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The Optimization and Three-Dimensional Survey of the Reform Path of English Education System in Higher Vocational Colleges Driven by Information Technology in the New Era

***Abstract:* -** Artificial intelligence (AI) technology has advanced quickly along with the growth of mobile information, altering every aspect of our lives. Meanwhile, the concept of smart education gained popularity, but there hasn't been a thorough debate on how to go towards smart classrooms combined with artificial intelligence. This article focuses on use of AI in college English smart classrooms in order to support intelligent evolution of education. This research propose novel technique in classroom designing based on English teaching model using machine learning model. Input is collected as classroom design data and processed for noise removal and normalization. This input features are extracted and classified using active contour fuzzy model with recurrent Gaussian perceptron neural networks (ACF_RGPNN). The experimental analysis for classroom design analysis is carried out in terms of prediction prediction Accuracy, precision, NSE, AUC, recall. With an average score that was 2.8 points higher than control class's, overall level of English was likewise superior. The proposed method achieved prediction accuracy, precision, recall, and NSE of 96%, 85%, 66%, and 52% respectively.

Keywords: classroom designing, English teaching, machine learning model, fuzzy model, recurrent Gaussian.

1. Introduction:

Public foundational courses in higher education in China are in English. Effectiveness of college English instruction as well as student learning outcomes directly influence other teaching activities [1]. College teaching reform has begun. English classes have been offered for a long time, but college English instruction based on conventional teaching techniques has had difficulties with student engagement and learning outcomes. It advances the fundamental restructuring of education and teaching practises and offers fresh approaches and resources [2]. College English classroom education and teaching can be thoroughly integrated with artificial intelligence technology to generate smart and effective classroom teaching, better cultivating students' ideological qualities and positive value orientation. Smart classroom instruction using smart technology is made possible by artificial intelligence [3]. Rapid expansion of the economy as well as advancement of science and technology are both related to the development of English skills in collegiate English smart classroom based on AI. Rigorousness of college English teaching models makes it more difficult to develop students' versatile language skills, which are essential for navigating globalisation as well as economic integration. Accordingly, training's substance, shape, strategy, and design will undergo crucial adjustments. It has long been a topic of research interest to combine media innovation with foreign language instruction, and it continues to be so in the context of 21st century foreign language education due to the profound interplay between current data innovation and innovation. The Chinese Ministry of Education released "School English Course Requirements (Trial)," "School English Course Requirements," and "School English Curriculum Requirements" in 2004, 2007, and 2020, respectively. These documents clearly expressed the PC-based media [4]. A freshly developed English programme called English displaying mode will help Chinese undergraduates reach the required level for educational plan. Students can attain higher levels of originality in their academic achievement as long as they are encouraged to utilise computer to its fullest in speaking as well as listening duties. To help pupils improve their general language skills, teachers can use computers to successfully teach reading, writing, and translation. Multimedia teaching has become more common in educational settings as a result of development of information technology as well as offers considerable efficiency advantages. The effectiveness of a teaching resource library in community nursing multimedia instruction may be maximised in terms of student engagement in learning. By including YouTube in reading courses, reading comprehension as well as vocabulary retention were increased [5]. Students can also benefit from utilisation of AI and cutting-edge educational technologies to master the essential and difficult facets of English language and literature. With the aid of contemporary technology, teachers can employ a variety of multimedia formats, including video, audio, and graphics, to vividly and engagingly impart complicated cultural and historical knowledge. Teachers can give students an engaging as well as participatory learning environment that promotes exploration as well as establishes a firm foundation of topic knowledge by integrating AI and smart classroom technologies into classroom instruction [6].

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2. Related works:

