee a fair selection process for scholarship recipients. Furthermore, this system offers a digital solution, resulting in faster, convenient and fair scholarship process.

There is always a potential for further enhancement after the system's development has been successful. In accordance with the conclusions and for further improvement of the system, the researchers would like to recommend to adopt to the current trend and including the search function to be more flexible and more convenient. This system has the capacity to greatly boost its efficiency, lighten administrative workloads and provide convenience to aspiring scholars and the coordinators. These suggestions are intended for future researchers who will use this study as a point of reference to ensure the accuracy and value of their research.

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## 5. Conclusion

In conclusion, this bayes.NaiveBayesUpdateable model demonstrates a strong capacity to analyze and predict outcomes within the given dataset, with high correlation and relatively low prediction errors. It provides a clear structure for decision-making and pattern identification. This evaluation is based on the analysis of 100 instances, with two instances being ignored due to class unknown conditions.

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

No conflict of interest to be disclosed

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