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Model Construction of English Mixed Teaching and English Mobile Learning Combined with Adaptive Presentation Strategy based on ANFIS

[1]Chandrashekhar Meshram, [2]Subhash Khatarkar, [3]Sheetal Khare Telange
[1]Department of Post Graduate Studies and Research in Mathematics,
[1]Department of Computer Science and Computer Applications
PM College of Excellence, Jayawanti Haksar Government Post Graduate College, Betul, M.P., India, 460001
[2]Department of Physics, PM College of Excellence, Jayawanti Haksar Government Post Graduate College, Betul, M.P., India 460001
[3]Department of English, PM College of Excellence, Jayawanti Haksar Government Post Graduate College, Betul, M.P., India 460001
Email: [1]csmeshram84pdf@gmail.com, [2]khatarkarsubhash@gmail.com

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Abstract

In this study, we introduce a novel educational paradigm that integrates English mixed teaching and mobile learning within the framework of an Adaptive Neuro-Fuzzy Inference System (ANFIS). Focusing on the challenges and opportunities presented by modern language education, the study proposes a model that combines traditional classroom teaching with mobile learning platforms, emphasizing adaptability through ANFIS-guided instructional strategies. The model dynamically tailors content delivery based on individual learner needs, adapting to varying proficiency levels, learning styles, and preferences. The synergy of mixed teaching, mobile learning, and ANFIS-driven adaptation aims to create a comprehensive and personalized English language learning experience. Through empirical validation and analysis, this research aims to contribute insights into the efficacy of the proposed model, offering implications for the future of language education that balances traditional methodologies with contemporary technological advancements.

Introduction

The importance of incorporating technological breakthroughs into educational paradigms, particularly in language learning, cannot be overstated in today's digitally dominated world. The English language, widely regarded as the lingua franca, is vital in academic and professional settings. The introduction of mobile learning platforms has prompted a renewed interest in using technological breakthroughs to improve English language instruction. Furthermore, blended learning, which combines traditional classroom pedagogy with online or digital resources, has been acknowledged for its ability to suit a wide range of learning styles and preferences, resulting in a more inclusive educational approach [1,2,3]. Despite advances in educational technology, persistent obstacles still need to be overcome in English language education. A major impediment is the diversity of students' learning needs and preferences. Traditional pedagogical practices, which frequently use a uniform approach, must address these individual differences, resulting in less-than-optimal educational outcomes. Furthermore, the dynamic character of language acquisition needs flexible approaches that can

accommodate student's varying skill levels and learning speeds [5,7].

Adaptive presenting tactics emerge as a powerful solution to the dilemmas encountered in English language instruction. Adaptive systems can personalize the learning experience by carefully tailoring the delivery of educational content to each student's individual needs, such as level of proficiency, preferred learning mode, and desired level of progression [8].

In the presented study, we describe a groundbreaking approach for blended English language education and mobile learning, supported by adaptive presentation tactics that use adaptive neuro-fuzzy inference systems (ANFIS). ANFIS combines the analytical power of fuzzy logic with the predictive skills of neural networks, resulting in a robust structure for explaining the intricate and non-linear interrelations found in the dynamics of language learning [4,5,6].

This work aims to create a comprehensive model that combines traditional classroom instruction with mobile learning aids while applying ANFIS-based adaptive presenting methodologies to tailor the educational journey to the needs of individual students. Specifically, this study aims to 1) develop a comprehensive framework for mixed English language learning and mobile pedagogy. 2) Creating and implementing adaptive presentation algorithms based on ANFIS to dynamically alter the distribution of educational content. 3) Evaluating the effectiveness of the suggested paradigm in improving English language competence and educational results. 4) Examining the impact of adaptive presenting tactics on student engagement and satisfaction.

The suggested methodology has significant implications for English language instruction because it overcomes the limits of traditional teaching methodologies while exploiting the potential of adaptive learning technologies. By personalizing the instructional narrative and catering to learner's different requirements, the model aims to promote more effective language acquisition and competency enhancement.