The steady introduction of augmented reality into daily life in recent years has raised a great deal of anxiety. Mobile-based AR has been used in a variety of industries as a result of smart phones' increasing ability to operate in augmented reality and the affordability of augmented reality technology. Since AR's inception, many academics and educators have paid close attention to this new technology, particularly as it continues to be applied in the classroom [7]. Because of its rich visual presentations and varied user engagement, augmented reality offers a lot of promise for educational activities, and teachers have shown interest in and readiness to employ augmented reality. Evidence suggests that AR can assist inquiry activities and improve students' conceptual knowledge and practical abilities [8]. By incorporating AR into learning activities, primary school pupils would perform better in the areas of motivation, confidence, and associated dimensions [9]. Thus, AR has been viewed as a ground-breaking approach to several instructional challenges, such as the teaching of abstract concepts[10].In many aspects of daily life and the management phase, including scientific research organisations, businesses, governments, banks, and records, a sizable amount of data has been saved in information systems [11]. In full contrast, the capacity for data processing and analysis is severely limited. The rapidly expanding Internet has intensified the history of knowledge failure and data explosion. Work [12] implemented an improved algorithm (IA) that thoroughly examines the current framework for oral language education online and its accompanying protocols in order to provide a framework for an online oral language learning system that is fully structured and functional. An increasing number of employees are using computer network teaching system (CNTS)[13] to reform as well as enhance educational impact of teaching techniques. In this instance, computer network supplemental teaching methods for English are provided. English teaching shares many conservative traits with other academic fields, which could lead to emergence of strong theory, light practise, and phenomenal theory. These traits include a lack of time for teachers to connect with students, a single oral learning environment in English teaching, and the learning process. Data questionnaires from thirty respondents were processed using multivariate statistical analysis [14]. Through his research, he discovered that two crucial emotional variables, namely interest and benefit, must be taken into account while creating user interface of a mobile parent data method [15]. In addition to offering an overview of blockchain and next generation of AI[16], Polina also suggests creative ways to speed up the study of teaching models. Monitoring mistakes could occur [17]. Through courses that adhere to local wisdom, Myeongae is able to understand students' platform development scores [18]. In his study, he employed 30 participants in a small field experiment and 10 participants in a group experiment. His study's findings demonstrate that applying the local intelligence module for learning has improved academic performance [19,20].

3. System model:

In Figure 1, a teaching model is displayed. Most relevant content is chosen as well as distributed to students or teachers based on their individual learning needs and aptitudes. Additionally, evaluation and comments are given to students based on a continuous analysis of their classroom performance. This helps students have a consistent and stable impact on their learning progress. The system's learning results can be continuously analysed and provided to teachers and students using artificial intelligence technologies.

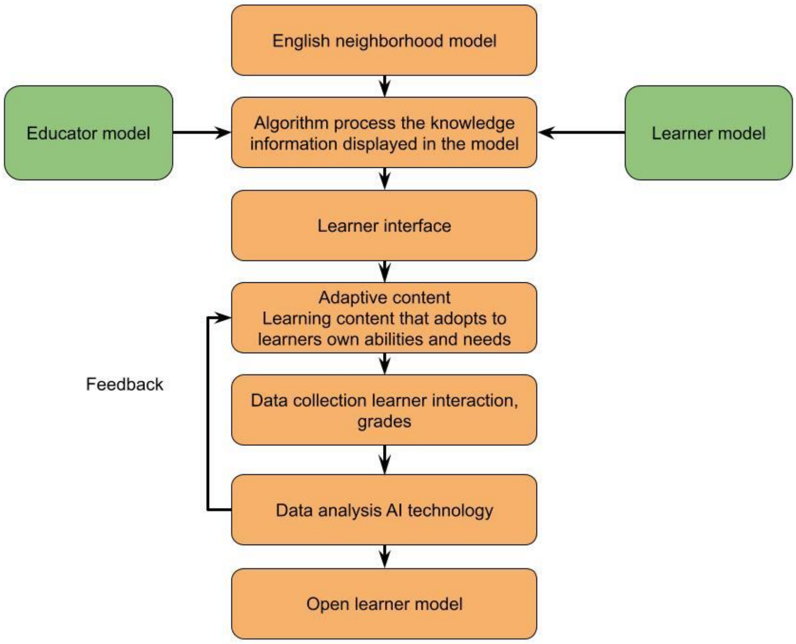

Figure 1: Artificial intelligence based proposed teaching model

A human-centered endeavour, teaching languages places a strong focus on ecological consciousness. English education must follow the rule of second language acquisition as well as coordinate interaction between teachers as well as students with teaching environment in order to maintain a dynamic as well as balanced relationship for its healthy development. With the aid of AI, a transparent, all-encompassing, and long-lasting virtuous language learning ecology can be created, enabling teachers as well as students to interact as well as work together on a smart platform while also enabling students to generate knowledge and skills in a dynamic way and perceive and internalise them during interactive experiences. Although the advanced technology helps us imagine how college English instruction can develop in the future, more research and investigation needs to be done on how to make this vision a reality.

