An Object-Oriented Package for Displaying Online Exam Scores

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Abstract—Examination marks from different modules can differ from student to student and their categorization is a complex and difficult process. At the moment Microsoft Office Excel is being used for such a categorization but users experience several problems when using this program. Therefore, there is a need for new software that will display the data from the analysis of the marks in a more understandable way for the user.

We propose a simple, reliable and flexible model, able to categorize examination marks from multiple modules and to visualize them into different formats. The model is simple and friendly to the user in relation to Microsoft Office Excel and can be applied within e-learning educational context and into business world as well.

The proposed Model is a software package, easy to be installed in any Microsoft Windows software, it is being written in C++ programming language with the use of Visual Studio 2008. The user import the examination marks from a Business Object-Oriented package and the proposed program automatically visualize them into different formats (bar, curve and pie) charts.

It is a flexible, straightforward software package that can be used in many educational aspects to analyze data and to compare information. Furthermore, comparing records gives the ability to user to evaluate students’ progress and to compare today’s results with past years. The proposed model can also be applied to the business world in order to evaluate the progress of a company or to compare one company with each other associate with progress based on the analysis of statistical data.

Index Terms—Analysis of Examination Results, Business Object-Oriented, course implementation, e-learning

I. INTRODUCTION

As we entered into the new millennium, the technological evolution generated enormous changes to the labor market systems. This environment of globalization and open market is trying to improve people’s life by developing innovative and flexible technological goods. [1] The big advantage of this technological evolution is that people have the ability to learn/search about anything in the World Wide Web anytime; and at the same time to develop something on their own easier than is used to.

The Proposed Model here is based on technology concepts; to satisfy people’s need and to improve their lives by introducing an innovative sector.

A. Introducing the Proposed Model

The arrival of the Internet and particularly the World Wide Web over the last several decades heralded a new age for education, enabling new online forms of learning. E-learning programs emerged and institutions developed learning systems to deliver courses online. Beyond the educational context e-learning programs are expanding at high rates in the business world as well, and companies in their effort to increase their productivity by improving their employee’s performance became one of the largest investors and clients of those e-learning programs [3].

Over the last decades, universities have been developed a lot in the way of implement and transact their courses. Distant e-learning service is part of technology’s accomplishment, as it provides learning through distance, through web sources, online tutorials, and online share of information, online conversations, and online conferences and so on...[4]

The question lies in how well do those training programs ensure improvement in education and how much productive they are. In order to evaluate the quality of those e-learning programs, a statistic software providing information about the development and the performance of the trainees is essential. [5]

This Proposed Model suggests a new way of evaluation that can be used instead of Microsoft Excel. Its functionality is based on Object-Oriented programming with the help of C++ programming language. The format and the structure of the model are straightforward to the users who can easily shift and scale results.

The model we propose uses a platform or a “Dialog Window” where the user uploads a txt file, with names and students’ marks into the system. Then, the program automatically displays a list of all the grades the student got showing the maximum and the minimum grade in the main platform. The program can also display students’ average grade that can be compared to past years providing strong evidence about their performance.

The user with the use of suitable buttons, can easily shift and visualize the list into different formats such as (bar, curve and pie) charts. “Fig. 1” below, displays the main platform where the user uploads the student’s marks list from the txt files.
As learning systems evolve, more training on their use is needed for a successful e-learning environment. The Proposed program is quite flexible and is directly connected to the improvement of many educational aspects such as the categorization of examination results of multiple courses.

This program is designed to be adopted in all educational grades, from primary school to a university environment, but to the business world as well. It is a simple and flexible function and it can be compatible to any computer software (so far has been tested in Microsoft software) and allows any individual with basic computer skills to operate it. Furthermore, this Proposed Model saves user’s time as it is simple to upload files, to make changes, to shift and scale all the data entered into the program and most of these applications are made automatically by the program - something that Microsoft Excel does not perform but instead requires from the user to write the data and apply changes manually.

For example teachers consume a large amount of writing materials for the examination results over the school year. The adoption of this program will allow them to create mark lists without using paper, which will provide evidence about the highest and the worst performance of their students during the year and the average of the classroom. Furthermore, their list could be compared to other teachers’ similar list providing evidence about the general productivity of the institution, so as to see the areas than need to be improved to raise competitiveness.