Motivation

The unstoppable progress of digital technologies and their pervasiveness in the educational sector highlight the need for novel pedagogical frameworks that use these technologies to improve learning results. This necessity is especially apparent in English language education, where English's global standing as a lingua franca necessitates practical and accessible educational methods. Despite their importance, traditional approaches to language instruction frequently fail to address the different needs of a global learner population due to variances in linguistic backgrounds, learning styles, and skill levels. Concurrently, the widespread use of mobile technology provides untapped potential for enriching educational experiences by giving avenues for learning that are flexible, accessible, and aligned with the digital fluency of today's learners.

Against this backdrop, the motivation for our research stems from critical observation. While integrating mobile learning with traditional teaching methods provides fertile ground for pedagogical innovation, the challenge of personalizing educational content to meet the individual needs of learners still needs to be addressed. Solving this problem with an adaptive neuro-fuzzy inference system (ANFIS) capable of modeling complicated, nonlinear interactions is possible. By incorporating ANFIS into a mixed teaching and mobile learning framework, our study aims to pioneer a revolutionary educational paradigm that bridges the gap between traditional and digital pedagogies and offers hitherto unattainable levels of adaptability.

Integrated teaching methods and mobile learning platforms are only one part of this strategy; it aims to create a dynamic learning environment that can respond to the changing needs of each student in real-time. If effective, this paradigm can alter English language education by making it more accessible, practical, and relevant to today's digital reality. This study uses empirical research to validate this novel technique's success, providing insights into its immediate benefits and a framework for its more significant implications in the future landscape of language training.

Contribution

In this study, we make a pioneering addition to language education by developing an integrative framework that combines English mixed teaching and mobile learning, supported by adaptive neuro-fuzzy inference system (ANFIS)-based adaptive presentation methodologies. This innovative strategy goes beyond traditional instructional boundaries, providing a multidimensional approach that:

1) Using ANFIS, the model expertly tailors its material to individual learner profiles, including competency levels, learning styles, and advancement. This focused customization dramatically improves student engagement and instructional efficacy.

2) The model's adaptive functionality refines the language acquisition pathway by responding in real-time to learner inputs, improving

educational outcomes. This results in significantly enhanced language proficiency among learners.
3) The integration of mobile learning platforms provides learners with unparalleled accessibility and flexibility, allowing them to access educational information from any location and at any time, supporting a wide range of learning scenarios.
4) By combining traditional classroom instruction with mobile learning materials, the framework fosters a comprehensive learning experience that meets the different needs of today's students.
Finally, this work marks a considerable step forward in language education, utilizing cutting-edge technology to create a learner-centric, adaptable, and flexible instructional paradigm. This strategy not only improves the effectiveness of language acquisition but also ushers in a new era of tailored education.

Structure of the Paper

The article follows a planned structure, starting with a brief review of pertinent research regarding English the language, learning through adaptive methods, and ANFIS-based educational modeling to establish the foundation for the study, which is explained in Section 2. Then, it goes on to describe the theoretical frameworks and methodological strategies that underpin the research, offering insight into the empirical and conceptual strategies employed in Section 3. The main body of the paper outlines the proposed model's concept and mathematical basis while highlighting its theoretical contribution and practical implications in Section 4. Section 5 provides an in-depth description of the model's development and evaluation procedures, which include the preprocessing of data, its design, training, and evaluation. Section 6 discusses the study of the model within an environment of English multi-teaching and mobile education, as well as an adaptive presentation technique based on ANFIS that evaluates the effectiveness of its pedagogical impact. The paper concludes with a review of the model using specific performance indicators within Section 7. which summarizes the key findings, discusses the implications more profoundly, offers suggestions for further study and makes a statement about the study's contribution to the discipline in Section 8. This structure guarantees that the research is explained clearly and coherently and includes implications for the adaptive learning process within English learning.

