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Supporting Adaptive English Learning With Fuzzy Logic-Based Personalized Learning

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ABSTRACT

Serious play for learning has gained popularity in recent years. The research belongs to the opportunity to engage pupils in innovative ways to attract and hold their attention. The purpose of this research is to offer a novel interdisciplinary strategy to identify English language possibilities using complex games that integrates psychological analytic theory, fuzzy reasoning, and neural networks. The study began with a Delphi approach to collect comments from students based on a matrix of the usage of complex games to speak English. A fuzzy logic-based personalized English learning (FLPEL) system is suggested in this article. It creates a fuzzy linguistic identification method that includes four basic input variables (strong points, weak points, possibilities, and risks) recognized through the matrix. It indicates the outcome (studying potentials of the second language) by considering some dynamic input characteristics. The outcomes of the implementation were acquired using the Matlab tool and revealed trustworthy insights and discoveries.

KEYWORDS

Adaptive Learning, English Learning, Fuzzy Logic, Personalized Learning

INTRODUCTION TO PERSONALIZED LEARNING

According to a study undertaken by other researchers, the ability to speak and write in English can be improved through extensive reading. Developing individualized e-learning systems necessitates building comprehensive profiles of the students served by these systems. Players' profiles can be interoperable thanks to Blockchain-enabled AI in digital gaming. There are many blockchain networks where cryptocurrency dealers and investors can conduct transactions using their public addresses.

In the twenty-first era, instruction in the global system has become critical to enhancing life lessons (Papi et al., 2020). Students are increasingly digital residents, learning and understanding information in new ways (Machado et al., 2021). Since infancy, they've been used nowadays, including gaming, writing, and networking sites. They reject conventional teaching tools and become bored in classes rapidly because they spend so much of their time on smartphones. The traditional teaching technique involves having pupils recite and memorize the material of study and what the teacher is teaching in the classroom.(Manogaran et al., 2018; Saravanan et al., 2020). The challenge with the digital age is capturing their interest and engaging them in learning activities.The concept of "networked learning" refers to the practice of exchanging ideas and resources to enhance one another's capacity to learn. A PLN consists of educators who meet online to exchange lesson plans, teaching practices, and words of encouragement. One can locate PLNs on Twitter and other social media platforms or look for communities formed around topics that interest one explicitly. Much digital gaming necessitates a withdrawal of visual and aural memory retention.(Subramani et al., 2021)

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The traditional method of learning English is still in use(Chi et al., 2016). This traditional paradigm ignores pupils who have a wide range of backgrounds, abilities, and needs. That is because everyone's learning needs are unique (Amudha et al., 2018; Shakeel et al., 2020). Indeed, course resources that are inappropriate for learners' features can significantly impact learning results. To accomplish this, academics from several disciplines, especially English teachers, use video games as a dynamic learning aide in the classroom to add a bit of fun to serious topics (Zheng et al., 2021; García et al., 2014).Digital gaming isn't a new fad by any stretch. As long as indoor games have existed, it has only changed their shape. It won't be long before virtual reality, and 3D gaming becomes commonplace, along with many other cutting-edge peripherals for digital gaming.

Furthermore, due to time constraints, teachers were unable to create all types of learning resources that corresponded to the features and capabilities of individual students (Chakraborty et al., 2021). The digital revolution has been actively employed to promote a more efficient teaching method. Adapted teaching methods areintegrated approaches that customize or alter learning based on users' needs (Tao et al., 2021). As a result, the system can give appropriate learning resources based on learning styles and prior knowledge levels.Distressed by their inability to learn something, children with learning difficulties may act out, appear weak or retreat from society. Emotional or behavioral issues, such as ADHD or anxiety, can co-occur with a learning disability. A Blockchainenabled AI for digital gaming (also known as an NFT video game or a crypto video game) incorporates cryptography-based blockchain technologies.

The e-learning model is a complex teaching element that makes education more effective by connecting learners to substances and services over the Internet (Amudha et al., 2021). Effective learning methods are developed among the most hotly debated subjects in education (Gao et al., 2020). The fundamental issue of these teaching methods is that they are static and do not consider the differences between learners in terms of intelligence. As a result, an e platform can be either intelligent or non-intelligent (Abdel-Basset et al., 2021). For pupils, the non-intelligent method gives a static learning approach, and the approach alleviates the restriction of the existing learning strategy (Bhat et al., 2021).

The material of an e-learning program is generated utilizing intelligent technologies depending on the learner permit profile and the instructional technique (Jain et al., 2021). The system determines the student's personality type and providesappropriate course material for the educational experience (Shakeel et al., 2021). Students prefer to consume instructional content in audio, visual., or text. The main goal of this project is to use a smart and adaptable instructional e-learning internet tutor to support both learners and lecturers. The data gathering and grouping model are used in this tutor (Wickerd et al., 2021).

The suggested system intends to provide students with a smart language online class to extract the best learning style and maximize every achievement. It also seeks to group pupils based on active learning and determine every group's most effective learning style.

The primary contributions of this article are as follows:

- To develop a machine learning-based deeper learning, internet smart English education platform.
- To create a gradient boosting decisions tree and a neural network (NN) for students' more efficient exam evaluation method.
- Based on the review of the learners' achievement in the exam, the study results were carried out, and the suggested system does have a greater performance.
- With the advent of Blockchain, digital gaming is shifting from a purely recreational activity to one that can be financially rewarding.

The rest of the article is as follows: Section 2 illustrates the background to the adaptive learning models. The proposed fuzzy logic-based personalized English learning (FLPEL) system is designed and developed in section 3. Section 4 denotes the suggested model's software analysis and performance evaluation, and section 5 discusses the conclusion and future scope.

