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Direct Assessment Automator for Outcome Based System

Utkarsh Jaiswal [1], Rishabh Pandey [2], Rishav Rana [3], D.M.Thakore [4], NaveenKumar JayaKumar [5]

Final Year Student [1], [2] & [3]
Head of Department [4], Associate Professor [5]
Department of Computer Engineering
Bharati Vidyapeeth University College of Engineering
Pune - India

ABSTRACT

The paper discusses the contribution of academic result analysis of students in Accreditation Criteria for Engineering Programs by the National Board of Accreditation. NBA is a body set up to enhance the quality, standard, relevance, extent and excellence of engineering education in India. The proposed application allows the faculty to view their student details, result details of allotted subject. These details can be used to generate document for calculation of Graduate Attributes.

Keywords: — Assessment, Accreditation, Methodology, Criteria, Engineering Programs, Analysis.

I.   INTRODUCTION

The National Board of Accreditation (NBA), established in the year 1994, for evaluations of technical institutions and programs basis according to specified norms and standards as recommended by AICTE council periodically [1].

The parameters adopted by NBA for programme accreditation are based on skills, competence, capability etc. while keeping in mind the outcomes desired by the concerned profession. There are 12 such parameters called Graduate Attributes for undergraduate engineering programme: Individual and Team Work, Engineering Knowledge, Conduct Investigation of complex problems, Modern Tool usage, the Engineer and Society, Environment and Sustainability, Problem Analysis, Ethics, Communication, Project Management and Finance and Life-long Learning. Knowledge of engineering curriculum is one of the deciding factor for attaining proficiency in multiple GA. Engineering Knowledge is directly associated with academic performance. The proposed tool helps to analyse the performance report, which helps institution achieve the goals needed [2].

The NBA methodology and Criteria are based on the ABET approach of the 1990s and the various steps listed earlier, suitably adapted for Indian needs. It includes 3 steps:

STEP 1: Submission of Accreditation Proposal to NBA in the prescribed format by the institution in two parts: Part I: Institutional Profile; Part II: Program Profile (one for each program); Preliminary scrutiny of proposal at NBA and constitution of the visiting team of experts.

STEP 2: Validation of each proposal (Parts I and II) by the visiting team at the institution, by physical verification and discussions with various stake holders; Criteria-wise assessment of the Profiles in each case by using NBA Criteria, discussions among team members and Report preparation for submission to NBA.

STEP 3: Consideration of the Report received by the concerned Sectorial Committee of NBA and forwarding its qualitative/quantitative recommendations to NBA; Discussion and decision at NBA on the accreditation status to be awarded to each program and final announcement on its web site. (The accreditation status is decided by the total marks scored at the programme level, as follows: Accredited for 5 years, Score >=75%; Accredited for 3 years, Score; Not Accredited, Score < 65%; All Accredited programs must also meet the minimum performance levels (>=50%) specified in respect of chosen Criteria) To meet these requirements, NBA has evolved a detailed procedure for A&A of engineering programs, including the Criteria and weights specified for each of them. The chosen Criteria broadly fall under three categories:

(a) Organization/Infrastructure, covering Institutional mission, governance and objectives; financial resources of the institution; Physical infrastructure for academic activities;

(b) Academic Performance, covering Human resources – quality of faculty, staff and students; Teaching-learning process – innovations in course work/examinations; Success rate of students – academic, professional, placement, and other; and Adoption of new technologies in teaching and learning process;

(c) Industry Interaction, covering Industry and Institution interaction; Research and Development work; and Contribution to society.

The academic performance and success rate of student is easily calculated by this tool *Direct Assessment Automator for Outcome Based System* (DAAFOBS). This tool will help to minimize the manual effort of analysing the results which is such a large data to analyse.

II.   APPROACH

The Direct Assessment Automator for Outcome Based System can analyse student performance, document analysis

report and help to evolve a plan of action for refinement. This application will present statistical data that will be used for overall academic progress of the department or student or faculty academic progress. The proposed tool will help to minimize the manual workload which includes collecting students' performance data, performing basic analysis and documenting the outcome, the proposed system will take user input as their performance report and then document the analysis as outcome. It is the most challenging phase of present systems for analysis. There are several criteria for analysis of student marks and progress. The grading system we are following is CGPA based evaluation system, where we generally use A/A+/B/B+ grade notations to recognize whether the student can fulfil the criteria of a given course. Thus the faculty members require the maintenance of records manually, which is a difficult job to perform. A typical student appears for more than 50 examinations to meet the requirements of graduation degree; therefore, it's difficult to analyse the progress report of each student because the data is

too huge for manual analysis. Further, it is necessary to show not only that all the students who graduated met these criteria, but also other students that are still in the program are making apt advancement. Still further, there is a need to show the continual development of each student [3].