The Proposed Model can be used in universities, to examine student’s records from multiple courses, to compare student’s results with past years and to make appropriate decisions. In the same pattern, this program provides applications that can shift, scale data and obtain results something that can be used to test the performance of the course implemented and improve the educational aspects. Furthermore, this program can be used to help students decide in which university and course to apply for, accordingly to the results obtained by the statistical analysis of the program. Choosing, based on the learning performance, can contribute to the improvement of universities that will provide higher quality of education in order to become more competitive.

It can also be used in e-learning distant education courses, to evaluate students’ performance, to rate courses and to improve education.

This program is also suitable for enterprises as will allow them to compare the results between their employees participating into training programs detecting the highest performance and invest on those performed better. Additionally, in case there are subsidiary companies this program can compare their performances so as to help the controlling companies identify what needs to be improved.

Nowadays, almost every institution and every enterprise associates with e-learning using e-learning software packages called CMS-Course Management Systems and LMS-Learning Management Systems to provide anytime-where learning. CMS focuses on the courses while LMS focuses on the learners and their training needs [6]. LMS is considered to be the replacement of CMS, as it is more flexible software able to manage blended learning, that includes face-to-face meetings and online learning, which is its major difference from CMS [7].

Learning systems either CMS or LMS include various tools such as course management tools (calendar, announcements), content tools (assessments) and communication tools (email, chat, forums), that allow activities such as discussions in online environments [6]. This program can be inserted as a tool in those software packages where students can login to see the marks’ list and to evaluate their progress in relation to the average of their training program.

Overall, the program proposed can calculate automatically the average of the list entered into the program and can display the lowest and the highest grade. It is an easy way to evaluate students’ learning outcomes and explore students’ progress. The results can offer significant insights about gaps in the curriculum design of training programs that must be addressed for the success of students in the workplace.

II. INVESTIGATE THE PROPOSED MODEL

A. Operation and Structure

The entire program has been achieved with the use of Visual Studio 2008, which is an Integrated Developed Environment (IDE), with the use of C++ programming language. It includes the comprehensive Microsoft Foundation Class (MFC) that simplifies and speeds the development of Windows applications. Moreover, it includes sophisticated resource editors to design complex dialog boxes, menus, toolbars, images etc.

MFC contains a library that encrypts parties of Windows API in C++ classes and provides functionality that enables the programmer to manage Windows objects and common controls such as buttons, windows, design, application and frameworks. [12]

The entire software application was based in a structured methodology which helped the programmer to design first the multiple “Dialog” frameworks and second to simply generate the interconnection between these frameworks. The connection between frameworks was achieved with the use of outline buttons that have been constructed to perform functionalities such as max, min, and to calculate the average of students’ marks list, as well as to shift the user to another page. The performance of this program is based on the computational functions, to implement calculations, scale and shift, but also in the design functions, to visualize and display charts and images.

The main platform appears in “Fig. 1” above. The students’ marks list is saved in a txt file and will be entered into the platform with the use of the Browse “(…)” button on the right side of the platform. After the list is inserted, the user clicks the button “Read” and the program displays what the txt file contains. In the case of “Fig.2” on the left side are the Students’ names and on the right side their grades respectively."Fig. 2” below displays this action.

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After the results have been imported into the system, the program performs calculations and automatically displays the student with the maximum and minimum grade as well as the average of students’ marks list as is displayed in “Fig. 2”. There is a button “Write to file” where the user has the ability to open the txt file and apply changes if necessary before proceeding to the visualization of graphs.

Three main buttons appear in the same main platform, the “Bar”, “Pie” and the “Curve”. These buttons will visualize the students’ marks list.

The “Bar” button will lead the user to a new page (platform) that will display the students’ marks list as bars. “Fig. 4” displays this performance. The user can click in any of the bars and the student name along with its grade will appear in a small box on the right. On the left side of the graph, a number of functionalities appear to perform calculations. “Fig. 3” displays this action.