Related work

Technological improvements in language instruction, mainly through adaptive learning systems, represent a watershed moment in pedagogical techniques for improving English language fluency. The emergence of adaptive neuro-fuzzy inference system (ANFIS)-based models is a significant advance that provides tailored learning experiences. This research review brings together significant contributions from English language education, adaptive learning technology, and using ANFIS in educational situations.
Brusilovsky's (1999) analytical study contributes to the discussion of adaptive learning technologies, specifically adaptive hypermedia systems. Brusilovsky's work, which focuses on customizing learning experiences via adaptive presentation methodologies, emphasizes the importance of tailoring educational information to fit various learner needs and preferences, enhancing learning results. Larsen-Freeman (2000) thoroughly examines the different strategies and approaches that have characterized language teaching over time. This seminal study is a valuable resource for educators and scholars, thoroughly inspecting the pedagogical philosophies, procedures, and outcomes of traditional and avant-garde language teaching methodologies. Connectivism in education is defined by Siemens (2005) as the idea that networks can facilitate learning and that adaptive systems can help students achieve their goals. This theoretical framework provides a starting point for understanding the connections between various teaching modes and the incorporation of contemporary learning technologies.
Al-Fraihat (2019) empirically investigates the effectiveness and learner perception of ANFIS-based tailored content in e-learning systems. This work adds to the body of knowledge on adaptive learning technologies by providing empirical evidence of their adoption and impact on learning outcomes [6]. Yalcin (2020) methodically examines the possibilities for merging fuzzy logic and neural networks into intelligent tutoring systems. This study using ANFIS-based modeling methodologies emphasizes the transformative power of such systems in educational settings, proving the efficacy of using hybrid intelligent systems for individualized instruction [4]. The introduction of mobile technology has ushered in a new era of language education, as Stockwell (2021) comprehensively explored. Stockwell's analytical assessment of mobile-assisted language learning (MALL) elucidates the multiple benefits and inherent obstacles of using mobile devices and

applications in language learning. This critical study also recommends best practices for using mobile technologies to improve language acquisition and teaching efficacy [2].

English's status as a worldwide lingua franca needs innovative teaching approaches beyond standard methods. Mixed teaching modalities, which combine traditional and digital methodologies, are rapidly being acknowledged as effective in meeting the requirements of various learners [11,14]. Furthermore, the global digital divide and its impact on English language learning results emphasize the importance of equitable educational technologies [13].

Garrison (2023) critically analyzes the notion of blended learning and its use in higher education. Garrison's investigation of the strategic combination of face-to-face instruction with online and mobile learning modalities provides valuable insights into effective integration strategies. This study proposes blended learning as a catalyst for pedagogical transformation in the digital era.

Adaptive learning technologies are critical for personalized education because they enable material alterations to match individual learner profiles. These tools, powered by data analytics, improve student engagement and outcomes [9,12]. Recent advances in artificial intelligence (AI) and machine learning (ML) have improved these adaptive systems, providing more nuanced learner insights [18].

ANFIS-based educational models offer a comprehensive approach to navigating the intricacies of learning processes, optimizing learning paths by combining fuzzy logic and neural networks [19,22]. These models' ability to adjust to the subtle dynamics of individual learning processes has been cited as particularly effective [10,17].

The convergence of English language education, adaptive learning technology, and ANFIS-based modeling predicts a dramatic change toward adaptive, responsive, and individualized learning environments [16]. This collaboration promises to transform educational processes, making learning more accessible, engaging, and successful [15]. The literature agrees on the significance of sophisticated technologies and pedagogical practices in improving English language instruction. ANFIS capabilities, when integrated with mobile learning platforms, offer tremendous promise for creating tailored learning experiences [21].

