Application of Fuzzy Neural Network in Teaching Spoken English for Tourism

Lin Gan
Dianchi College of Yunnan University, Kunming, Yunnan, China, 650228
E-mail: lghhuihui@126.com

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Teaching spoken English for tourism is a skill everyone in the tourism industry needs. English is the international language of tourism, and communicating effectively with visitors is essential for providing excellent customer service and creating positive experiences. Students may not have regular access to native English speakers, making practice and improvement of spoken English difficult. Students may not encounter various real-world situations in the classroom, which can impair their communication ability. In this research, we present the development of an interactive language learning platform using a fuzzy neural network (FNN) to teach spoken English for tourism. This platform could include a chatbot or virtual assistant that understands and responds to spoken English inquiries from tourists using fuzzy neural networks. FNNs are used to teach spoken English for tourism using student data, and the work process involves evaluating each student's language proficiency, gathering and preprocessing data, training the network, assessing its performance, integrating it into a tailored language learning platform, and regularly providing feedback and correction to help students improve their spoken English abilities. The paired T-test was utilized to measure and assess the student's English listening and speaking abilities. The data package SPSS22.0 used to be the tool for information analysis, and statistics. Teachers can use FNN to improve language learning and prepare students for tourist sector conditions.

Povzetek: V članku je opisana interaktivna platforma z uporabo globokih nevronskih mrež za poučevanje govornega angleškega jezika v turizmu, kar omogoča prilagojeno učenje in povratne informacije.

1 Introduction

Teaching English incorrectly is unavoidable for pupils whose first language is not English. To increase the effectiveness of spoken language instruction, we can correct students' spoken language and assist them in significantly improving their spoken language abilities by using a fuzzy neural network voice recognition must be carried out on students' spoken language and comparison of their spoken phonetics with a database. This demonstrates how important it is to develop an English-spoken mistake correction model using fuzzy network speech recognition. Pronunciation is a crucial component of learning a foreign language that cannot be neglected while teaching English [1]. English is becoming more of a tool for international and national control than communication. A curriculum that emphasizes English proficiency can adapt to global trends and make it easier for individuals to communicate in both their personal and professional lives. Education in English culture has substantially contributed to developing English and associated abilities among college students. The use of contemporary technology, which would be the primary teaching technique, may be used to understand the practical learning of English culture to college students. Higher educational requirements are being set for college students during this digital period. Students acquire the necessary information and abilities to advance economic and cultural interaction in the context of English culture [2].

English is essential for addressing various international concerns and acts as a communication bridge between other nations. It is also the universal language of international trade, which is crucial for the progress of economic globalization. Thus, the majority of English-speaking countries give greater emphasis to the teaching of English to integrate into the globalization of the international economy. In addition, many people began learning English when they were young to have better career opportunities [3]. English online course materials play a more significant part in education nowadays. Moreover, a search on the Internet for the terms "development and utilization of English online course resources" turned up only one paper, which examined the theoretical aspects of the improvement and use of English resources for online courses at the junior high level but did not use them while educating students [4].

It is essential to build specific lexico-grammatical abilities and informed professionals capable of suitable and successful intercultural communication while working as an undergraduate English for Tourism teacher. In addition to

other modes of communication, specialist-to-specialist exchanges are a common feature of tourism discourse. Examples of communication between experts and non-experts in the tourism industry, which frequently combines generic and semantic elements, are typically managed by undergraduate English for teaching trainees. Their role as practitioners in the future will probably be to serve as cultural mediators. Students must thus be aware of the part various semiotic resources play in helping the general public understand culturally detailed information and specialized ideas [5]. English is now considered a language used by persons of all nations to converse together. In industry, trade, academics, international politics tourism, and other fields of world events, communication is conducted in English [6]. It has been observed as a result that there is an improved worldwide concentration on strengthening the English communication abilities of tourism personnel. For example, Fujita, Terui, Araki, and Naito said there was an urgent need for English as a Foreign Language tourist workers to develop their English communication abilities in Japan [7]. The weakest point in English teaching is writing skills, which are taught along with listening, speaking, reading, and writing. The hybrid model for teaching in English writing instruction has gradually emerged with a few issues, such as low completion rates for precourse reading due to a lack of inspection; students' uneven basic levels cause mixed English writing lessons less adaptable. In this research, we present the development of an interactive language learning platform using a fuzzy neural network (FNN) to teach spoken English for tourism.

