

# Data Mining Based Universities E-Secure Student Admission System

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## Abstract

The process of joining students in universities is a very important and complex process, where the selection of the best students applying to universities is an important element of the advancement of the educational process and training. Develop an Electronic Secure System to Admission Students in University (E-SSASU) is a new vision for university admission systems by building a security electronic system that is an alternative to the existing traditional admission systems used by universities. This system is able to overcome many of the obstacles and challenges faced by universities in the enrollment of students. The main idea of the research begins by checking the student's data with national identification number and national data to select their qualifications, then distributing the student due to the university's test committees in accordance with the general secondary certificate obtained. Conducting initial tests on students then using data mining methods to predict the performance of student. The system result shows that data mining algorithms prediction success rate is 87%.

**Keywords** - Electronic secure system, educational data mining, neural network algorithms, NNC.

## I. INTRODUCTION

Electronic secure system for admission students in university is the process of predict the best students to enrollment in universities [1]. Admission of students is a very complex process, and university or college admission is a complex decision process that goes beyond simply matching test scores and admission requirements [2]. This paper describes a new vision for university enrolment systems through the establishment of an electronic security admission system for university enrollment. This system is an alternative to the existing traditional coordination systems used by the universities because of the characteristics that enabled it to overcome many of the obstacles and challenges faced by universities. The problem with traditional coordination processes in unable to choose best students applying for university. Where coordination processes traditional depend only on a single variable which the total score is obtained a student in the pre-university, without depends on scientific systems and database help decision makers choose the best Applicants. Many attempts to penetrate regular coordination systems are successful. Data mining also popularly known as

Knowledge Discovery in Database, refers to extracting or "mining" knowledge from large amounts of data. Data mining techniques are used to operate on large volumes of data to discover hidden patterns and relationships helpful in decision making. While data mining and knowledge discovery in database are frequently treated as synonyms, data mining is actually part of the knowledge discovery process [3]. Using data mining methods to develop a secured system to coordinate students in universities using modern methods, tools and software [4]. Distributed database (DDB) as a collection of multiple logically interrelated databases distributed over a computer network, and a distributed database management system (DDBMS) as a software system that manages a distributed database while making the distribution transparent to the user [5].

The paper is organized as follows: Section II provides a briefing of related works. Overview of the overall developed systems is explained in Section III. Section IV deals with experimental results. And the Paper is concluded with Section V.

## II. RELATEDWORKS

Some of the related works are illustrated as follows:

Akhmad, M [6], Recruitment is an important thing in a company , but there are problems that often arise such as candidates who do not fit the needs and still often use a system that is manual and not integrated. The solution that can be given is to create a recruitment application system that can manage the recruitment and placement process centrally with systematic standards and procedures

Alemu K. Tegegne [7], Universities are working in a very dynamic and powerfully viable environment today. Due to the advent of information technology, they gather large volumes of data related to their students in electronic form in various formats like records, files, documents, images, sound, videos, scientific data and many new data formats. This study focuses on predicting performance of student at an early stage of the degree program, in order to help the university not only to focus more on bright students but also to initially identify students with low academic achievement and find ways to support them.

Isha Shingari [8], The term education data mining deals with extracting knowledge out of academic database which can be used for providing suitable patterns to education managers, teachers,

and students. Education is a progressing field and students need to put in extra efforts to keep the right move towards learning. This paper presents an approach to study the student data and implementing various data mining classification algorithms. Thus, finding out the best algorithm, that can help in evaluating the final grade of a student and finding the best fit for identification of possible results beforehand, so that appropriate interventions can be planned.

Heena Sabnan [9], Data mining has been successfully implemented in the business world for some time now, its use in higher education is still relatively new, i.e. its use is intended for identification and extraction of new and potentially valuable knowledge from data. Using data mining the aim was to develop a model which can derive the conclusion on students' enrolment behaviour. Different methods and techniques of data mining were compared during prediction of students' enrolment. This paper contributes a technique that will help the institute to analyse the current scenario of admission by predicting the enrolment behaviour of student.

Esther A. Ibrahim [10], Admission applications from high school students are received yearly by colleges but majority of the students that are being admitted eventually do not graduate. Colleges need to base their admission requirements on some specific factors to determine the students who will succeed. The purpose of this research was to utilize the data from first time incoming students who were enrolled full time and graduated from the mathematics department within five years to predict the success of future students seeking admission into the department.

### III. DATA MINING BASED UNIVERSITIES STUDENT ADMISSION SYSTEM

Admission process is one of the most important processes when it comes to any educational institution such as universities. However, this admission process is a much-stressed work. The aim of our developed system is to help the college/Universities to analyse its admissions, based on the preferences considered by the student.