The present manual approach requires a collection of all the information from professors who taught subjects during the graduation period for analysis. Our project will automate the data collection, analysis, and documentation steps. Our objective is to analyse the results to identify major difficulties before it emerges. To analyse one needs to gain ingress to the individual student grades and academic history, probably from the university's student database.

As existing system is centred on manual calculation and manual paper work. The amount of work makes the department procedure very monotonous & dawdling. The system requires preserving a lot of documents. Control of such important documents is again a monotonous work. Also repossession of important statistics and documentation will consume time. Hence there is a need for a better system [4].

III. PROPOSED SYSTEM

The system will analyse the student result and provide the success rate in form of statistics which will reduce the difficulties and manual efforts. Proposed tool is used for analysis of new course, old course of both under-graduate and post-graduate.

Functional Design:

The proposed tool focuses on collecting data i.e. progress report from students as an input which is main resource of tool further data is used to performed various analysis and generate the document.
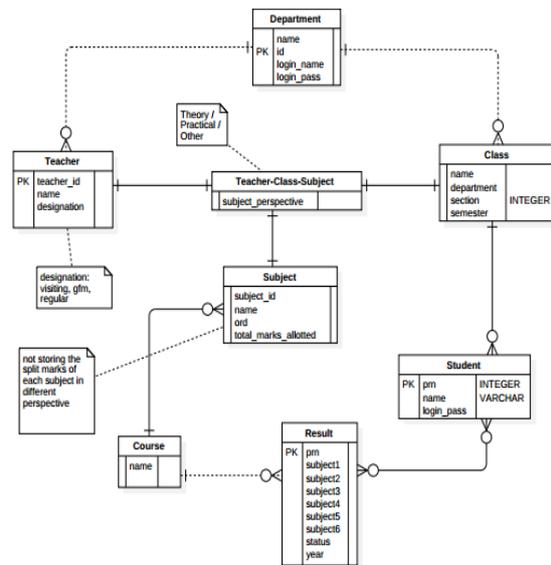
Figure 1 ER Diagram

As data is the most critical part in proposed tool the above ER Diagram is used to manage the data. It contains a table Result which store user input performance report of students where PRN number is primary key which is unique for all the students. Subject table contains list of all the subject semester wise. It contains other table such as Students, Class, Department and Course. [5]
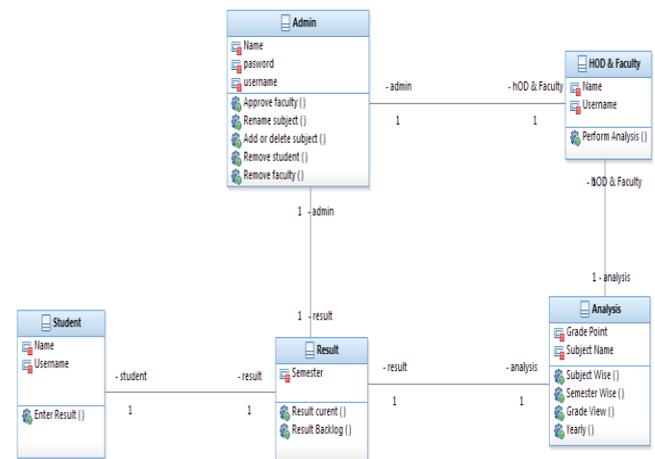
Figure 2 Class Diagram

The above class diagram explains the measure class of the tool all the classes are loosely coupled there is no inter dependency among them. Performance report as a result class, Result class has one to one relationship to perform analysis which is semester analysis, subject wise analysis and yearly analysis. [6]

Use Cases:

Our tool consists of three users and their functionalities are following:

ADMIN / HOD:
In the current system Admin will be performing following activities:
- Can edit the structure of mark sheet as per university guidelines.
- Add, rename, delete subject
- Approve and delete faculty
- Add and delete student
- Can do semester wise analysis, subject wise analysis, yearly analysis, grade wise analysis.
- Can view backlog.

FACULTY:
- Can do all types of analysis that admin can do when approved by Admin.

STUDENT:
- Can enter marks only.
- Can view their own performance report.

Proposed Tool user interaction screenshot

It contain screenshot of end user interaction with proposed tool for accepting performance report and performing analysis.

