

E-learning Argumentative in Iraq's Public Universities

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ABSTRACT

The Corona virus imposed an important reality in the world, which is the e-learning system, as it was adopted in most universities in the world, accompanied by great controversy in countries that do not have experience in dealing with e-learning. In response to the emerging and permanent solution to the outbreak of the Corona virus in the world and the importance of the continuation of educational institutions, e-learning and blended learning methods have been used. But in Iraq, the main reason for the problems faced by e-learning is that Iraq was not prepared for such an educational system and because of the lack of development of the ICT infrastructure. This research deals with the method and ease of implementing the e-learning system in Iraqi universities. This study proposes a theoretical and practical framework based on the literature and the specific model for the success of educational institutions in using the e-learning portal. Samples of data similar to Iraqi university and school students, namely 1,205 cases of data on university and school students at different educational levels, were collected and converted into digital data. Machine learning was used to predict future e-learning outcomes in Iraq through the neural network algorithm (MLP) and the Naive Bayes Classifier algorithm, and the Support Vector Machine algorithm (SVM). Using the Weka program, the best accuracy results were obtained through the MLP algorithm with an accuracy of 96% and were compared with the results of other algorithms. Finally, this study reveals the importance of adopting technology in the educational system and the lack of skills associated with employees, lecturers, and students. In the future, the volume of data can be increased on students in Iraqi universities who used blended learning or e-learning and the tools that helped them succeed.

Keywords: Smart learning, E-learning, Mobile learning, Mlp, machine learning, COVID-19.

INTRODUCTION

The Corona epidemic imposed the reality of social distancing in the world to limit the spread of the epidemic. A new way of life was adopted, and life activities changed and are now managed via the Internet, and most educational institutions continue in the e-learning model even after the end of the Corona pandemic. Education is one of the areas that is greatly affected, as it is essential for many people and students all over the world. Students' ability to go to school, university, educational institutions and participate in group activities is limited, so learning, research and exchange activities are mainly carried out according to e-learning or blended learning methods [1]. Imposing the reality of the spread of the Corona virus. An important model of education used in the world is e-learning, and Iraq is one of the countries that dealt with this reality. One of the most important educational institutions in Iraq is public universities they were forced to continue education in the years (2019-2022) by relying on blended education. All Iraqi universities need to rely on the available technology system to integrate education with communication tools and educational applications such as educational platforms. There are many e-learning methods that lecturers and students can use in teaching and learning during this pandemic, such as the various social media that are widespread in the world, Facebook, WhatsApp, YouTube, Zoom, Google Classrooms, and other e-learning applications that are available everywhere and at any time. And these applications play a vital role in our daily lives and are safe applications. Computers help us with storage. Large amounts of data, and accomplish our tasks quickly and easily. With high precision, connecting us with the rest of the world through the Internet anywhere, anytime. The Internet has evolved now. It changed human life dramatically. Communication and social interaction have become easy [2]. Therefore, it is required in this study to know whether the e-learning process is taking place or not. Effective or ineffective, and the most important problems they face, according to

students' perceptions. Students are limited in their ability to go to school or university, participate in groups, and interact. So learning activities are done according to e-learning [3].

This study is concerned with the subject of e-learning in all its aspects and the methods used in applying smart education in Iraqi public universities that face major problems in implementing this system. The study helps educational institutions, especially Iraqi universities affiliated with the Ministry of Higher Education in the process of integrating technology through the experience of e-learning during the spread of the Corona virus.

LITERARY REVIEW

All research published over the coming years that discussed the subject of e-learning did not suggest the establishment of national platforms for learning. A research paper was published in the field of e-learning at the University of Negeri Makassar, Indonesia, but it focused on a sample of the university only and did not focus on different age groups. The results were not expanded and focused on students of the College of Languages, Department of English [4]. The results of this review indicate that most students and learners in educational institutions have a natural inclination to use mobile applications and smart devices. I consider them effective and useful educational tools suitable for blended learning and e-learning anywhere and at any time [5].