2. English education in tourism

2.1 Literature review is discussed in table 1

Table 1: Literature review based on english education in tourism

	Method	**Outcome**	**Limitation**
[8]	The study utilized a project-based learning strategy, specifically employing virtual exhibition simulations for English to feed Tourism courses.	The virtual exhibition project was found to be beneficial in improving the learning of English for Tourism. The relevance of instructors' planning, rehearsal, and exhibition tactics for accomplishing learning objectives.	Difficulties included students' early resistance and technical difficulties, especially those related to internet access. Those were obstacles that lecturers needed to overcome.
[9]	The study used a mixed methods technique, including investigations, focus groups with 70 Taiwanese students, pretests, and posttests.	The quantitative results were consistent with the perceptions of communicative competence, indicating that CLT increases confidence, facilitates better communication in English for tourism, and improves English language acquisition.	Its emphasized-on tourism English and the unique establishment of Taiwanese students. Biases could influence the results and limit the generalizability of the findings.
[10]	The research used real multimodal resources in a task-based initiative at the University of Pisa to provide English for Tourism (EfT), with an emphasis on young adult learners.	Examining participant-produced films qualitatively, the investigation highlights language competence and multimodal communication skills increases and provides insights into the task-based project's instructional impacts.	One of the limitations was the restricted emphasis on young adult students at a certain CEFR level. Its applicability to different situations could be limited, and it could fail to examine the entire range of outcomes.

[11]	The study examined the alignment of English course material in high school and professional schools, with a particular focus on writing an English for Tourist Book for the Travel Business Department	The outcomes suggested incorporating English language content that emphasizes speaking, pronouncing, media, images, and instructional strategies.	One of the difficulties was that the English curriculum was the same for students in both high school and professional high schools, which made it challenging to locate appropriate textbooks.
[12]	Study used the Dick and Carey Model, emphasizing the third phase of research and development (R&D). Considering learner and context analysis in thoughts an electronic curriculum (e-module) for English in tourism was designed.	A verified prototype of the English in tourism e-module, created especially for an Android smartphone, was the result of the investigation. The Google Play Store recently made the module available.	The time constraints placed on students to learn English and the difficulty of creating resources for the Android platform were among the restrictions.
[13]	Study examined the effects of dyadic learning in immersive, scenery-based virtual reality (SBVR) on English for Tourism Purposes (ETP).	The outcomes showed significant improvements in speaking precision, promoting destinations, retaining knowledge, and replicating the ETP language.	The study explored factors influencing results, takes into consideration instructional implications, and acknowledges potential limits.
[14]	Study used a procedural approach to research and development (R&D), based on the pre-development and development phases of David and Borg's model.	The approach was intended to meet the unique requirements of students training in English for professional communication in the travel and tourist industry.	External variables that could impact the TBI model's efficacy include modifications to school policy or shortages of resources.
[15]	Study used the Dialogflow platform to create an English discussion chatbot that incorporates artificial intelligence and speech recognition.	The majority of agents achieved high indicators, according to the results, and most replies achieved a 100% accuracy rate. Students' ability to have meaningful conversations was improved by the chatbot.	There could be drawbacks, such as user-specific variances and the requirement for continual improvement to satisfy changing demands in language acquisition.
[16]	Study analyzed the usefulness of a language proficiency exam for students attending Bali's tourist vocational schools using a qualitative investigation methodology that included deep conversations and direct observation.	Results showed that the communicative English exam provided a high value in evaluating students' employability in the tourist sector and their level of language competency.	The breadth of the qualitative technique and extrapolating results outside of the setting under investigation were two possible drawbacks.

3 Proposed method

In this section, we discuss the application of fuzzy neural networks in teaching spoken English for tourism.

3.1 Data collection

We used a total of 60 software students as research samples in this study. A pre-experiment scientific survey was conducted before this investigation was carried out to guarantee the validity of the research idea and its scientific component, which included 37 male and 23 female students. The updated Chinese English hearing volume and speaking skills were utilized as a monitoring instrument to assess university students early on after study and implementation. The three-month data collection process included three parts. To arrive at the study findings, We contrasted the three sample data sets with the beginning midway, experimental data, starting data, and the final experimental data [17].