Active contour fuzzy model with recurrent Gaussian perceptron neural networks

The primary stage seeks to clean up the image's noise. Here, the grayscale conversion of input leaf image is done. Filtering technique is used to clean image of noise. Image is filtered during this stage of pre-processing to reduce noise. The suggested model in this case employs complicated Gaussian filtering.

A class of convolutional filters known as "Gaussian filters" choose its weights based on characteristics of a Gaussian function. A extremely effective filter for eliminating noise derived from a normal distribution is Gaussian smoothing filter. One-dimensional zero-mean Gaussian function is given by eqn (1)

$$g(x) = e^{-\frac{x^2}{2\sigma^2}} \quad (1)$$

An isotropic Gaussian in three dimensions has the shape by eqn (2)

$$G(x, y, z) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2+z^2}{2\sigma^2}} \quad (2)$$

The Gaussian filtering technique uses convolution to accomplish its objective of using this distribution as a "point-spread" function. We can now terminate the convolution kernel because, in practise, the Gaussian distribution is effectively zero beyond three standard deviations from mean. Theoretically, a convolution kernel that is infinitely huge is required since Gaussian distribution is non-zero everywhere. an adequate integer-valued convolution kernel with 1.0 Gaussian approximation. Gaussian value at centre of a pixel in mask might be used, however doing so would be wrong because the Gaussian value varies nonlinearly all over the pixel. The value of the Gaussian has been integrated throughout the entire pixel by adding it in steps of 0.001. Array was rescaled so that corners have value 1, but integrals are not integers. 273 represents total of all the values in the mask.

It was filtered utilizing Gaussian Blur built-in function from ImageJ after noise was added using Add noise built-in function. "Gaussian Blur" results from the convolution of an image's pixels and a kernel that can be characterised by a Gaussian function. In discrete example, convolution is given by eqn (3,4)

$$\mathrm{f} * \mathrm{g}[\mathrm{n}] \stackrel{\text{def}}{=} \sum_{m=-\infty}^{\infty} \mathrm{f}[\mathrm{m}] \cdot \mathrm{g}[\mathrm{n}-\mathrm{m}] \quad (3)$$

$$f(x, y) = A \cdot e^{-\left(\frac{(x-x_0)^2}{2\sigma x^2} + \frac{(x-y_0)^2}{2\sigma y^2}\right)} \quad (4)$$

By using this filtering technique, image data will be improved by reducing background noise and distortions as well as background noise. For processing and analysis, it improves image features. The RGB-formatted photos are scaled down to conventional dimensions. Active Level Set Contours by eqn (5)

$$\begin{cases} \frac{\partial \phi}{\partial t} = |\nabla \phi| \operatorname{div}\left(\frac{\nabla \phi}{|\nabla \phi}\right) \\ \phi(x, y, 0) = \phi_0(x, y) \end{cases} \quad (5)$$

where φ(x, y, 0) is initial level set. First, it is suggested that ACMs, often known as snakes, evolve the contours by finding a solution to an energy minimization issue. Region-based Chan-Vese method is one of many ACMs that have been created over the last few decades to enhance the performance of image segmentation. Chan-Vese model's energy functional is written as eqn (6)

$$\begin{aligned} F(c_1, c_2, C) = \mu \cdot \text{Length } (C) + \nu \cdot \text{Area (inside } (C)) \\ +\lambda_1 \int_{\text{inside } (C)} |u_0(x, y) - c_1|^2 dxdy \\ +\lambda_2 \int_{\text{outside } (C)} |u_0(x, y) - c_2|^2 dxdy \end{aligned} \quad (6)$$

According to their paradigm, the picture I(x, y) of interest consists of two zones with different intensities. Smoothed Heaviside function is interior of C by eqn (7)

$$H_e(\phi) = \frac{1}{2} + \frac{1}{\pi} \arctan\left(\frac{\phi}{\epsilon}\right) \quad (7)$$

And1-H depicts its outside. Smoothed Dirac delta function is the derivative by eqn (8)

$$\delta_e(\phi) = \frac{\partial H_e(\phi)}{\partial \phi} = \frac{1}{\pi} \frac{\epsilon}{\epsilon^2 + \phi^2} \quad (8)$$