The Corona epidemic had a major side effect that online teaching and learning received an involuntary direct boost and were widely implemented at the University of Technology Graz (TU Graz) in a short time. This temporary and temporary, but almost complete, conversion of the teaching system to online (distance) teaching using technology, specifically e-learning, was successful. The challenges and bottlenecks facing this stage of time were described [6]. Dalia Kamal [7] A multi-layer artificial neural network model was created the study investigates the determinants of student satisfaction in e-learning and proposes a model to identify the factors which affects student satisfaction using artificial neural networks for students at the University of Tabuk. Study model Conducted using a survey questionnaire for 321 participating students who used e-learning, and the evaluation was done in terms of interaction and student satisfaction with the teaching method. The model obtained student satisfaction with e-learning at a correct rate of 92.2%.

Problem Statement

By searching in Iraqi public universities, we found problems related to e-learning, as Iraqi universities were not ready to work with e-education in the year 2020 at the time of the spread of the Corona virus, and they use old methods. The most important problems that Iraqi universities faced are:

1. There is no ICT infrastructure.
2. The lack of experience of the teaching staff using technology tools.
3. The university administration does not trust E-learning.
4. Rapid transition from traditional learning to advanced learning.
5. Some teachers rely on face-to-face teaching.
6. Not converting academic lectures to the electronic system.
7. There is no electronic database for students.
8. There is no electronic personal ID for each student.

Aim Of The Study

There are problems facing Iraqi universities, which is that most teachers and trainers do not trust e-learning. Create a training model that predicts e-learning outcomes in the coming years from a dataset. Collecting data from the category of students who studied in the e-learning system and creating a model through machine learning training. Set goals for each party responsible for education in Iraqi universities so that universities can manage education in all its forms in the coming years. Create a virtual website to provide lectures for the university. Modern Iraqi institutions help achieve the goals of rapid e-learning, save time and effort, and encourage the learner and student to rely on himself to gain experience and knowledge that can contribute to granting him lifelong learning skills in all fields. Open online courses provide assistance and communication to educators.

Machine Learning And E-Learning

Technology increases on a daily basis and enters all fields, and one of these fields is one of the types of education that is considered advanced and can be used in all educational institutions, which is e-learning. Because it allows the learner to access information quickly. This led to the necessity of analyzing the collected data and extracting useful information from it [8]. Among the proposed technologies that help in analyzing, using and extracting data and information are machine learning (ML) and data analytics (DA)

to obtain results that help us in knowledge and classification. Algorithms are used to make use of data by “learning” behavior and finding important types [9].

Feed-forward neural networks (FNNs) consist of one or more input layers, one or more intermediate layers, and one or more output layers arranged in parallel. If FNNs consist of a single hidden layer, they are known as MLP [10]. There are many neurons in each layer. The input vector applies only to the neurons in the input layer but to other neurons in the layers, the outputs of the neurons in the previous layer. An example of an MLP is shown in Fig. 1.

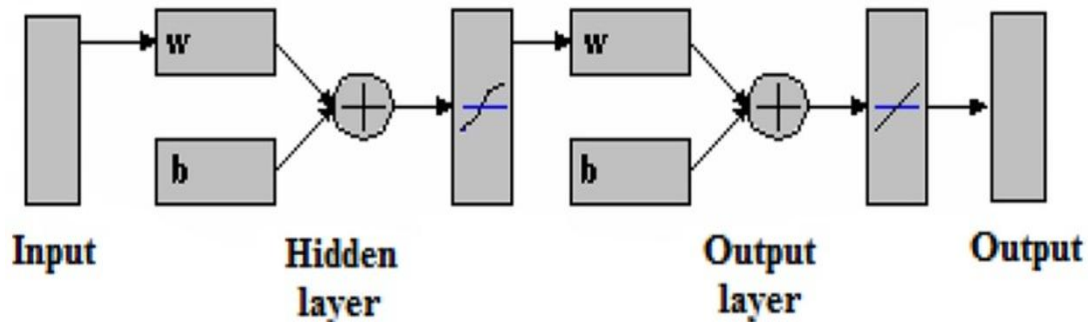


Figure 1. Example of the MLP

Proposed Solution

The research aims to predict and know the ability to know student results using the MLP algorithm. This will help education professionals to address the problems of lack of technology experience among students. The proposal adds a crucial role in education, especially for experts with less knowledge and skills and learners. Fine-focused results are the main limitation of the current methodology.