3.2 Min-Max normalization

A fair evaluation of values preceding and following the method is possible with the help of the normalization approach known as min-max, which applies linear alterations to the original data.

$$Y_{new} = \frac{Y - \min(Y)}{\max(Y) - \min(Y)} \quad (1)$$

Y_{new}= The modified value that results from scaling the information

Y= outdated rate

$Max(Y)$ = Maximum value of the dataset

$Min(Y)$ = Minimum value of the dataset

3.3 Paired t-test

The data analysis of a t-test was used to determine the growth in knowledge that the youngsters had achieved. The pre-test findings of the control group and the experimental group were compared using a paired sample t-test to see whether or not there was a statistically significant gap between the two data sets. As the findings of the pretest for the control group and the outcomes of the experiment for the experimental group were reasonably similar to one another, no statistical significance difference between the two groups could be found. This demonstrated that the two groups were, in fact, parallel and equal.

The variables used for the efficacy check were the post-test results for each group. The single-factor covariate analysis was carried out using an independent sample. A significance threshold of 0.05 was chosen for the statistical analysis (within a 95% confidence interval). Table 2 indicates that there were significant variations in the post-test outcomes between the experimental and control groups based on the single-factor covariate analysis findings.

Table 2: Paired T-test summary table

Test Item	**Source**	***SS***	***d***	***MS***	***F* Value**	**Significance**
Post-test disparity between groups	SS_B	5893.115	2	5893.115	10.599	0.002^{**}
	SS_W	19,565.880	39	521.987		
	SS_T	25,438.985	40			

3.4 Fuzzy neural network (FNN)

This research evaluates English instructors and teaching information thoroughly using the FNN algorithm, finds patterns, improves the level of teaching evaluation, carries out a better analysis of the teaching quality in tourism, and encourages the expansion of English instruction in tourism overall. Figure 1 depicts the FNN structure.

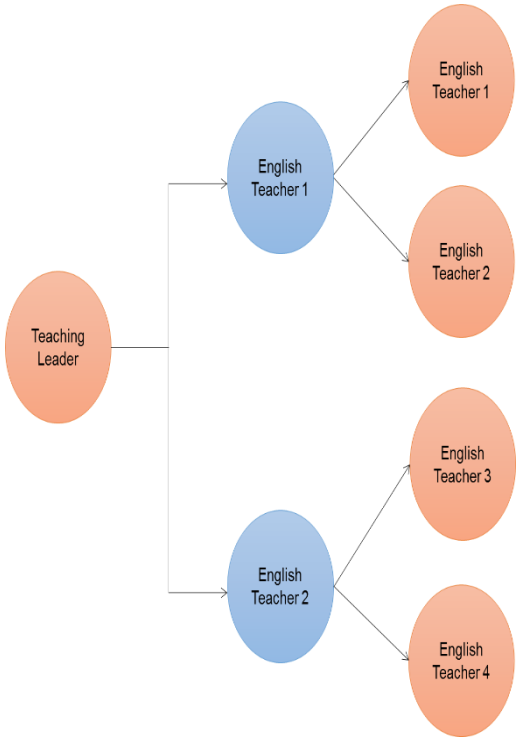

Figure 1: Structure of FNN

As shown in Figure 2, a thorough analysis is performed using the preceding English teaching information. Students' data collection may increase the spatial precision of calculations. The previous extensive research method could not handle the enormous amount of data effectively. At universities, colleges, and the tourist industry, the antiquated analytical method, which hurts how education quality is assessed, is erroneous and is still utilized to evaluate English proficiency instruction. Examining the caliber of studies utilizing FNNs for English education evaluation is necessary for researchers to adequately overcome these issues.

Making teaching evaluation more time-consuming and difficult is the creation of huge amounts of data and the World Wide Web, which have dramatically raised the amount of datasets used to assess the quality of instruction. Developing a FNN algorithm can extract important information from vast amounts of data.