Written as, the energy functional connected to C is by eqn (9)

$$E(\phi(x,y,t)) = \int_{\Omega} \mu\delta_e(\phi(x,y,t))|\nabla\phi(x,y,t)| + \nu H_e(\phi(x,y,t))dxdy + \int_{\Omega} \lambda_1(x,y)(I(x,y)-m_1)^2 H_\varepsilon(\phi(x,y,t))dxdy + \int_{\Omega} \lambda_2(x,y)(I(x,y)-m_2)^2(1-H_e(\phi(x,y,t)))dxdy \quad (9)$$

Finite difference discretized Euler-Lagrange PDE for (x, y, t) is numerically time-integrated within a small band around C to evolve ACM given an initial distance map (x, y, 0) and specification mappings 1(x, y) and 2(x, y). Based on probability theory, the image improvement has been achieved for the purpose of acquiring precise grey levels that are uniform and smooth and that are changed by the histogram for grey level pixel mapping using contrast adaptive histogram equalisation. If a pixel's density of probability and grey level value for a new image are r (0r1) and p(r), respectively, and a pixel's density of probability and grey level value for an improved image are s (0s1) and p(s), respectively, where their operation of mapping is denoted by s=T(r), then. According to notion of physics histogram, every bar for an equalised histogram has a same elevation. We will therefore modify RNN operations in the context of graph processes to take the graph structure into account. There are various benefits to making the hidden state zt a graph signal. The value of this signal is first made more interpretable in relation to the underlying graph support. As an illustration, we may examine the concealed state's frequency content and contrast it with the frequency content of the graph process xt. Second, it enables computation of zt to be fully local, requiring just repeated exchanges with each node's one-hop neighbours. However, turning zt into a graph signal also implies that we are no longer able to adjust the concealed state's size, which is now set at N. Given that it affects the HMM's capacity for description, the size of the hidden state is a key hyperparameter in the design of RNNs. This can be avoided by using graph signal tensors, where each node is given a vector of features as opposed to a single scalar. A descriptor u has been used with the probability distribution function (x), and (x, u) may be a Gaussian distribution as well as having mean and variance. Distribution function (x, u) under Bernoulli distribution is formalised as eqn (10)

$$(x,u) = \prod ul\ xl\ L\ l{=}1\ (1-ul)\ (1-)\ . \quad (10)$$

[x1m,, xNm] refers to operation assignment of 1 N to CAP m in order to lessen the recurrence of the created instances. Consider G stands for a group of selected block indices used in sampling, while T is a distinct set used to save the instances in order to satisfy the constraints for all iterations. When the assumed cardinality of |G| equals that of M, a suitable sample is created. In T, valuable samples are obtained, sampling is carried out in accordance with T's cardinality, and the outcome is S. It demonstrates that minimum (q, p) is less closer (x) and (x) are. Results show that equation (11).

$$\min H(q,p) = \max \sum q(x) \ln\ p(x) = \max \frac{1}{S} \sum \ln\ p(x,u), \quad (11)$$

where S stands for a set's cardinality and q(x) = 1 S. In a collection of samples, the probability of an autonomous result is 1/S. Based on issues in (10), objective is utilized to identify best optimal indicator u for decreasing (q, p). Prospective sample for adaptive sampling is determined. Perceptron would be modified to match a training dataset for supervised linear classification tasks. The classification of fresh, unidentified samples is then possible using this modified hyperplane. To do this, the training dataset is applied using the hyperplane while the error function is minimised. The learning rule that was applied to choose the value for updating the weights at each increment is shown in Equation (12).

$$\Delta \boldsymbol{w}_i = \eta \left(\text{true}_j - \text{pred}_j \right) x_i^j \quad (12)$$

4. Performance analysis:

Following the data analysis in this stage, we extracted our findings and used Python to visualise them so that we could assess the relevant information and patterns in student grade performance across different courses. Data visualisation enables the discovery of all the features and insightful information from the student dataset, assisting instructors in improving student academic performance for better decision-making in the future. Additionally, we compare every result of our proposed model in a more effective graphical manner in order to better grasp the results of the data.