By comparing the algorithms used in the dataset, it is clear that using the Multilayer Perceptron Neural Network (MLP) algorithm is the best in terms of score and classification on the 1205 Instances dataset. Data were obtained from <https://www.kaggle.com/datasets/arfanaji/dataarfan> [11]. During the work on the dataset, the optimal optimization model for (MLP) training was these were identified and the neural network parameters were optimized. The experimental data is fed into the MLP trainer and optimizer. The data is also trained based on student parameters, which are the input parameters for the best performance in universities. As mentioned earlier, this research aims to determine the best type of optimization that optimizes according to MLP optimization criteria with the highest level of accuracy and reliability [12, 13]. Iraqi universities can prepare a huge data set similar to the data set that was used in this research and include all regions of Iraq and all age groups and work on it and improve it to predict the future increase of students and predict the result. The flow chart in Fig. 2. shows the sequential work of the research.

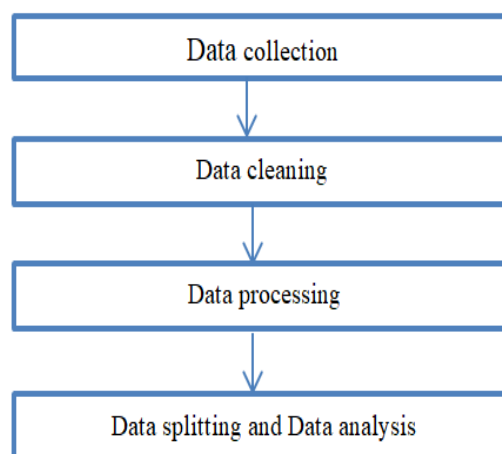


Figure 2. Sequential work

Data Collection

Real-time data collection is the first step in developing this system. So, the data should be It is collected very carefully. We selected open-source data and applied an algorithm to it.

Data Processing

Cutting and fragmenting the data and arranging it well, and making sure that all data is written in a consistent manner.

Students Adaptability Level Online Education (Data Set)

Collecting data from the city and the rural community to create a model to see if students can use technology to study in universities, colleges, public and private schools, and the data was cleaned and redundant was deleted.

Register 1205 Instances and Use 12 attributes with the class binary classification (successful, failed) Student dataset Table 1.

1. Attribute Education Level {University,College,School}.
2. Attribute Institution Type {Private,Public}.
3. Attribute Gender {Female,Male}.
4. Attribute Age numeric.
5. Attribute Device {Mobile,Computer,Tab}.
6. Attribute Location {Town,Rural}.
7. Attribute Financial Condition {Mid,Poor,Rich}.
8. Attribute Internet Type {Wifi,Mobile Data}.
9. Attribute Network Type {4G,3G,2G}.
10. Attribute Flexibility Level {Moderate,Low,High}.
11. Attribute IT Student {Yes,No}.
12. Class binary classification {successful, failed}.

Table 1. Student dataset.