The developed system (E-SSASU) workflow, as shown in Fig. 1, have been followed the software development life cycle show this steps:

- Requirements Analysis
- Design
- Development
- Testing
- Maintenance
- Data Mining Based Prediction Enhancement

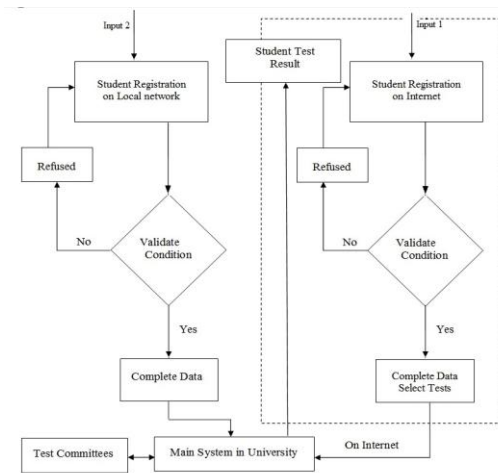


Fig 1: E-SSASU workflow

#### A. Requirements Analysis

Requirements are the features that your application must provide. At the beginning of the project, you gather requirements from the customers to figure out what you need to build. Throughout development, you use the requirements to guide development and ensure that you're heading in the right direction. A project's requirements must be consistent with each other, unambiguous, clear [11]. First in phase requirements analysis we overcome the problems of traditional admission systems.

#### B. Design

The goal is to divide the system into chunks that are self-contained enough that you could give them to separate teams to implement. A good GUI can make programs easier to use by providing them with a consistent appearance and with intuitive controls like pushbuttons, list boxes, sliders, menus, and so forth.

Using graphical user interface (GUI), by placing standard UML diagrams in methodology's work products, make it easier for UML-proficient people to join the project and quickly become productive. The most useful, standard UML diagrams are: Diagram Structure Diagram (Class Diagram-Composite Structure Diagram- Component Diagram-Deployment Diagram - Object Diagram- Package Diagram- Profile Diagram) Behaviour Diagram (Activity Diagram- Use Case Diagram-State Machine Diagram- Interaction Diagram" Sequence Diagram - Communication Diagram- Interaction Overview Diagram - Timing Diagram").

The deployment diagram shows how a (E-SSASU) system physically deployed in the hardware environment, as shown in Fig. 2, its purpose is to show where the different components of the developed system physically run and how they will communicate with each other.

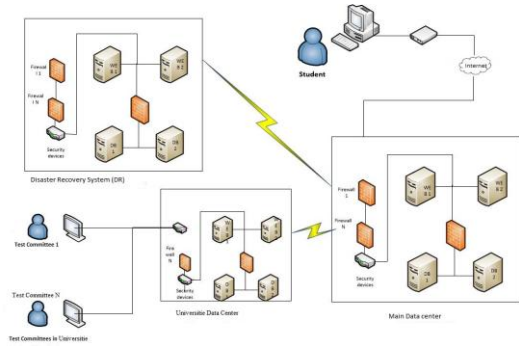


Fig 2: E-SSASU Deployment Diagram

A use-case diagram illustrates a unit of functionality provided by the system. The main purpose of the use-case diagram is to help development teams visualize the functional requirements of a system, including the relationship of "actors" (human beings who will interact with the system) to essential processes, as well as the relationships among different use cases, Its main purpose is to visualize the functional requirements of a system, including the relationship of "actors" (human beings who will interact with the system) to essential processes, as well as the relationships among different use cases as shown in Fig. 3, the Use-Case Diagram of my developed system.

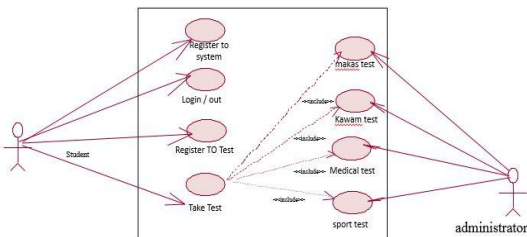


Fig 3. Use-Case Diagram

A graphical user interface (GUI) is a pictorial interface to a program [12]. A good GUI can make programs easier to use by providing them with a consistent appearance and with intuitive controls like pushbuttons, list boxes, sliders, menus, and so forth. The GUI should behave in an understandable and predictable manner, so that a user knows what to expect when he or she performs an action, as shown in Fig. 4, the Graphical User Interface (GUI) design of the registration form of my developed system.

B. Fig 4. Graphical User Interface (GUI) design of the registration form

Database design is an important part of most applications. The first part of database design is to decide what kind of database the program will need. If you use a relational database, you can sketch out the tables it contains and their relationships during

high-level design, fig 5 show the database design for my developed system.