BACKGROUND TO THE ADAPTIVE LEARNING MODELS

Adaptive training was a training method wherein the information or content adapts and changes to meet users' demands. It also gave pupils individualized education depending on their prior knowledge. An adaptive learning system (ALS)was essential to achieve the requisite learning approach. There are numerous tasks and evaluations and numerous opportunities for practice and detailed feedback from the instructor in an adaptive format that is flexible. Allows teachers to devote more time to targeted skill development for each student. Although other technologies have made the digital gaming experience more enjoyable and immersive, the revolution brought about by Blockchain might be the most profound. (Kazakoff et al., 2018). This system gathered data from users' characteristics, backgrounds, and preferences, among other things. The properties of this data are used to create a prototype system that is used to personalize or adjust. In data gathering, several studies and experiments have been conducted (Grenon et al., 2019). Data gathering methods improved and facilitated understanding andused the advantages offered by e-learning platforms. These strategies were used to locate underperforming academic pupils to improve their grades. E-learning platforms were used during 1980, and various specialists have created their methodologies, which the remainder of this section discusses (Yang et al., 2019).

Later studies demonstrated that the e-learning procedure must be efficient, flexible, adaptable, and intelligent using educational ideas (Kabudi et al., 2021). Smart e-learning systems hadbeen designed to manage every academic program's material., learner models, and systematic instruction, allowing the utilization capacity to be customized and the learning to be simplified. (Vuet al., 2018) presented an artificial teaching method for engaging learners without using generative grammar In most cases, an education grant is a set sum of money given to deserving students enrolled in postsecondary education programs. There is no better location to begin a search for information about educational grants than your local university or college. Decentralization and highly effective encryption methods make it impossible for hackers to access data on a server because of Blockchain.

The technique was designed to inspire students to learn new things by giving them tips that helped them figure out the majority of the solution. The model created a setting where students coulddevelop new challenges to solve (Hubalovsky et al., 2019). The issue author developed a graphical depiction of the issue and the research problem even before total time. The system analyst utilized this explanation to provide a resolution in the graph format that depicts the problem as the optimum solution. (Brezovszky et al. 2019). began the next phase in the technology .It was effective at instructing, but it lacked the expertise of a human educator. They modified the system and introduced the framework, which employed linguistic processing methods to aid learning and combine information with literacy development (Hashim et al., 2020).

The systemwas smart and helped engage systems designed to aid in learning programming. Students were given an online textbook in adaptable and engaging learning content via the suggested system. In addition, (Sobocinski et al., 2020) developed an Auto Tutor that mimicked a normal human instructor's lecturing patterns and pedagogical tactics. The designed system helped students learn how to use the OS, equipment, and the Web for newcomers.

(Fatahi et al., 2019) created a Maths Tutor platform for sixth-graders from three schools. It gave schools and teachers a greater grasp of how information retrieval works and how approaches might help them make better decisions. An adaptable e-Learning method was used, in which a fresh set of challenges appeared every time a learner entered the program (Wu et al., 2020). That was employed since most instructors have limited familiarity with the areas they are instructing and are not well trained.

(Xu et al., 2020) compared conventional teaching techniques with e-Learning-based approaches. An e-Learning platform was used on graduate school adolescents. It was shown that using e-resources allowed learners more appealing and provided them with better comprehension, particularly while learning electrical components and parts and conducting scientific experiments. Furthermore, professors helped students depending on their success, such as through personalized tasks depending on their experience.The traditional teaching technique involves having pupils recite and memorize

the material of study and what the teacher is teaching in the classroom. The rest of the class, aside from those reciting, is quiet and patiently awaits their time. Rather than merely a fun diversion, digital gaming is now poised to become a viable commercial enterprise thanks to the advent of Blockchain.

As demonstrated in the study, scholars employed web-based platforms to ease and enhance classroom instruction by employing data gathering methodologies and technologies. (Xiao et al., 2019)presented an adaptable paradigm for an e-learning environment that utilized. This tool was created to help instructors create suitable teaching material for learners by determining their learning styles. Student-learning style was discovered and developed depending on the participant's data.In addition to its intrinsic importance, motivation is a significant predictor of learning and success. Students that are more eager to learn to remain in class longer, put up the stronger effort, get a deeper understanding of the material., and outperform their peers on tests and assessments. According to certain theories, the interplay between cryptocurrencies and video games will be enhanced by blockchain technology. Several long-standing issues in the gaming industry can be addressed with Blockchainenabled AI for digital gaming.

Visual-Verbal., Sensor, Aggressive, and Sequential-Global students' learning styles (Tekin et al., 2020) outlined. This concept sought to assist learners by tailoring the information to their way of learning. Various researchhasbeen conducted on various elements of adaptive learning systems. For instance, in a Web-based Schooling System with Study Habit Adaption, a teaching aid for artificial intelligence (AI) based disciplines was adapted depending on learning strategy features.E-learning adapts hypermedia scheme style adapted instructional resources to a way of learning. It adopteda multi-dimensional customization parameters system to provide adaptable educational materials depending on students' teaching methods and cognitive types (Hou et al., 2019).

(Islam et al., 2021) proposed the IVEC resource management based on blockchain technology and use edge users (such as automobiles) to verify computations. Our solution to unbalanced load distribution is a secure IVEC Federation model designed to balance loads.

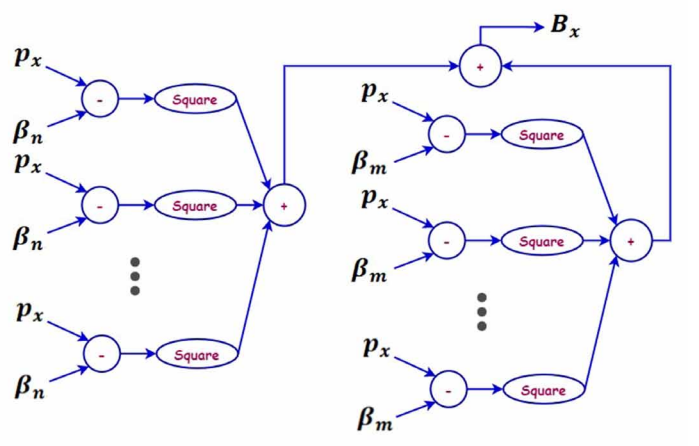
In comparison to the old work, this study used the platform to adjust database topic learning content based on the features of the learner's level of expertise. There were three tiers of learning resources: beginner, medium, and exceptional. These grades had recently been classified into four types: fail, adequate, good, and excellent. A better English teaching system is needed with a simpler computation model.