Figure 3- Window to accept Students Mark Sheet

This window will let user to insert their performance report which is most critical part of tool further these data are used for analysis.
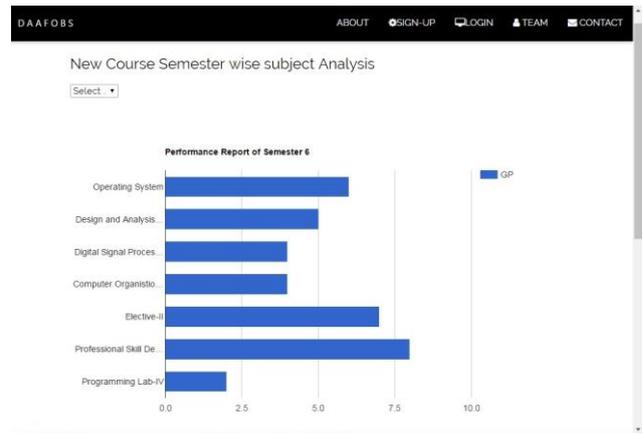
Figure 4- Semester wise subject analysis

Semester wise analysis we need to select the course and semester graph depicting average Grade point of each subject in particular semester.
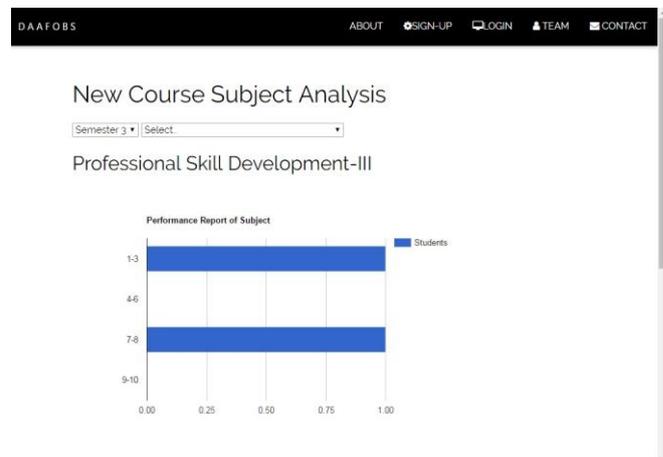
Figure 5-Subject Analysis

In this analysis module end user need to select semester and subject graph depict the number student in particular grade point range i.e. 1-3, 4-6, 7-8, 9-10.
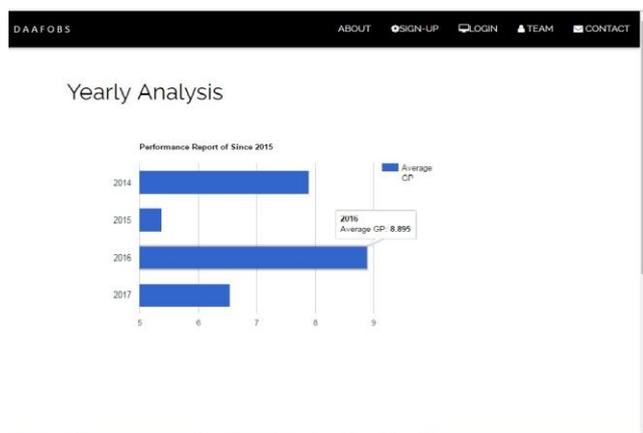
Figure 6- Yearly Analysis

In this analysis module user need to select the course and it generate the performance report of current to previous year up to input given by end user average CGPA of the particular year.

IV. APPLICATION DETAILS

For the application to be effective, it needs to consider variability in the information technology (IT), infrastructure at university level and account for the same. This shows certain engineering and user requirements that the software tool (or Application) should meet. It should be adaptable enough so that any university can use it; it should also provide user friendly interfaces for all of them. To meet such criteria a web based approach was used for development. The application is developed as a J2EE project built using standard MVC architecture with POJO beans. The view is responsible for data input i.e. student marks; models interact with database; controllers are the servlets used for routing the execution flow. Beans were used to transmit objects within different methods in our architecture. For graphical representation on analysis section we used Google Charts. Google Charts is a very simple graph and graph generation API, we implemented it client side using JavaScript. DAAFOBS is deployed on Apache Tomcat Server 9. The application uses a MySQL database and consists of tables for administrator configuration, backlog backup, faculty details, login, result data, student details and subject details. The application is developed with scalability as one of the priority as software architecture is the key to scalability. Integration modules and core functionalities are loosely coupled which will allow us to migrate to different database and deployment tool in future.

DAFOOBS is an analysis oriented application; there are 4 primary analyses that can be done. Semester analysis, comparative analysis of average performance in all subjects of a semester. Yearly analysis, analysis of student performance for all semesters in one academic year. Subject analysis, shows number of students in different class of performance in specific subject. There is also a feature to track and analyse backlogs. [7]

V. CONCLUSION

While keeping in mind about the difficulties of analysing such large data of numerous student results, an automated solution like DAAFOBS for important activities like result analysis and report generation would greatly benefit the institution. The use of such application ensures a great time-benefit percentage while maintaining the productivity. Further, the successful execution of this system can contribute to the automation of other important activities. With continued improvement and refinement in the system, it can change the outlook of whole education system.

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