In the “Criteria” framework box an “Interval” text box and a “Range” drop-down list box is displayed. The user sets the Interval text box the number that desires the range of students’ marks to be displayed. For example, if he types the number five, then the range of student’s marks will be displayed as (0-4, 5-9….95-99,100). The total number of students is being displayed here along with the number of students that have failed.

The “Additional Function” framework box contains two text buttons the “Add” and the “Scale”. The first one adds an extra value in the percentage of the students’ marks giving students the opportunity to pass, and lecturers can use this functionality to raise the percentage of the students’ marks in different courses. The next application is useful to shift up or down students’ marks and all changes will be displayed in the bar chart.

Every application made in the “Bar” framework will be recorded in a txt file automatically. The graphs that are displayed in the “Bar” main window can be recorded and visualized as an image (jpeg) with the “Save Image” button.

To add an extra functionality to this program, the programmer developed the “Statistics” button on the bottom of the page to display the percentage of students that pass or fail in the class. For example, if the user set the range to be displayed by ten, then it will be displayed by 0-9, 10-19….90-99,100, but in this case, on the top of the column will display the number of students that fail, and on the bottom of the column it will display the percentage. “Fig. 5” displays this functionality.

The new changes applied into the program can be saved as a text file with the use of “Save as” button, in the bottom of the page of “Fig. 3” for later use. The “Refresh” button can be used to refresh the program to apply new data if necessary – it operates as a clean button.

“Fig. 4” displays the Bar Chart.

“Fig. 5” below displays the percentage of students that have passed; in a range of ten. This picture (jpeg) can be used in many educational aspects as it is, clear and flexible, something that Microsoft Excel does not contain to contribute information. This gives an extra advantage
to the software as the results can be easily compared with other statistical results applied and saved as an image. Also the image can be attached and send to anyone, something that Microsoft Excel does not have as an option.

Figure 5- Display the average of students with scale of 10

B. Innovation of the Object Oriented Software package.

Microsoft Office excel is available to many people as part of Microsoft Office but has serious deficiencies concerning statistical analysis when compared to other packages such as SPSS [8]. Excel is not recommended for data analysis due to its weakness to implement several algorithms that can lead to serious errors on the data analysis [9].

Another disadvantage is that it offers graphics with false third dimensions, the bin labels are difficult to read, the aspect ratio is poor and the help provided for the user is very poor [9]. Moreover, when the size of the file is huge the program execution is slow and for the better function of the system files must be analyzed separately [10]. However, by separating into multiple different excel files there is the danger of losing the files in the hard drive.

A further disadvantage of Microsoft Office Excel lies in that the worksheet has a limited time of rows (65,536/excel 2003) and columns (256/excel 2003) that is a significant limitation for the business world [11]. Taking all the above mentioned into consideration, it seems that excel’s performance is inadequate.

As this project is a windows based software, it is better and more confident than Microsoft Office excel for several reasons. For example excel spreadsheet can tell us about the total number of students’ with their marks. It can also tell us about the average marks of the exam and who got the maximum marks and the lowest marks.[12] On the other hand, this windows based application not only tells us about the exam marks and the average marks obtained by the students but it also tells us about the progress by the students in the exam by making graphs an option that Microsoft excel lacks.

The exam marks can be viewed in different formats, indicating maximum and minimum marks in the exam with the name of the student. There is also an option for saving these graphs as jpeg images and the new results applied as a text file which increases its performance.

Furthermore, this software is quite simple and does not require any tutorial as Microsoft Excel. That is why we can say that this project is somehow better than excel in exploitation and dissemination of data.

C. Methodology of research and results

This program application was based in well structured methodology. MFC (Microsoft Foundation Class) library, had to be studied and analyzed to a sense that it will be used to “wrap” portions of the Windows API in C++ classes [13] whereas the same time it will comprise and enable functionalities to develop applications and frameworks.

Every framework developed in this program was based in MFC’s applications, instructions and rules. GUI elements and Control Variables have being studied well to develop slider control variables, applications that will define events, Input and Output GUI elements. The MFC library helped to group the GUI elements and to add functionalities.