The Proposed Fuzzy Logic-Based Personalized English Learning System

Advanced data handling equipment is used in deep education and information finding. The FLPEL system with a decision tree classifier is adopted in this research. That not only looks at historical data and discovers apparent parallels, but it also does a high-level inquiry to assess best, anticipate future trends, and far more. Machine learning makes it possible to turn important information, laws, or greater information into a trustworthy resource for retrieving appropriate database collections. Real-time analysis of a student's performance modifies both the teaching methods and the curriculum. An improved education can be achieved by focusing on the student and tailoring instruction to their specific needs. The software assists students in determining which courses they should take. Secure crypto token transactions are possible because of the private key-public key cryptography employed by Blockchain enabled AI for digital gaming systems.

Fig. 1 indicates the design structure of the suggested FLPEL system. It has three blocks that contain browsers, authentication modules, and repository models. It has three modules: user layer, web server, and database server. With the quick expansion of Online driven enterprise, electrical research, and engineering, digital records are employed in colleges. The distinction between good and bad pupils is no longer based on the results of a test. The exceptional findings of assessment techniques performed a critical and essential role during schooling. AI technologies can summarise and evaluate data from a broad range of complicated information, convert data and derive, identify the hidden intellectual norms and linkages relevant to our essay on the overall team condition, and make final decisions easier.

Figure 1.The design structure of the suggested FLPEL system



The utilization of the language evaluation procedure and powerful data companies realize aid to powerful and flexible in the FLPEL platform. There are several educational approaches known as "Flexible Learning," which aim to provide students more freedom, flexibility, and control over their education. Learning can take place in various places, times, and ways depending on the learner's preferences for flexibility. There are more possibilities for career learners to learn on the fly, more alternatives for experiential and community-based learning, as well as a wider range of educational opportunities. The Blockchain enabled AI for digital gaming is constantly adapting new technologies, from big data analytics and AI to AR and VR.

The evaluation findings and their intrinsic linkages are concealed in a range of aspects that is completely investigated, strengthening the critical appraisal skills system, which makes the registration process for the whole evaluation systematic and objective.

Evaluation Process

Every decision tree is taught with the preceding decision tree categorization outcomes. Training the tree structure parallel is challenging, and Equation (1) shows the evaluation process.

$$\hat{S} = S_1 + S_2 + S_3 \tag{1}$$

The S_2 tree learning optimization target is the total of the first S_1 choice tree's result and the residual R-value. The technique's final results (S_3) are the averages of each decision tree's result.It contains two local features commonly used for the iterative method. Another option is to directly optimize the outcome, while the other optimizes the gradient's descending value. It is not the same as classic boosting. If it is sub-optimized, the goal is optimal. Every iteration's enhancer is a preprocessed sample. The resulting value of a split node is the mean price β of the numerous observations p as nodes actual output denoted in Equation (2)

$$\beta = \frac{\sum_{y=0}^{n} p_y}{n} \tag{2}$$

The optimal goal is denoted p_y, and the number of samples is denoted n.

As a result, the node's mistake is denoted Equation (3),

$$E_r = \sum_{x=0}^{n} \left(p_y - v\right)^2 \tag{3}$$

The optimal goal is denoted p_y, and the variance is denoted v. The characteristic with the biggest split profit for divisions must be picked in the operation of nodal division, and the technique for computing the split earning G is denoted in Equation (4)

$$G = B - B_x \tag{4}$$

The average error function is denoted B, and the selected error is denoted B_x. As seen in Equation (5), the variance is denoted thought as an error function, or B_x.

$$B_x = \sum_{x=0}^{n} \left(p_x - \beta_n\right)^2 + \sum_{x=0}^{m} \left(p_x - \beta_m\right)^2 \tag{5}$$

The optimal goal is denoted p_x, and the learning rate for two different layers are denoted $\beta_n \, and \, \beta_m$.

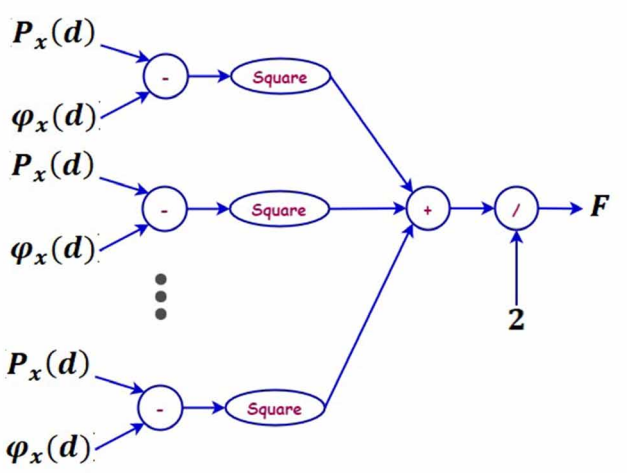
The pictorial representation of B_x is denoted in Fig. 2. The feature function, learning rate, and optimal goal functions are used for the calculation of B_x. As a result, each dividing node issue looks for a parameter that maximizes the divide gain. B and B_x are separated and expanded. The split function is denoted in Equation (6):

$$G = \frac{Su_n^2}{\left|n\right|} + \frac{Su_m^2}{\left|m\right|} - \frac{Su^2}{T} \tag{6}$$

Su^2 signifies the sum of the squared of all values, wherein Su_n^2 and Su_m^2 signify the sum of the squared of all specimens in the subtree, respectively. As a result, just G must be optimized. As previously stated, each tree nodeis broken up, and the purpose of any training branch is to add up the original trees and keep up. This research uses the method to predict student achievement in English-language postsecondary education.