Dataset description:

Data set used in this study was obtained from an experience API (xAPI) learner activity tracker application [25]. The xAPI offers learning and training architecture (TLA) that makes it easier to assess learning progress and keep tabs on learners' activities including writing essays, watching videos, and reading articles, among other things. Dataset has 16 attributes and 480 student records. These characteristics are divided into 3 categories: (1) Characteristics of a demographic nature, such as nationality and gender. (2) Characteristics that are academic in nature, such as grade level as well as section. (3) Behavior-related characteristics, such as raising one's hand in class, utilizing resources, conducting class surveys, and school satisfaction. A total of two academic institutions gathered the dataset. As an illustration, the European Commission finances two networks in Europe that provide reports for the institution that are then used to guide its official messaging. The OECD publishes concise policy suggestions in notes titled Pisa in Focus based on data analysis from its Programme for International Student Assessment (PISA).

Table-1 Analysis based on various dataset

Dataset	Techniques	Prediction Accuracy	Precision	Recall	NSE	AUC
EENEE	CNTS	86	77	61	54	42
	PLS	88	79	63	56	43
	ACF_RGPNN	89	81	65	58	45
NESET	CNTS	91	79	62	55	43
	PLS	93	82	64	59	46
	ACF_RGPNN	95	83	66	61	49
PISA	CNTS	92	81	65	63	45
	PLS	94	83	69	65	49
	ACF_RGPNN	96	85	71	66	52

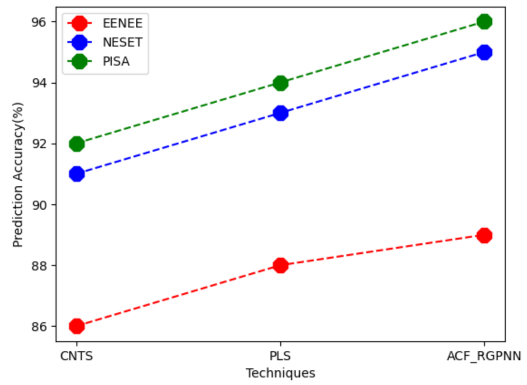

Figure-2 Comparative analysis of prediction Accuracy for EENEE, NESET, PISA dataset