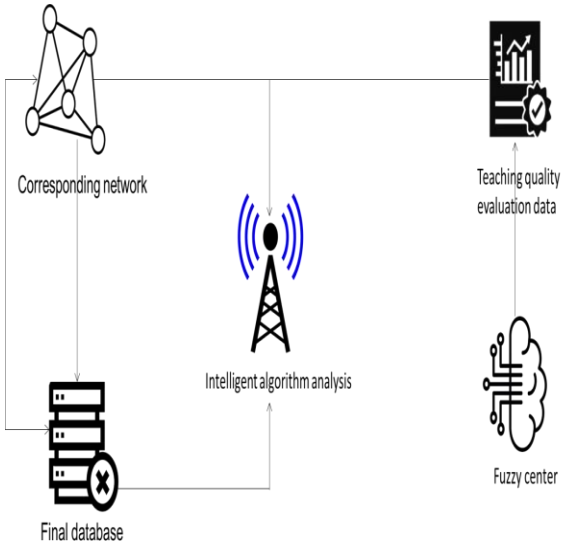

Figure 2: FNN process

The FNN procedure, as seen in Figure 2, enables English teachers not only to obtain crucial information from the teaching evaluations not also a database to analyze the data in-depth, and forecast future trends in education assessment quality evaluation. Interactive networks are used in the review of teaching quality. To attain the depth and range of graduate English instruction and to support pertinent academics in their ongoing study and analysis, higher education institutions must also maintain the quality of their teaching evaluations. Figure 3 depicts the process of English teaching quality results using FNN.

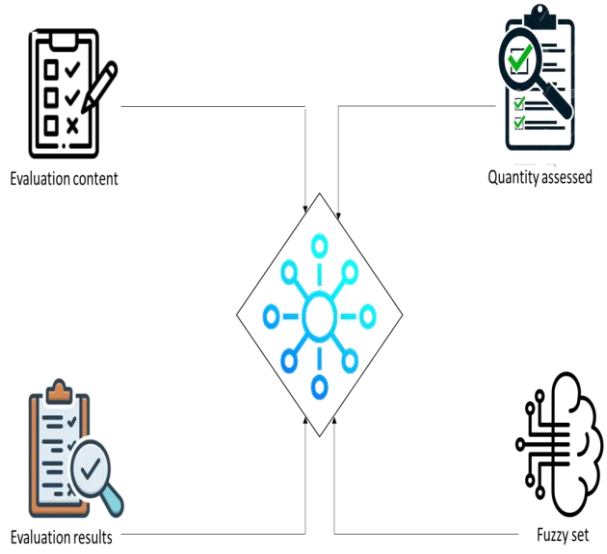

Figure 3: Process of English teaching quality result

According to Figure 3, examiners must promote the establishment of high-quality teaching tests at universities

and colleges if they want to boost the dependability of the outcomes. To enhance the efficacy of the spoken English teaching evaluation, they must also assess teaching quality by teaching criteria and take the required safety measures. An FNN is a thorough analysis technique that incorporates the relationship among many observations and modeling from an enormous quantity of data. English instructors are emphasizing completely reviewing pertinent findings more and more as the data used in the teaching evaluations database develops.

3.5 Fuzzy rule based on FNN

FR is a technique for calculating fuzzy concepts that can be applied to both qualitative as well as quantitative assessments. Then, determine the fuzzy set, its unit, and the total quantity of fuzzy sets.

Figure 3 show the fuzzy level O of each information set's FR. The teaching evaluation database's unit of measurement is T, the probability computation technique is $B_T(Y\forall Y)$, and the formula for calculation O is as follows.

$$O = \sum_{j=1}^{m}[B_T(\ Y\forall Y)_j|d] \quad (2)$$

Where $B_T(Y\forall Y)$ represents any subset item $T_j$and $Y\forall X$ reflects the percentage of the dataset that meets the conditions, T.

The quantity of instruction with YY with T and 95% VJ with x is represented by the dependability z of FRs in the proportion fulfilling the conditions in T. Hence, the ZZ calculation formula is as follows.

$$V = \frac{\lim_{j\to 0} B_T(X_j|Y)|d}{\sum_{j=1}^{m}[B_T(X_j|Y)|d]'} \quad (3)$$

Where $\lim_{j\to 0} B_T(X_j|Y)|d$ represents any piece of the subset of data $T_{j.}$

The following are the evolution formulae for G_j, based on the likelihood $B_T(Y\forall X)$ referenced in the FR constraint.

$$G_j = \frac{\lim_{j\to 0} e_j}{\sum n} \ j \in \{1,2,\ldots.,m\} \quad (4)$$

The fuzziness of the collection of objects $Y\forall X$ is then identified as S.