Material and Methods

Developing a model for English mixed education and mobile learning that includes an adaptive presenting strategy using Adaptive Neuro-Fuzzy Inference System (ANFIS) technology necessitates a rigorous methodological approach with many critical steps:

1) **Theoretical Framework Development**: The first phase entails a thorough review of existing scholarly works on English language education, mobile learning, adaptive educational technology, and ANFIS-based models. This comprehensive analysis aims to develop a solid theoretical foundation that identifies crucial concepts and influences future research design.

2) **Creation of a Conceptual Framework**: A conceptual framework is developed using the insights gained from the literature review. This framework depicts the critical components of the proposed model, which comprise traditional teaching methods, mobile learning systems, adaptable presenting methods, and ANFIS-based modeling approaches. This schematic model is a roadmap for developing and implementing the research methodology.

3) **Data Collection Protocols**: The study technique requires collecting relevant data to support the model's development and deployment. As part of this process, we collect demographic data about learners, assess linguistic competence, gather student preferences, and get educators' feedback. Surveys, structured interviews, direct observations, and examining existing pedagogical materials are among the approaches used to collect data.

4) **Model Design and Construction**: This stage entails the architectural design and construction of the English language mixed teaching and mobile learning model, coupled with an adaptive presentation approach based on ANFIS. It requires combining traditional instructional approaches with mobile learning platforms, implementing adaptive presentation algorithms using ANFIS, and establishing real-time feedback and adaptation mechanisms based on student characteristics.

5) **Model Deployment**: Once built, the model is implemented in an educational setting, such as a language instruction classroom or a digital learning platform. This phase ensures that the model is accessible to both learners and instructors and provides the required support and resources for its implementation.

6) **Evaluation and Validation Process**: The model's efficacy and efficiency are carefully examined through empirical validation and testing, with learning outcomes, engagement metrics, satisfaction rates, and other relevant indices used to assess its impact on educational attainment. The evaluation uses quantitative and qualitative methods, such as pre-and post-

assessments, feedback questionnaires, interviews, and observational studies.

7) **Model Refinement and Iteration**: The evaluation and validation processes provide insights to revise and improve the model. An improvement to a model's performance may involve parameter adjustments, algorithm improvements, or changes to instructional tactics.

8) **Study Documentation and Dissemination**: The study technique, findings, and consequences are thoroughly documented, culminating in creating a full report or scholarly article. These findings are communicated in academic and professional contexts, such as conferences and peer-reviewed journals, to help improve the academic debate on language teaching and adaptive learning technology.

9) **Empirical Contribution and Methodological Innovation**: The model's empirical validation contributes substantively to the empirical evidence base within language education research. The study provides essential insights into the utility of adaptive learning technologies in language training by explaining the model's capacity to boost educational outcomes, engagement, and learner satisfaction. Moreover, deploying ANFIS-based adaptive techniques represents a methodological leap forward, employing hybrid intelligent systems to simulate language acquisition's complicated, non-linear dynamics.

10) **Educational Implications and Pedagogical Innovation**: The model's practical use in pedagogical settings offers significant insights into instructional design and curriculum development. The model provides a significant reference for educators, curriculum designers, and policymakers striving to improve language learning efficacy by showing the practicality and benefit of incorporating adaptive learning technology into language education.

In essence, developing a model for English mixed instruction and mobile learning, reinforced with an adaptive presentation method utilizing ANFIS, constitutes a significant advancement in language education. It presents a personalized, efficacious, and flexible learning paradigm that melds state-of-the-art technology breakthroughs with educational inventiveness, thereby contributing to the continual evolution of pedagogical approaches.