Raw data, preparation, and feature engineering are among the techniques used to process the classification model. The collected data is preprocessing, feature engineering, retraining model, and unlabeled data forecast have all been considered. The model building stages and variable adjustments are a continual refining and implementation process until the desired effect is attained. Teaching and learning science to people who aren't scientists, such as elementary school pupils, college students, or members of the general public, is known as science education. The scientific method, social science, and instructional pedagogy are part of science education's breadth and depth

Figure 2. The pictorial representation of B_x



Classification Algorithm

When a choice is made, the insights obtained are used to choose which test characteristic to use. Whenever a root node and child nodes are ignored at detection rate, the innermost node is derived from the subcategory data, which would be the trial's greatest category data. The true substance is that all qualities are initially identified before the tree-based nodes are created. The data gain characteristic determines which node is chosen. Just one with the greatest gain chosen, the organization and group foundation are constructed. The ground station does not have the same parameter value as the other stations.

Simultaneously, the iterative technique is used to put the sets of any junction point upon each group until just one form of information is secured by all the massive tree leaf nodes. Finally, the preceding stages provide a tree structure out of which different feature event parameters are classified. Measuring and analyzing the dimensions of each character is a simple way to get the gain ratio for each one.

Training and testing B, which comprises the list of data examples and specifies the m class $y = 1,2,\cdots,m$, is used to compute the knowledge volatility. DS_y is a lot of data items. The computed data is denoted in Equation (7)

$$Y\left(b_1,b_2,\cdots,b_m\right) = -\sum_{y=0}^{n} T_y ln_p\left(T_y\right) \tag{7}$$

B expressed as T_y, in which the chance that a randomized dataset corresponds to a DS_y in the test dataset. Assume that property N is the tree's root and that N has n values $\left[n_1,n_2,\cdots,n_n\right]$. The labeled training S is divided into subgroups $\left[s_1,s_2,\cdots,s_n\right]$, each of which is labeled S_x and has a value of N equal to n_x. The number of iterations in S_x that correspond to DS_y is s_{yx}. B, C, and D have been selected as parameter estimations.The computed function is denoted in Equation (8)

$$G\left(N\right) = \sum_{x=0}^{n-1} \frac{s_{1x} + s_{2x} + \cdots + s_{nx}}{S} Y\left(s_1,s_2,\cdots,s_n\right) \tag{8}$$

The labeled training S is divided into subgroups $\left[s_1, s_2, \cdots, s_n\right]$. The subgroup S_x weight is $\frac{s_{1x} + s_{2x} + \cdots + s_{nx}}{S}$, and the data entropy is calculated using Equation (9):

$$Y\left(s_1, s_2, \cdots, s_n\right) = -\sum_{y=0}^{n} T_{yx} ln_2\left(T_{yx}\right) \tag{9}$$

T_{yx} is the chance that a randomized dataset in the subgroup S_x corresponds to class DS_y, and T_{yx} is computed using $\frac{s_{yx}}{S_x}$.Equation (10) expresses the gain ratio of grouping N

$$f\left(N\right) = Y\left(s_1 x, s_{2x}, \cdots, s_{nx}\right) - G\left(N\right) \tag{10}$$

The GINI index $\left(G\left(N\right)\right)$ is computedsimilarly from other characteristics, and the largest value is discovered, using the characters as the root. The labeled training S is divided into subgroups $\left[s_1, s_2, \cdots, s_n\right]$. Split S into subsets, and use the identical method to choose the sub-set testing characteristics of each node, one by one, till no branching ending is feasible.

Neural Network Repository System

The data description does not relate to the platform's dispersed autonomous rule criteria and values. The conceptual modeling system differs from the neural program's skill set and the traditional intelligent systems. The neural platform's repository uses description and built-in mechanisms, and neurons give and retain cutoff and value data and build up the neuronal platform's skill set. Existing knowledge is built primarily through two storing and acquisition procedures: a web-based learning procedure.

The construction of the educational tool should construct a knowledge foundation to provide pupils with information. Adjusting the load of self-adaptive methods and acquiring examples from the expertise technique till the research aim is accomplished is the road to informal learning. After that, the heuristic issues were made public on the Web. There are several nodes along the road of information literacy, each with the appropriate neuron to connect the intake and load. The neuron is dynamically divided through every criterion and linking weight to satisfy the data that must be analyzed. The intrusion prevention perfection (P) is utilized to improve artificial neural settings. As a result, the artificial neural parameterization issue is described in Equations (11) and (12)

$$\max P\left(M\right) \tag{11}$$

$$M = \left(t_{yz}, d_y, \beta_y\right) \tag{12}$$

The perfection function is denoted $P\left(M\right), t_{yz} \geq 0, d_y \geq 0, \beta_y \geq 0$, where t_{yz} denotes the link possibility from the yth neurons to the xth neuron, d_y denotes the direct method's central frequency, and β_y denotes the kernel trick.

The input data, output units, and hidden units are the three primary components of a neuron. The layers are connected by a variable weight α. A multilayer perceptron neural network is made up

of many hidden units. The artificial neural intake is denoted as $q_y\left(d\right)$,, the actual output is denoted as $p_x\left(d\right)$, and the platform's optimum output is denoted as $P_x\left(d\right)$,. The subscripts y x identifies the platform's input nodes, respectively. Equation (13) defines the approximate error measure,