Education Level	Institution Type	Gender	Age	Device	Location	Financial Condition	Internet Type	Network Type	Flexibility Level	IT Student	The result
University	Private	Male	23	Tab	Town	Mid	Wifi	4G	Moderate	Yes	Successful
University	Private	Female	23	Mobile	Town	Mid	Mobile Data	4G	Moderate	Yes	Successful
College	Public	Female	18	Mobile	Town	Mid	Wifi	4G	Moderate	Yes	Successful
School	Private	Female	11	Mobile	Town	Mid	Mobile Data	4G	Moderate	No	Successful
School	Private	Female	18	Mobile	Town	Poor	Mobile Data	3G	Low	No	Failed
School	Private	Male	11	Mobile	Town	Poor	Mobile Data	3G	Low	No	Successful
School	Private	Male	11	Mobile	Town	Mid	Wifi	4G	Low	No	Successful

RESULTS

The data set shows that most of those over the age of 18, who number 736, are better at using technology than those under the age of 18, who number 469. through the data set. Everyone gets low on resilience traits and is not good at using technology as a result of failure as shown in Fig. 3.

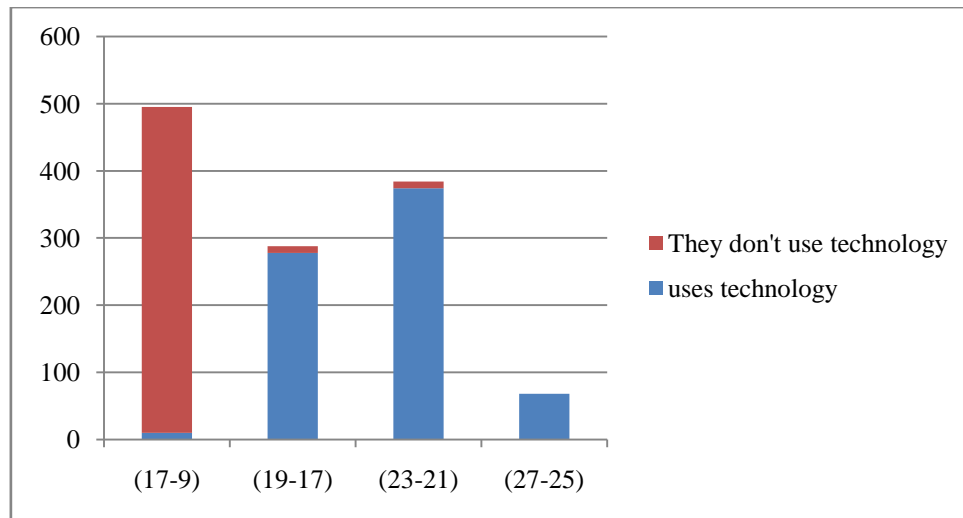


Figure 3. The relationship between age and technology use

Calculating the standard deviation = $9 + 27 + 17.066/2$
 $\sqrt{26.533} = 5.83$ Table 2.

Table 2. Standard deviation

Statistic	Value
Minimum	9
Maximum	27
Mean	17.066
stdDev	5.83

As a result of the data set, everyone who is not proficient in using technology and has a low level of flexibility got a failure result Table 3.

Table 3. Label (The result)

No.	Label (The result)	Count	Weight
1	Successful	1081	1081
2	Failed	124	124
		1205 Instances	1205

Data Analysis

Testing and improving models and types in machine learning is very important. Depending on the problem, different metrics are used to find out and evaluate the effectiveness of the model most of the time.

Accurate: The basic criterion for the accuracy of data classification. It correctly describes the proportion of predictions made by the model being evaluated.

It's important to know that we want great accuracy in the model, because the ratio is a percentage. Classification is binary if there are only two categories to choose from. We can call this measure "binary accuracy," and most of the time we create a "good" and "bad" category. Categories of results known as True Positive can be seen. A sample from the True Positive category is identified as a (TP). This sample may be incorrectly classified as negative and constitutes a false negative (FN). A true negative (TN) is a sample that is correctly identified as a negative, while a false positive (FP) is a sample that is incorrectly identified as a positive (FP) [14].

$$\text{Binary Accuracy} = \frac{TP + TN}{TP + TN + FP + FN} \quad (1)$$

- Positive Predictive Value

$$PPV = \frac{TP}{TP + FP} \quad (2)$$

- Negative Predictive Value

$$NPV = \frac{TN}{TN + FN} \tag{3}$$

Data Classification Using Machine Learning

One field of artificial intelligence (AI) is machine learning (ML), and computers have developed how to learn and solve problems automatically through machine learning.