**A. Development**

The end goal of an object-oriented development of a system is the creation of code in an object- oriented programming language. In the earlier design phase, we already created the information necessary in order to generate the code. Implementation in an object-oriented programming language requires writing source code class definitions and method definition.

**B. Testing**

Many tests were performed on the (E-SSASU) system:

- Unit testing: should focus on testing the functionality of objects,
- Component test: where several individual units are integrated to create composite components,
- System test: all of the components in a system are integrated and the system is tested as a whole,
- Implementation test: system can be install or Uninstall,
- Security Test: Testing of database and network software in order to keep company data and resources secure from mistaken or accidental users, hackers.

**C. Maintenance**

Maintenance tasks are grouped into the following four categories:

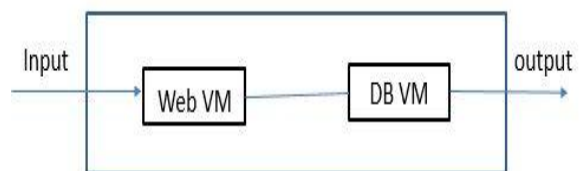
- perfective: Improving existing features and adding new ones,
- adaptive: Modifying the E-SSASU system to meet changes in the application’s environment,
- corrective: Fixing bugs,
- Preventive: Restructuring the code to make it more maintainable.

Classic admission system as shown in Fig.5, consists of two serial components (Web VM and DB VM).The reliability of series system is the probability that all components are reliable so:

$$R_s = R_1 R_2$$

Where R1 is the reliability of Web VM and R2 is the reliability of DB VM, equal 0.7, 0.8 respectively.

$$R_s = 0.7 * 0.8 = 0.56$$



C. Fig 5. Classic admission system

Current Main E-SSASU system consists from two parallel sub system each of them consists from parallel and series components, as shown in Fig.6.

The reliability of developed system is:

$$R_s = 1 - (1 - R_1) (1 - R_2)$$

$$R_s = 1 - (0.3 * 0.3) = 0.91$$

The same way reliability for two parallel DB VMs are:

$$R_s = 1 - (1 - R_1) (1 - R_2)$$

$$R_s = 1 - (0.2 * 0.2) = 0.96$$

The reliability for main system:

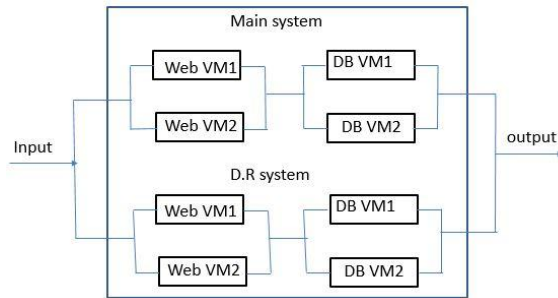
$$R_s = 0.91 * 0.94 = 0.873$$

The reliability of the DR system will be the same. The reliability of the overall developed system is:

$$R_s = 1 - (1 - R_1) (1 - R_2)$$

$$R_2 = 1 - (0.126 * 0.126) = 0.984$$

As we show that, our developed E-SSASU system has reliability more than the classic.



D.

Fig 6. Current main E-SSASU system

#### A. Data Mining Based Prediction Enhancement

Data mining is the extraction of hidden predictive information from database. Generally data mining is the process of analysis of data from different perspectives and summarizing it into useful information used to increase profit. For higher education institutions whose goal is to contribute to the improvement of quality of higher education, the success of creation of human capital is the subject of a continuous analysis.

The algorithm was developed to help the system predict the level of the advanced student based on the input data [13]. Where the system excludes students of low level to contribute to the optimal utilization of resources, reduce cost and also contribute to the realization of the progress in the stages if the required data need to increase or decrease the level of tests.

The system relied on the advantage of extraction through the data entered and then used Neural Network Classifier (NNC) to classify students according to the level of acceptance.

### IV. SYSTEM RESULTS

The system was tested and evaluated by testing it on one of the Egyptian universities. The system was fed by 10 years of data (e.g., gender, birth year and place, place of living, place and total score from previous education, total secondary score, father and mother data, relative's data, etc.) and then tested. The success rate of the system was 87%.

### V. CONCLUSIONS

Because the developed system has the following attributes: availability, reliability, safety, and security

we conclude that the system has the dependability attribute.

We conclude that our developed system is reliable 0.98 % more than old system 0.56%. and Neural Networks are applicable to student performance prediction, additionally, the use of Neural Networks trained on student data and test data resulted in good predictive performance for the majority of the candidates.

Develop an Electronic Secure System to Admission Students in university (E-SSASU) is a new vision for university admission systems by building a security electronic system that is an alternative to the existing traditional admission systems used by universities. This system is able to overcome many of the obstacles and challenges faced by universities in the enrollment of students.

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