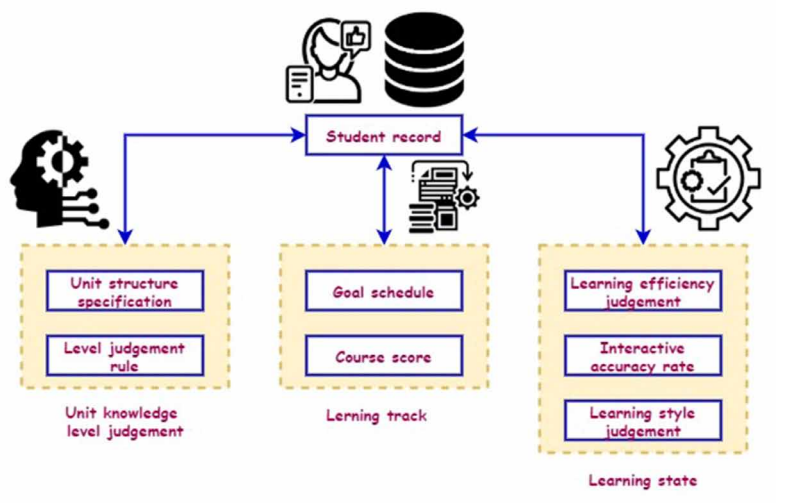
$$F = \frac{1}{2}\sum_{x=0}^{N}\left(P_x\left(d\right) - \varphi_x\left(d\right)\right)^2 \tag{13}$$

The actual outcome is denoted $P_x\left(d\right)$, and the mean value is denoted $\varphi_x\left(d\right)$.

The pictorial representation of F is denoted in Fig. 3. It uses the actual input and means the value of the data. The mean function is denoted in Equation (14)

$$\varphi_x\left(d\right) = g\left(q_y\left(d\right),\ \pm\right) \tag{14}$$

Figure 3. The pictorial representation of F



The values of each protocol stack ($q_y\left(d\right)$) and node service is used to calculate the g functions. The faster grads descending rule is used to learn weights $\pm$, which is described as the different number of weights about the negative slope directional estimation error F, with the specific review described as Equation (15),

$$\lim F = \lim\left(\frac{1}{2}\sum_{x=0}^{N}\sum_{y=0}^{N}\left(P_x\left(d\right) - \varphi_x\left(d\right)\right)^2\right) = 0 \tag{15}$$

As an essential stage in university Language education, the traditional classroom assessment played a prominent part in the assessment of English. The actual outcome is denoted $P_x\left(d\right)$, and the mean value is denoted $\varphi_x\left(d\right)$. It influenced interest in employing neural nets to teach English.

$$G_a = \frac{\sum_{b=0}^{in} G_i + P_s}{X_{mn}} \tag{16}$$

In equation 15, G_a stands for multilayer perceptron neural network, G_i representsinput data, P_s represents parameterization issue, X_{mn} Denotes input nodes of the platform.

This study develops a framework for monitoring English teaching signals and proposes a new assessment method that represents this publication's study and creativity; results demonstrate the relevance and functioning of the evaluation tool in this research.

English Learning Model

The suggested document grouping approach methodology is presented in this section using the proper procedures.

Step 1: In this stage, a folder containing several files of additional attributes is supplied as input for the text grouping procedure. However, the suggested method functions with word documents with endings such as.txt,.doc, and.pdf. When the system receives these folders as input, it reads the data item as text and stores it in a list.

Step 2: Preprocessing the strings reduces the workload on the procedure by ensuring that the information is high quality. All duplicate data is removed due to this procedure, allowing the entire document grouping process to be completed with much less speed and less convolution. As outlined below, there are multiple phases to this procedure.

- Unique Symbol Withdrawal: This technique removes all special characters from the file's text.
- Stopword Removal: The technique of removing the connectives from the document string is known as stop deletion. This technique saves the static data of all possible stopwords in the Written word and afterward rips the combination words using linear analysis of every phrase. The content of the string is never altered as a result of this. For instance, if a Strand is "we enjoyed Diwali," the Stopword elimination method changes the strand to "enjoyed Diwali." Even when the connection words are removed, the statement's meaning is preserved.
- Stemming: Removing the postfix verbs returns the term to its normal form, called stemmed. Strings turn "Enjoy Diwali" when each word is spelled out, and the statement keeps its intended definition. Let's examine the stopword eliminated phrase from the previous phase, i.e., "Enjoyed Diwali," to grasp this better.

Many methods aim to fulfill stemming, such as Port stemming, Stans Stemmer, and others. These techniques require their methodology for word trimming, which is appropriate for all types of textual input. Certain universal stemmed technologies accessible, such as Google stemmer, are more expensive for any network developer. As a result, the suggested system employs the string substitution approach to remove unneeded tenses from phrases. For an effective trimming procedure, a collection of methods for the past tense are applied. Performing these preprocessing steps produces super light linguistic data, which can be used in the article formation phase.

Step 3: This map minimization stage showed the text categorization process by establishing various divisions of the articles. Then, during runtime, each document division is sent to several threads

for simultaneous calculation of the text extracting the features, resulting in semantically grouping in the following phases. This procedure is graphically depicted in the algorithm below.

Step 4: Feature engineering produces more relevant papers in the required format than large data. Short text features must be segregated correctly to group texts in a highly meaningful way.

- The title feature contains the first phase of the papers as the header phrase, as the name implies. These terms are collected by the computer and stored in a List.
- The name of any paper is highly important in interpreting it significantly. And taking this into account adds another feather to the semantic grouping of the articles.

Numerical Data: The quantitative approach in any text is just as significant as the content itself, as integer value is used to determine the article's quality. As a result, including the numeric values characteristic for the clustering algorithm is an excellent way to improve the clustering results. The map retrieves all characteristics of a given document flows of parallelization, and each of these characteristics is linked to the necessary documentation.

The suggested technique extracts all the articles' precompiled strings and groups all keywords into a vector. The program then evaluates each word and transforms it into an integer data format. If a value cannot be converted to the form of a numeric value (Int or Floating) without throwing an exception, this is a clean String; otherwise, it is numerical. If the dependent variable is measured, it is gathered into a vector for more analysis.

Proper Noun: Appropriate nouns in either text data draw instant attention since it is self-evident that they always refer to a live creature or location. As a result, extracting this as a characteristic for clustering algorithm has a major impact on the growth of the grouping in every way.