It plays a big and important role in our daily life through a wide and large range of applications, such as speech recognition systems and applications, smart assistants, car driving, face and image recognition, etc. So, it has come to be understood that students need to be ready to thrive in the future with AI/Machine Learning already in the university [15].

Using the Naive Bayes Classifier Algorithm On the data set where 70% of the data was used as training and 30% as test and cross validation (5) Figure4Tables4,5,6.

Table 4. Evaluation on test split

Summary		
Correctly Classified Instances	300	83.1025%
Incorrectly Classified Instances	61	16.8975%
Kappa statistic	0.4883	
Mean absolute error	0.1708	
Root mean squared error	0.3409	
Relative absolute error	69.7475%	
Root relative squared error	100.2477%	
Total Number of Instances	361	

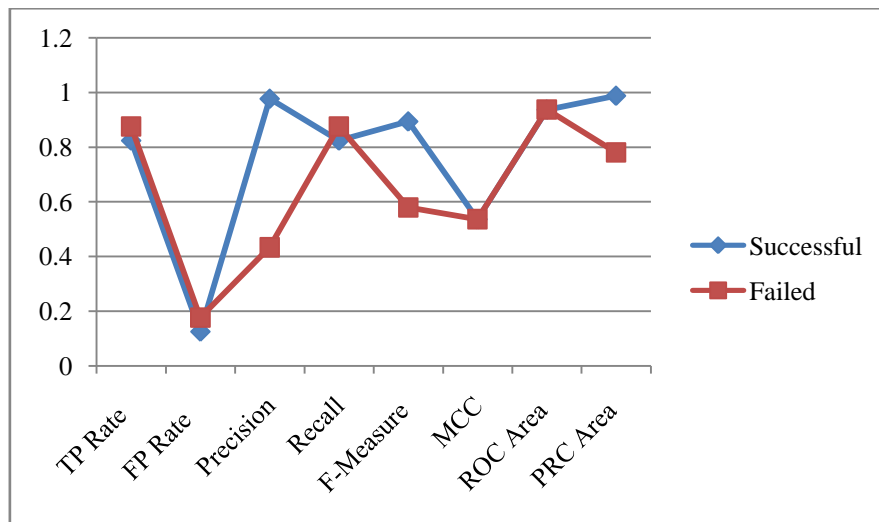


Figure 4.Detailed accuracy by Naive Bayes algorithm

Table 5. Detailed accuracy by Naive Bayes algorithm

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.824	0.125	0.977	0.824	0.894	0.536	0.937	0.988	Successful
	0.875	0.176	0.433	0.875	0.579	0.536	0.937	0.780	Failed
Weighted Avg.	0.831	0.132	0.905	0.831	0.852	0.536	0.937	0.960	

Table 6. Confusion Matrix

A	B	Classified
258	55	A = Successful
6	42	B = Failed

Using the Multilayer Perceptron Neural Network (MLP) Algorithm On the data where 70% of the data was used as training and 30% as test and cross validation (5) Figure 5, Tables 7,8,9.

Table 7. Confusion Matrix

Instances: 1205		
Attributes: 12		
Summary		
Correctly Classified Instances	347	96.1219%
Incorrectly Classified Instances	14	3.8781%
Kappa statistic	0.8318	
Mean absolute error	0.0654	
Root mean squared error	0.2024	
Relative absolute error	26.6999%	
Root relative squared error	59.5118	
Total Number of Instances	361	