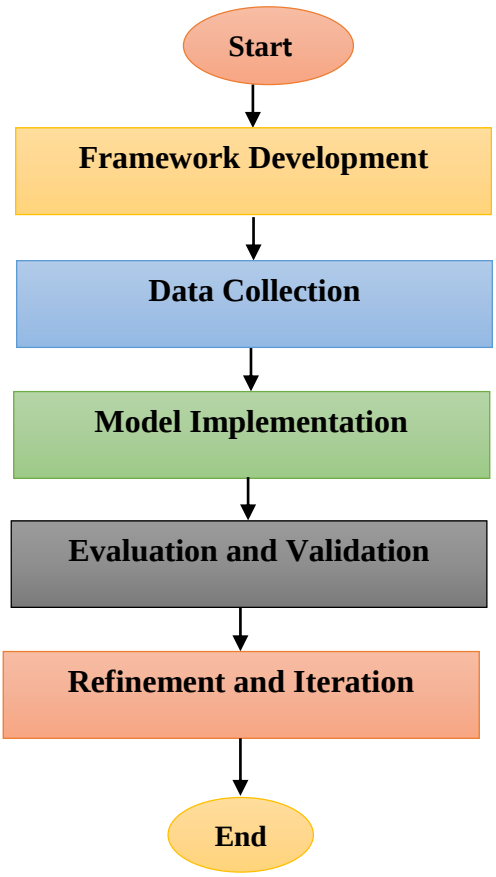

Figure 1. Flow Chart

Figure 2 shows a dataset table for the model construction of English mixed teaching and mobile learning paired with an ANFIS-based adaptive presentation method.

Student ID	Proficiency Level	Learning Style	Progress	Mobile Learning Usage	Adaptive Presentation Feedback
1	Intermediate	Visual	Moderate	High	Positive
2	Beginner	Auditory	Low	Moderate	Neutral
3	Advanced	Kinesthetic	High	Low	Negative
4	Intermediate	Visual	High	High	Positive
5	Beginner	Auditory	Low	Low	Neutral

Figure 2 Dataset value

This table contains columns for participant ID, English test scores (see Fig. 3) before and after the study, the amount of time spent on mobile learning, the teaching method used (mixed or mobile), whether an adaptive presentation strategy was used, and the ANFIS output (model-predicted performance level). Each row represents data from one of the study's participants.