- For this purpose, the proposed system uses a dictionary of words in MS- Excel format collected over the Internet. This dictionary contains more than 100 thousand words of English language except for the Proper nouns.
- The computer groups all preprocessed phrases into a vector to find the correct noun and then checks each word's appearance in the lexicon. If a term does not appear in a vocabulary, it is regarded as a proper noun; otherwise, it is not.

Term Weight: Also known as top terms, it represents the most endlessly repeated keywords. These top words mean the significance of the phrases, which in turn denotes the value of the entire work. The proposed approach initially checks all text terms for uniqueness before adding them all to vectors. The frequencies for every one of the words from the vector network are then calculated. Each document's top keywords are sorted in decreasing order until the consumer size is reached.

Step 5: After the map flows of parallelization have retrieved all of the characteristics for the given document, every one of these characteristics is linked with the relevant documentation in a list. By calculating the measured, estimated values of the characteristic's ratings with other surviving papers, this list is organized in multiple rows to provide the mean estimated values of the characteristics scores.

This average aggregation value provides a balanced matrix of characteristics and that aids the algorithm in obtaining highly meaningful groups of the input material. This entire procedure is depicted in detail in the method below.

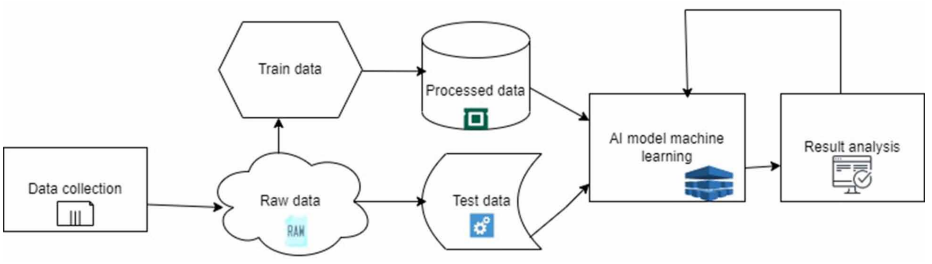
Step 6: Fuzzy Logic is an abstraction classifier that generates crisp, fuzzy values categorization segments. As a result, a cluster is constructed for every text in the row or column depending on the user-defined correctness normalized to fuzzy values regarding the articles scores aligned in every column. The suggested method eventually produces fine-grained semantically groupings for the provided input sentences.

Adaptive Learning System

The FLPEL method is designed to answer cognitive (knowledge) issues based on the students' abilities. Every user who plays by the rules to study English gets distinct educational materials based on their competence level. It designed an appropriate learning program based on the students' learning levels to reach this aim.

The adaptive learning model of the suggested FLPEL system is denoted in Fig. 4. It uses unit knowledge level judgment, learning track, learning state, and student record. To begin, the user must first login with the service. To determine the levels of proficiency, the user completes a pretest. Learning categories (primary level, medium, and expert) are given depending on the pretest. The appropriate learning component tailors the Teaching English resources based on the level. Lastly, the student should complete a post-test after a longer timeframe for the success of the education process.

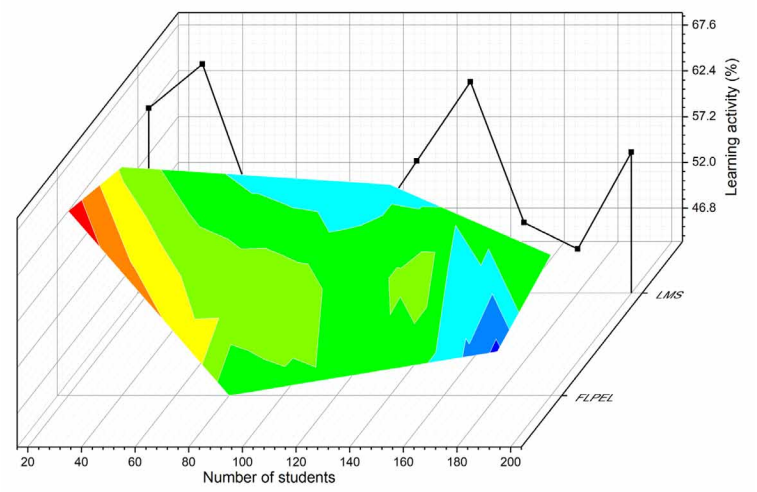
Figure 4. The Adaptive learning model of the suggested FLPEL system



As previously said, the process starts with the login procedure. If the user has never participated in a group meeting, they must open an account. Instead, the user inputs the Login details directly. The procedure then continues with a knowledge test. If the user has already been tested, specialized learning resources, such as language, literature, hearing, grammatical., and quizzes, are offered based on their English proficiency. Instead, a pretest is required to establish the user's starting competency level.

Data Collection: Images, words, and voice are examples of non-structured data gathered at this level. Preparation for AI development begins here shown in fig. 5, with the extraction of appropriate data for AI use.

Figure 5. Blockchain enabled AI



Preprocessing: Filling in or eliminating missing data values, selecting or deleting data properties, and combining existing data properties are all examples of data preprocessing in this step of the machine learning model's creation.

Data Analysis: Analyze data to be used in AI, including conventional data patterns, data mapping, data extraction based on exploration and inference, and data learning using some of the data.

There is some noise, inconsistency, and repetition in the raw data that is collected during data gathering, making it unsuitable for use in AI algorithms

The participants receive a post-test after the active learning to assess the efficiency of the FLPEL model. The post-test competence level is established in the same way as the pretest. After post-test, the algorithm detects that the user goes from basic to medium and intermediate to beyond. In this way, the suggested FLPEL system is designed with fuzzy logic and machine learning models.

Software Analysis and Evaluation

The study team attended five Jordanian classrooms to execute the strategy and gather information from students for this study. A total of 350 kids from both sexes are among the competitors. They are the same age. This data was coded into the Rapidminier as an experimental dataset and then separated into learning sets via cross-validation. Studies on windows-based java computers are carried out to assess the findings and describe the suggested system. The system's productivity is assessed using a Core i7 CPU with 8GB of RAM and papers in various text forms such as pdf, txt, and doc/docx folders as the source.