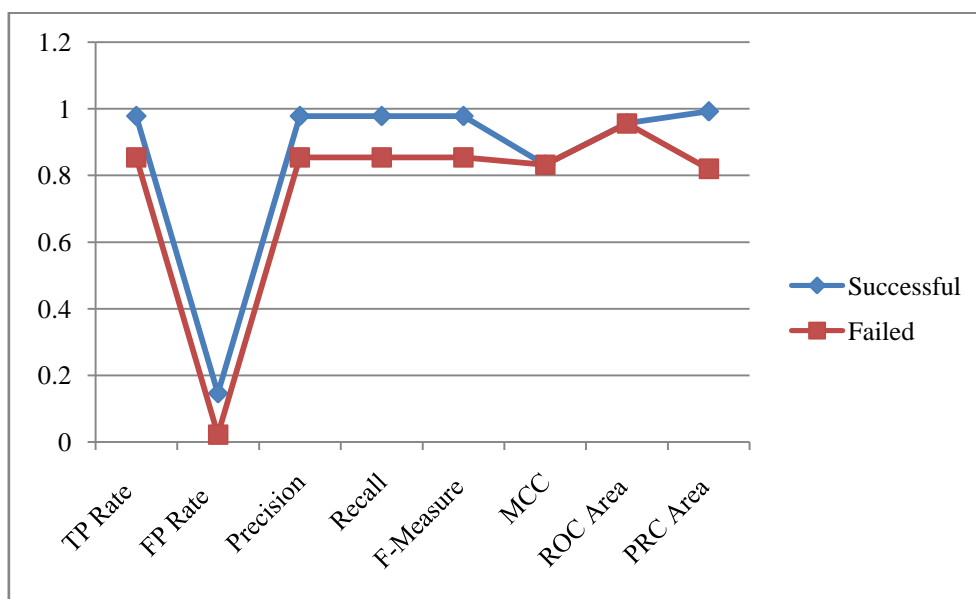


Figure 5. Detailed accuracy (MLP) Algorithm

Table 8. Detailed accuracy by (MLP)

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.978	0.146	0.978	0.978	0.978	0.832	0.956	0.992	Successful
	0.854	0.022	0.854	0.854	0.854	0.832	0.956	0.820	Failed
Weighted Avg.	0.961	0.129	0.961	0.961	0.961	0.832	0.956	0.969	

Table 9. Confusion Matrix

A	B	Classified
306	7	A = Successful
7	41	B = Failed

Results And Performance Comparisons

Results classification the comparison between the two algorithms Naive Bayes, MLP and SVM is shown in the Table 10.

Table 10. Comparison

Parameter	Naive Bayes algorithm	(SVM) Algorithm	Multilayer Perceptron (MLP) Algorithm
Accuracy	83.1025%	85.3942%	96.1219%

Comparison Of Previous Studies

Other search results in the Table 11 compared to current and experimental methods tests, we consider that our proposed system is better than the other model. Therefore, the classification accuracy of MLP Rental models have been improved.

Table 11. Label (The result)

Model of other works	Techniques used	Accuracy	Proposed mode
A. K. Ramotra et al. (2020)[15]	MLP	80.89%	96.1219%
Rana Riad K. 2021[16]	MLP	83%	96.1219%

CONCLUSION AND FUTURE WORKS

Iraqi universities were not ready to move sequentially to e-learning, and the transition to e-learning took place surprisingly, and this was the reason for not applying the e-learning system well during previous periods. Iraqi educational institutions are trying to use technology and computer applications and need a lot of work. And technology is increasing day by day in the world. The modern education system that relies on communication and the rapid development of technology in order to provide a good educational process for students in a new scientific and digital way, in addition to the presence of good advantages for this type of education described in this research, the most important of which is saving time and cost. Despite the development of this system, it is still in its early stages in Iraq, and there are many problems that hinder its progress, despite its adoption by international universities and Arab universities that hold cooperative agreements with the Iraqi government. E-learning has achieved great success at the time of the spread of the Corona virus, as universities in Arab countries have proven it, including Lebanon, Jordan and Egypt achieved success.

At the future, collecting large data, increasing the spread of communication companies and expanding the scope of the Internet and disseminating. Moreover, Training the educational community and build national eLearning platform.

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