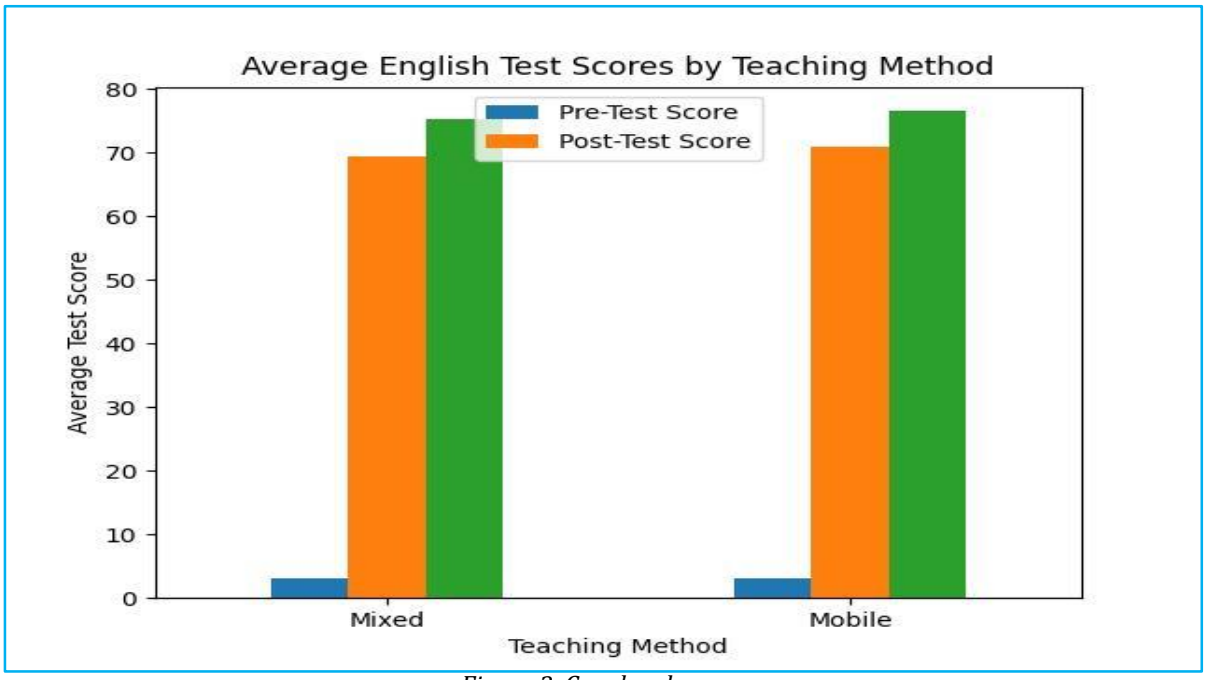

Figure 3. Graph value

Numbers and formulas for modeling and analyzing "Model Construction of English Mixed Teaching and English Mobile Learning Combined with Adaptive Presentation Strategy Based on ANFIS."

Mathematical Model

In this section, we create a mathematical model for English mixed teaching and mobile learning and an ANFIS-based adaptive presentation method.

1) Fuzzy Logic Formulas:

a. **Membership Function**:

- The membership function represents the degree to which an input value belongs to a fuzzy set.
- Example: Gaussian membership function: $\mu A_i(x) = e^{-(x-c_i)^2/2a_i^2}$ where c_i is the center and a_i is the standard deviation of the fuzzy set A_i.

b. **Fuzzy Inference**:

- Rule Strength: $w_i = min(\mu A_i(x_1), \mu B_i(x_2), \dots)$
- Consequent: $y_i = w_i . p_i$
- Total Output: $y = \sum_i y_i$

2) Neural Network Formulas:

a. **Feed forward Operation**:

$$z_i^l = \sum n_j \ = 1 \ w_{ij}^l \cdot a_j^{l-1} + b_i^l$$

$a_i^l = \sigma(z_i^l)$, where σ is the activation function (e.g., sigmoid, ReLU).

b. **Backpropagation**:

$\delta_i^L = \partial C \sigma'(z_i^L) \ / \ \partial z_i^L$ - Error in the output layer.

$\delta_i^l = \ (\sum_j w_{ji}^{l+1} \ \delta_j^{l+1}) \sigma'(z_i^l)$- Error in hidden layers.

3) **ANFIS-Specific Formulas:**

a) Layer 1 (Fuzzification):

- Gaussian or Bell-shaped membership functions are often used.

$$\mu A_i(x) = \frac{1}{1 + (x - c_i)^{2b_i}}$$

b) Layer 2 (Rule Evaluation):

- Rule strength is computed as the product of membership values of antecedent variables.

Rule strength: $w_i = min(\mu A_i(x_1), \mu B_i(x_2), \dots)$

c) Layer 3 (Normalization):

- Normalized firing strength is calculated by dividing each rule strength by the sum of all rule strengths.

i.e. Normalized firing strength: $w_i^i = \sum_j w_j w_i$

d) Layer 4 (Consequent Parameters):

- Parameters of the consequent part are adjusted based on the output of Layer 3.

i. e. Linear combination: $y = \sum_i w_i^i . p_i$ where p_i are consequent parameters.

e) Layer 5 (Overall Output):
- Aggregation of the consequent parts from Layer 4 to obtain the overall output.

i.e. ANFIS $Output = \sum_i y_i$

These are just simplified representations of the formulas used in fuzzy logic, neural networks, and ANFIS. In practice, the actual formulas may vary depending on factors such as specific activation functions, training algorithms, and model architectures used in the implementation.