Figures 6 and 7 show the learning activity level and interaction level analysis of the suggested FLPEL system, respectively. The number of students for the simulation analysis is varied from 20 to a maximum of 200 with a step size. The simulation analysis of the suggested FLPEL system is analyzed in terms of learning activity level and interaction level, and the outcomes of the suggested FLPEL system are compared with the existing least mean squared (LMS) system. The suggested FLPEL system with fuzzy logic and machine learning improves simulation outcomes.

Figure 6. Learning activity analysis of the suggested FLPEL system

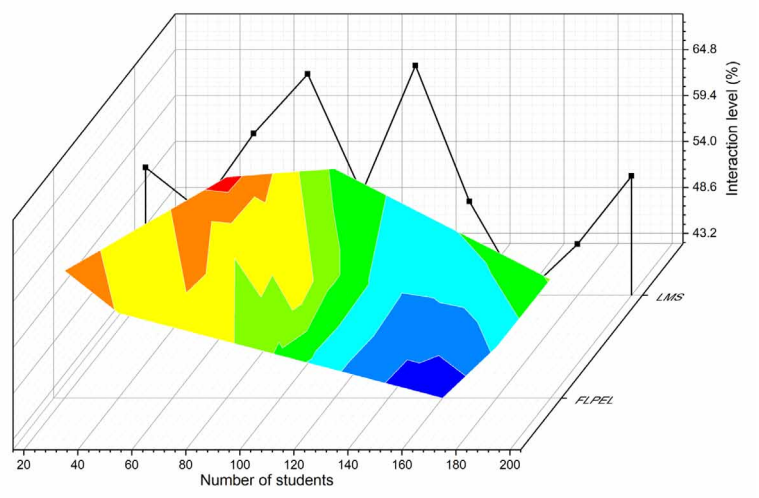


Table 1 shows the learning activity analysis of the suggested FLPEL system. The simulation outcomes, such as learning activity analysis of the suggested FLPEL system and existing LMS system, are monitored continuously. The simulation outcomes of the suggested FLPEL system are evaluated

Figure 7. Interaction level analysis of the suggested FLPEL system

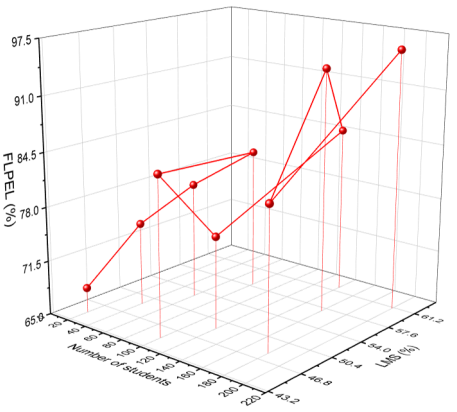


Table 1. Learning activity analysis of the suggested FLPEL system

Number of students	LMS (%)	FLPEL (%)
20	64	68
40	69	79
60	52	75
80	43	84
100	49	73
120	58	89
140	67	85
160	51	71
180	48	94
200	59	82

by varying the number of students from a lower count to a maximum count. As the number of student count increases, the respective learning rate of the student also increases. The machine learning and fuzzy logic model help to produce faster results with maximum accuracy.

Figures 8 and 9 show the resource utilization and quality of interaction analysis of the suggested FLPEL system, respectively. The simulation outcomes of the suggested FLPEL system are evaluated and continuously monitored. The resource utilization and quality of interaction of the suggested FLPEL system and existing LMS system are analyzed. As the student count increases, the suggested FLPEL system with fuzzy logic and machine learning helps achieve higher outcomes than the existing models. Depending on the system and the amount of data, the query can take 20 to 500 milliseconds (or even longer). The database's or database server's performance has a considerable impact on the rate of change. Create and use indexes to speed up the retrieval of transactions from databases. One can create indexes on the database side, where queries are run.

Table 2 indicates the quality of interaction analysis of the suggested FLPEL system. The suggested FLPEL system with fuzzy logic simplifies the computation functions. The machine learning model helps the suggested FLPEL system produces simulation results with higher accuracy. As the number of students increases, the suggested FLPEL system exhibits higher outcomes than the existing LMS

Figure 8. Resource utilization analysis of the suggested FLPEL system

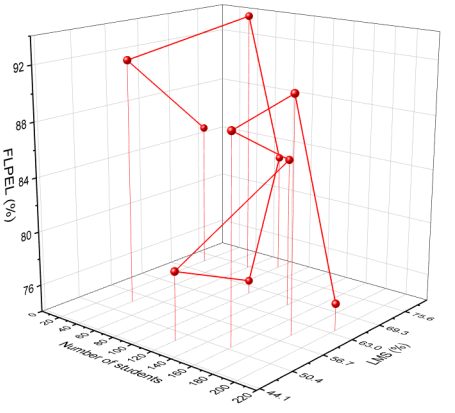


Figure 9. Quality of interaction analysis of the suggested FLPEL system

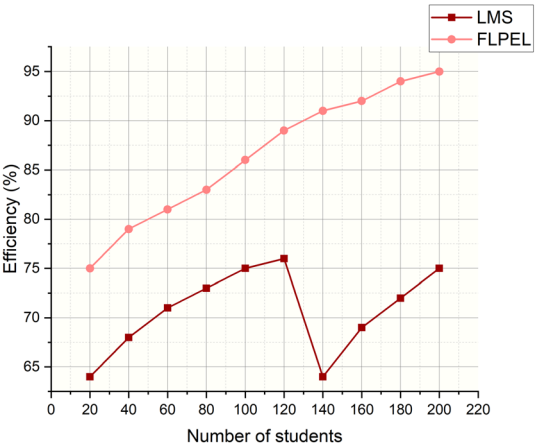


Table 2. Quality of interaction analysis of the suggested FLPEL system

Number of students	LMS (%)	FLPEL (%)
20	73	85
40	54	92
60	75	94
80	78	83
100	67	75
120	48	79
140	67	85
160	51	89
180	59	91
200	64	76

model. The higher quality of interaction leads to a better clarification of the English language, and students get more knowledge with the help of the machine learning model.