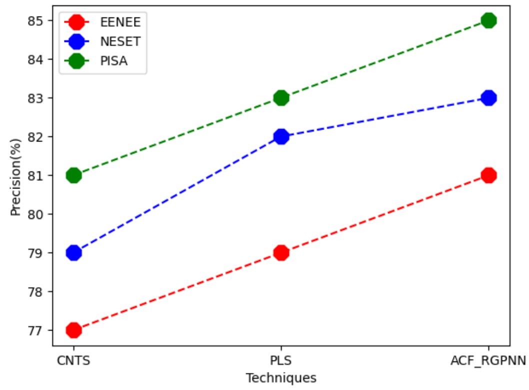

Figure-3 Comparative analysis of Precision for EENEE, NESET, PISA dataset

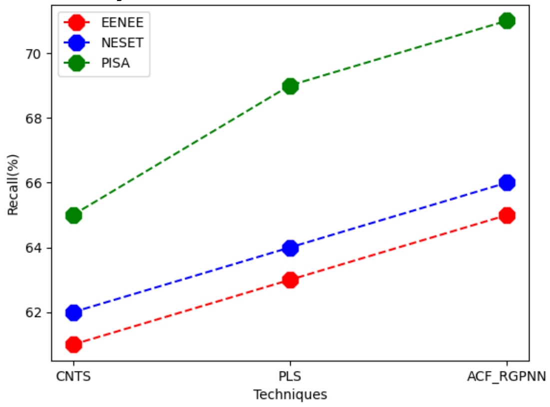

Figure-4 Comparative analysis of recall for EENEE, NESET, PISA dataset

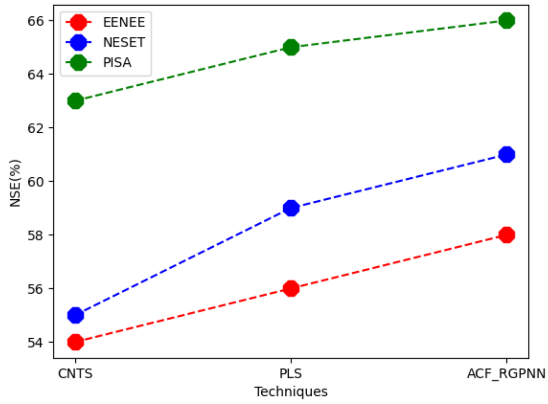

Figure-5 Comparative analysis of NSEfor EENEE, NESET, PISA dataset

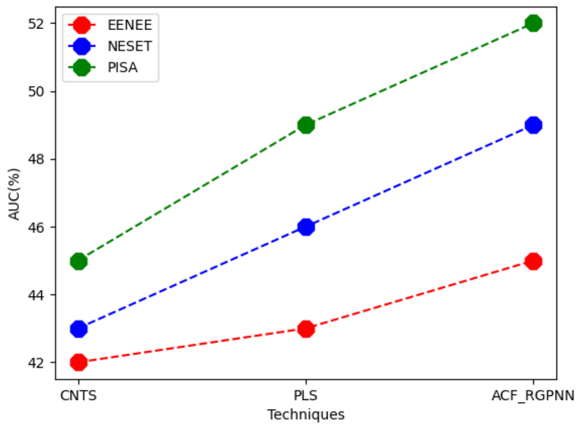

Figure-6 Comparative analysis of AUC for EENEE, NESET, PISA dataset

Table 1 and figure 2-7 shows analysis based on various dataset. The parametric analysis has been carried out for EENEE, NESET, PISA datasets in terms of prediction Accuracy, precision, recall, F-1 score, AUC. Here the proposed technique attained prediction Accuracy 89%, precision 81%, recall 65%, NSE 58%, AUC 45%; existing technique CNTS attained prediction Accuracy 86%, precision 77%, recall 61%, NSE 54%, AUC 42%; PLS attained prediction Accuracy 88%, precision 79%, recall 63%, NSE 56%, AUC 43% for EENEE dataset. For NESET dataset, proposed technique attained prediction Accuracy of 95%, precision 83%, recall 66%, NSE 61%, AUC 49%; existing technique CNTS attained prediction Accuracy 91%, precision 79%, recall 62%, NSE 55%, AUC 43%; PLS attained prediction Accuracy 93%, precision 82%, recall 64%, NSE 59%, AUC 46%. the proposed technique attained prediction Accuracy 96%, precision 85%, recall 71%, NSE 66%, AUC 52%; existing technique CNTS attained prediction Accuracy 92%, precision 81%, recall 65%, NSE 63%, AUC 45%; PLS attained prediction Accuracy 94%, precision 83%, recall 69%, NSE 65%, AUC 49% for PISA dataset.
The idea behind providing students with personalised learning assistance services in college English classes is to gather information about their voice, emotions, and other outward manifestations. It gives fundamental data model support for further personalised learning by mining and analysing this data. The main application of pattern recognition in teaching is the following: in an oral English training class, the spoken language of identified students can be compared with the normative spoken language to direct the student's spoken language learning, identify the learners' learning states intelligently, and provide timely support and encouragement for learning. Learners have several search options available to them, including voice searches. It is discovered that there have been significant differences between how the students perceived the learning impact of experimental class before and after experiment. With only 10 students remaining who dislike English classes, the percentage of pupils who enjoy them has significantly grown from 20% before the experiment to 60% after it. Additionally, from 30% before the experiment to 80% after it, more students can actively participate in class activities. Additionally, from 10% before the experiment to 20% after it, more students now have confidence in their ability to learn.

5. Conclusion:

This research propose novel technique in designing with assessing English classroom based teaching model using machine learning techniques. Here the classroom design analysis is carried out using active contour fuzzy model with recurrent Gaussian perceptron neural networks (ACF_RGPNN). a NN based rating prediction method is designed. This method integrates a DL method built on word embedding as well as text convolutional networks, improves feature vector using input from users and learning resources, and then utilises DL to mine hidden interest features based on this foundation. Scores are utilised to convey a potential relationship between user as well as learning resource, and method is also trained using user's historical rating data. Finally, user experience is improved while the performance of the suggestion impact is improved. The training and recommendation elements of the model are separated. This method uses most fundamental data about students as well as their individual learning circumstances as starting point for a thorough investigation in order to create a method of English learning behaviour as well as experience. Through individualised analysis of learning circumstances, it can also rekindle students' enthusiasm for learning language. To accomplish accurate and high-quality teaching, an online system for learning as well as teaching English can suggest more in-depth learning strategies as well as materials to students and particular courses. It can also produce an intuitive representation of how learning has changed once the lesson is over. the suggested method achieved prediction 96% accuracy, 85% precision, 71% recall, 66% NSE, and 52% AUC

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