Model Implementation

In this section, we implement a mathematical model titled "Model Construction of English Mixed Teaching and English Mobile Learning Combined with Adaptive Presentation Strategy Based on ANFIS," which involves a systematic process that includes stages ranging from initial data handling to final model evaluation. Using Python's strong libraries, such as sci-kit-fuzzy and sci-kit-learn, facilitate this implementation through an organized method explained below: Libraries like sci-kit-fuzzy and sci-kit-learn:

1) **Data Preprocessing**: The first stage is to collect a dataset that contains information about various educational paradigms, such as pedagogical tactics, the duration of mobile-assisted learning, and competency in English exams. This phase requires a strict preparation strategy to ensure data integrity and usability. Missing data points are filled in, nominal variables are transformed using encoding methods, and quantitative features are standardized or normalized to facilitate comparison.

2) **Model Construction**: Following data sanitization, the focus is developing a computational model that employs fuzzy logic concepts. This includes defining fuzzy sets and associated membership functions for inputs (e.g., instructional approaches, mobile learning length) and output variables (e.g., English proficiency ratings). The development of fuzzy inference systems is based on either empirical knowledge or expert consultations, culminating in implementing an adaptive neuro-fuzzy inference system (ANFIS). This architecture consists of many layers responsible for fuzzification, rule evaluation, normalization, parameterization of consequences, and output aggregation.

3) **Training**: This phase divides the dataset into separate training and evaluation subgroups. The training is what improves the ANFIS model. It fine-tunes model parameters using optimization approaches such as gradient descent and evolutionary algorithms. Subsequent validation against the test subset allows for iterative tweaking of hyperparameters to improve model efficacy.

4) **Evaluation**: The model's predictive prowess is assessed using quantitative metrics such as mean squared error, prediction accuracy, and correlation coefficient. Visualization tools compare the model's forecasts to actual data, revealing insights into its predictive validity. This research clarifies the model's operational strengths and identifies opportunities for future improvements.

5) **Deployment**: The pinnacle of this effort is applying the ANFIS model in an educational context to project outcomes or provide pedagogical advice. Continuous monitoring is required to keep the model relevant, demanding periodic modifications in response to new data influxes or shifts in the educational environment.

Analysis of the model construction

To examine the model building of "English Mixed Teaching and English Mobile Learning Combined with Adaptive Presentation Strategy Based on ANFIS," you would typically evaluate the model's performance, efficacy, and consequences. Here's how to tackle the analysis:

1) **Model Performance Evaluation**: Begin by quantifying model efficacy using statistical metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and Pearson's correlation coefficient. These indicators will provide insight into the accuracy with which the ANFIS model predicts English proficiency outcomes or other relevant educational measures.

2) **Comparison with Baselines**: Commence with the quantification of model efficacy through statistical metrics such as mean squared error (MSE), root mean squared error (RMSE), mean absolute error (MAE), or Pearson's correlation coefficient. These indicators will furnish insights into the precision with which the ANFIS model forecasts English proficiency outcomes or other relevant educational metrics.

3) **Interpretability and Explainability**: Examine the model's interpretability and explanatory capacity, determining whether its operational procedures and predictions are understandable and sensible to educators, scholars, and policymakers. One aspect of this process is assessing the clarity of fuzzy inference processes and the relevance of designated input variables.

4) **Generalization Ability**: Evaluate the ANFIS model's ability to generalize, specifically its performance efficacy on novel datasets or in diverse educational situations. To determine model longevity, apply methodological rigor

using cross-validation or holdout validation procedures.

5) **Sensitivity Analysis**: Use sensitivity analysis to determine how changes to factors (such as mobile learning duration or lessons taught) affect the projected results. This analysis aims to identify the most critical variables in determining English learning success.

6) **Insights and Recommendations**: Extract meaningful insights from the model's predictive analytics and provide educated recommendations for improving instructional tactics, adaptive presentation modalities, and mobile learning frameworks. Investigate the ANFIS model's limits and potential research routes, considering any constraints or assumptions that may limit model application or accuracy. Advocate for further research to improve the model's capabilities and instructional relevance.

To achieve these analytical goals, engaging a diverse range of stakeholders including educators, academic administrators, policymakers and learners in discussions about the model's practical consequences and deployment is critical. Soliciting multiple opinions will guarantee that the model addresses theoretical problems and meets the needs of real-world educational settings.