Figures 10 and 11 show the efficiency and accuracy analysis of the suggested FLPEL system, respectively. The simulation is carried out by considering the given dataset and simulation environment. The simulation outcomes in terms of efficiency and accuracy of the suggested FLPEL system and existing LMS model are continuously monitored and plotted. The simulation outcomes show that the suggested FLPEL system has higher outcomes than the existing LMS model with the help of machine learning and fuzzy logic computation models.

Table 3 shows the performance of student performance of the suggested FLPEL system. The proposed FLPEL system's simulation results are reviewed and continually tracked. Fuzzy logic is incorporated into the FLPEL system, which reduces the complexity of computations. FLPEL's simulation results will be more accurate due to the machine learning model.

The suggested FLPEL system is designed, analyzed, and evaluated in this section. The simulation analysis considers the given dataset and varies the number of students from a minimum to a maximum level. The simulation findings show that the effectiveness of the suggested FLPEL system than the existing LMS model.

Figure 10. Efficiency analysis of the suggested FLPEL system

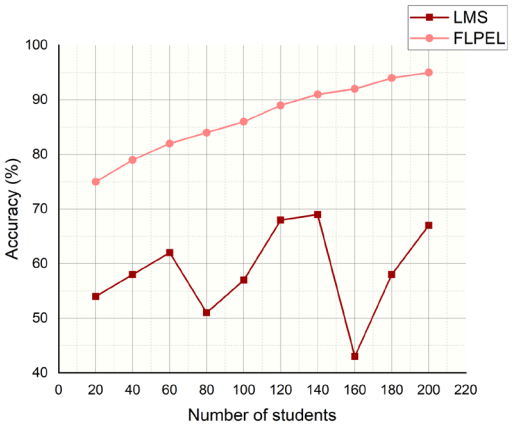


Figure 11. Accuracy analysis of the suggested FLPEL system

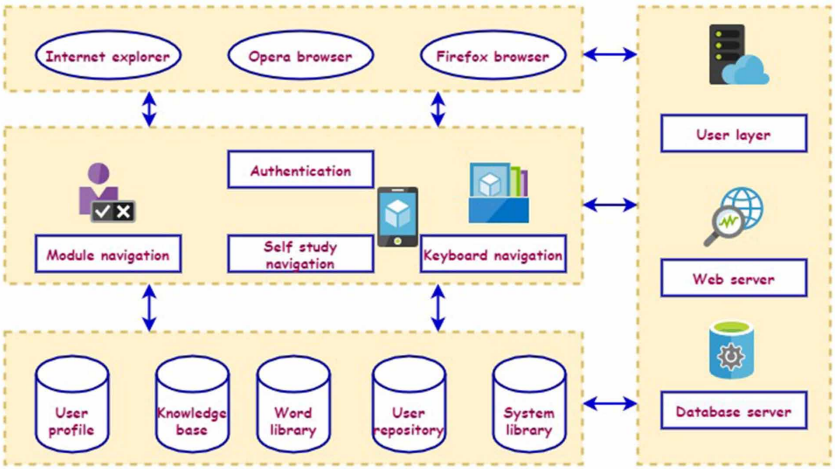


Table 3. Performance of student performance of the suggested FLPEL system

No of students	LMS	FLPEL
10	67	74
20	69	78
30	72	81
40	74	83
50	76	86
60	79	87
70	81	90
80	84	92
90	86	94
100	89	95

CONCLUSION AND FUTURE SCOPE

Serious play infiltrates daily lives and gains a foothold in educational institutions. Academic research has previously established that elements like involvement, desire, study habits, and customization are crucial in the case of real instructional games. There are two types of educational games: those that are deliberately intended to teach a lesson or those that teach something else in the process of playing. Playing games involves interacting with others and teaching skills such as goal-setting, following rules, adapting to new situations, and solving problems. Digital currency and assets can be exchanged for real money due to blockchain technology as the foundation of these virtual., in-game resources. They have received a wide range of reactions because of differing ideas regarding their effectiveness as a study aid, from critique to praise. It uncovered a collection of components that is necessary for the successful usage of real games in the case of language acquisition through data gathering. Identified criteria influence the efficiency of real games favorably or negatively. The goal of this study is an interdisciplinary approach to discovering English language possibilities using complicated games that incorporate psychological analytic theory, fuzzy reasoning, and neural networks.

A fuzzy logic-based personalized English learning (FLPEL) system is suggested in this article. It would be beneficial to determine the practicality of real games for second language learning. An experienced network that can accurately forecast the total effect of integrated factors is required to accomplish this. As a result, the suggested possibilities identification method would examine the smallest to biggest variances in advantages, flaws, chances, and dangers while analyzing the influence of real games on vocabulary development. The Fuzzy Logic and Neural Networks technique proved extremely successful and functional under various rules and situations. An investigation into this method's potential use in group English learning is needed before it can be put into practice. Combining Blockchain with other technologies that enhance the gaming experience, one could witness a shift in the way we view video games, which is more helpful, profitable, and long-lasting for all parties involved.

The benefit of a hybrid system is that the time-changing reward is concentrated on the changing inputs discovered in the assessment. Furthermore, as per the microscopic perspective modeling approach, this concept suggests a special relationship between English learning and serious gaming. More research is required to develop this technique at the modeling stage when English learning might be allocated to groups rather than individual learners. Using dynamic and relevant contexts and resources in the environment, adaptive learning systems engage students. Students can keep track of their development in these environments, which helps them become more self-trust-based the process of learning.

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