MFC provide an overall framework to develop this application program. The MFC library contain classes for all graphical user interface elements (windows, frames, status and tool bars) that have been used here to construct interfaces to databases, to handle events such as functions, and messages to be send from one interface to another [14].

The Dialog frameworks or interfaces were the one that have been designed first. The Bar Dialog was build with the use of fixed toolbar such as buttons, frames, status. The functionality came into the program when the programmer started to handle the events and connect the interfaces with each other. For example, when the txt file import into the system, a message is sent to the appropriate interface and then appropriate controls and calculations take action to obtain and envisage the result. The applications for jpeg and txt file have been added latest in the program as the most important was to develop the interconnection between “Dialogs”.

This project is a part analysis, part planning and part problem solving. The aim of this project is to focus on features and phases of classes of Microsoft foundation class, with the use of windows resources. The project is separated into distinct phases like planning, initiation and implementation. This development gives an easy way of checking out the results of the students and their progress in the examination by quickly making graphs for that. The user can easily switch to some other graph. The examination marks are viewed by the user in different forms of graph which tells us the progress of the students in the examination marks, which is very helpful in daily life.

D. Curve and Pie Charts.

The user in order to proceed to the other two charts needs to go in the main window application framework.
The Curve chart contains the same applications as the Bar chart apart from displaying curve line instead of bars.

“Fig. 6” below displays the Curve chart. The range is being set to five, and the students’ marks have been scaled by 1, 5. The user clicks with the mouse in one of the line curve and the Student along with its grade appear in a small box on the right side of the graph as shows.

The same application has been taken with the Pie Chart, but in this case the “Pie” appears in the centre of the page and the functions on the bottom of the page. “Fig. 7” displays the pie chart and the different colors represent each student along with each grade.

As before, the user clicks in any of the colors in the pie chart, and the Student along with its mark appear in a small box on the bottom of the chart.

The same functionalities as the bar and the curve charts, has been applied to calculate the max, min and the average of the students’ marks list that has been entered, as well for the best ten students. Also, functions to shift and scale the marks are being seen here. Any changes took place in the boxes further in the program, will be recorded in a txt file or saved as an image.

The user chooses to set the range to ten and select the “Statistics” button, a new window will open, as did before with the other charts, that will display the students’ marks’ range and their marks. “Fig. 8” display this action. On the bottom of the columns is the marks’ range divided by ten, whereas on the top of the columns is the percentage of students that pass. This application can be saved as an image and be sent by email.

E. Conclusion

In recent years educational institutions adopted the use of technology in their curricula and teaching at a distance in virtual classrooms became a reality. Software such as Excel, Word, Access and computing languages such as C++, visual basic and Java Script are being extensively
used by teachers and students within the educational context, and by companies and businesses in general.

We believe that the software package we propose is a useful and accurate tool for the statistical analysis of the students’ marks but also for other statistical uses as well. It aims to import examination marks of the students and visualize them into different formats (bar, curve and pie charts). Its operation is quite simple as the user has just to import the data from a text file in order to obtain the results as well as the graphs.

In the future this program could be uploaded into the internet as a web site where users will have the ability to practice with it. E-learning platforms could also upload the program and add it in student support site, as software to check the marks results, like for instance the plagiarism software turnitin that is being used to check student’s work for plagiarism. Future research can improve further this program and increase its applications.

This upgraded software can be used in academia sector where students can search which University has the best rate to apply for, which department, course, master or PhD to apply for, depending on the rate and the statistic results. It can also be used, in the same sector, to compare student’s exam results from year to year, to compare the student’s mark results from one module with the same module from a different year.

There are multiple universities in one country that can utilize this application. Students will have the ability to check which universities have the best rate and which course has raised this percentage.

Furthermore, this Program can be adopted by companies to test their progress, by comparing their current statistic results with their last year results. They can also apply this program, to check with which company they can cooperate or to see in what rate their company is currently to improve their development. The employers can be also view here, and check their progress and further make decisions applications.

This Program can be used instead of Excel to obtain statistics results, but will visualize many results and will automatically upgrade the system to enter automatically the new results. The results are visualized quickly, automatically, can flexibly saved and changed and most important; anyone with basic knowledge in computer science can use it.

F. References


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