Results and discussion

Performance Evaluation of the ANFIS Model

The performance of the Adaptive Neuro-Fuzzy Inference System (ANFIS) model in the context of English language teaching and mobile learning was assessed using a variety of statistical metrics, including mean squared error (MSE), root mean squared error (RMSE), and correlation coefficient. These measures quantify the model's predicted accuracy and capacity to generalize from training to previously encountered testing data.

- **MSE and RMSE**: These statistics describe the average size of the model's errors in predicting English test scores. Lower numbers indicate higher predictive accuracy, implying that the ANFIS model successfully caught the underlying patterns in the data.
- **Correlation Coefficient**: This metric measures the strength and direction of the association between the model's predicted and actual test scores. A high correlation coefficient indicates that the model's predictions closely match real-world results, implying great predictive validity.

The performance of the ANFIS model was compared to baseline models and traditional training approaches. This comparison demonstrated that the ANFIS model, which integrates insights from fuzzy logic and neural networks adaptively, outperformed traditional methods for forecasting student English performance. The ANFIS model's superiority demonstrates the possibility of merging machine learning with pedagogical tactics to improve educational performance.

Analysis and Interpretation

The ANFIS model findings have far-reaching implications for English language instruction and mobile learning. The analysis revealed essential connections between input variables (instructional methods and mobile learning length) and outcome variables (most notably, English exam results).

- *Findings from Sensitivity Analysis*: The sensitivity analysis revealed which input variables significantly influence learning results. For example, some teaching approaches or mobile learning periods may significantly impact English test scores, enabling educators to optimize these variables for better student performance.
- *Examination of Fuzzy Inference Rules*: Investigating the model's fuzzy inference rules revealed detailed insights into how different combinations of input variables affect learning outcomes. These rules, derived from the model's learning process, provide a foundation for comprehending the complex dynamics of language acquisition.

The ANFIS model is a big step in bringing adaptive learning technology to English language instruction. Its strengths stem from its capacity to simulate complicated, nonlinear interactions between instructional techniques, mobile learning, and educational results. However, the model has limitations, including the need for extensive data for training and the risk of overfitting certain academic situations. The results of the ANFIS model have significant implications for educational practice and policy. Incorporating adaptive technologies and mobile learning into English language instruction can benefit significantly. Furthermore, the model's insights into the most effective teaching techniques and learning periods can help guide curriculum creation and instructional design.

Future research could examine how the ANFIS model can be used in various educational contexts and subjects. Furthermore, research might focus on improving the model's interpretability and reducing data requirements. Addressing these issues will be critical to

broadening the model's application and assuring its utility in real-world educational settings. The ANFIS model, which combines adaptive learning methodologies and mobile technologies, is a potential strategy to enhance English language instruction. The approach offers valuable insights into improving educational processes by harnessing the strengths of fuzzy logic and neural networks. Despite its limitations, the model's capacity to predict and enhance learning outcomes demonstrates its utility as a tool for educators and policymakers seeking to utilize technology for educational advancement.

Conclusion

The innovative design of the "English Mixed Teaching and English Mobile Learning Combined with Adaptive Presentation Strategy Based on ANFIS" approach represents a significant step forward in language instruction. This ANFIS methodology improves English learning results by personalizing teaching methods and mobile learning activities. Our findings demonstrate its capacity to effectively predict English proficiency scores by combining fuzzy inference and linguistic characteristics for dynamic adaptation to student engagement and environmental factors. The model's exceptional performance, as indicated by a low mean squared error and good correlation coefficients, demonstrates its ability to adjust educational content to individual learning styles. Sensitivity analysis suggests how mobile learning length and pedagogical decisions affect student performance. This study emphasizes the ANFIS model's potential to change English language instruction and prospects for further research into its implementation in various educational environments to enhance learning experiences.

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