$$G = \sum_{j=1}^{m} G_j \quad (5)$$

When $g \geq \min(g)$, the item set $Y\forall X$ is a fuzzy set. Based on a formula (5), to represent the projection of the teaching quality test, the fuzzy degree is employed. In some circumstances, it is more accurate to characterize the fuzzy degree projection using the frequency, and the fuzzy level projections are expressed in the following manner.

$$\vec{T} = [\vec{e}_1, \vec{e}_2, \ldots \vec{e}_m] \quad (6)$$

When $G \leq \min(G)$, the item set $Y\forall X$ is not a fuzzy set.

$$GV = [g \to (Y\forall X)_1, g \to (Y\forall X)_2, \ldots g \to (Y\forall X)_m] \quad (7)$$

the relevant predictions and educational quality outcomes test deviate considerably from those of past studies, as shown by the aforementioned FRs. The FRs need to be clarified more to improve the results of the educational quality exam.

4. Result and discussion

The preliminary starting data, the intermediate empirical studies, and the following experimental data were used, respectively, by the researchers to investigate the variations within the three sets of experiment data to get the study's findings. The statistical information and analysis program SPSS22.0 was used to assess and determine if the initial and middle phases demonstrated an improvement in the listening and speaking abilities of English by both teachers and students. The Fuzzy NN is assessed using student Accuracy, proportion, score, ability, teaching diagnostic index, and Test score. Existing methods for comparison are the Production-Oriented Approach (POA) [18], Back Propagation Through Time (BPTT) [19], and Communicative Language Teaching (CLT) [20].

4.1 Ability

Ability refers to the necessary means or skills to accomplish a specific task. The capacity to communicate effectively orally is referred to as speaking competency. It indicates that a person can communicate in a way that is not only grammatically accurate but also easy to comprehend for the person listening. Ineffective communication, having listened, is the ability to hear and learn contact properly. Effective communication starts with listening. If one fails to possess the ability to listen effectively, messages can easily be ignored. Figure 4 displays the students' abilities. Table 3 displays the students' ability results.

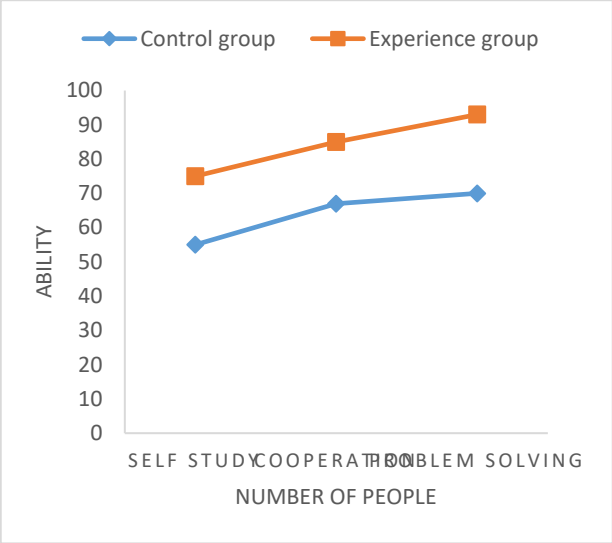

Figure 4: Students speaking and listening ability

Table 3: Result of the ability of the students

Number of people	Ability	
	Control group	Experience group
Self-study	55	75
Cooperation	67	85
Problem-solving	70	93

4.2 Proportion

A component or number evaluated with the total makes up what is known as a proportion. A teaching adjustment was made throughout the study period, role-playing was chosen as the primary setting technique based on the learning requirements and interests of the students. This increased the students' interest and initiative in their studies. Figure 5 denotes the proportion of the student's English knowledge. Table 4 indicates the result of the proportion.

Figure 5: Proportion of the proposed method

Table 4: Results of the proportion

Score range	**Proportion (%)**	
	Grade 2020	**Grade 2021**
More than 425	**24**	**33**
425-355 Score range	**50**	**42**
Less than 355	**25**	**20**

4.3 Teaching diagnostic index

Diagnostic tests are intended to help teachers discover the knowledge and abilities that students acquire in a variety of areas to improve their students' growth. A non-formal diagnostic assessment takes place prior to the initiation of an unfamiliar educational encounter. For example, the teacher might pick up a call and ask a few pupils to share what they've learned about a particular subject. Figure 6 illustrates the teaching diagnostic index. Table 4 shows the result of the **t**eaching diagnostic index.

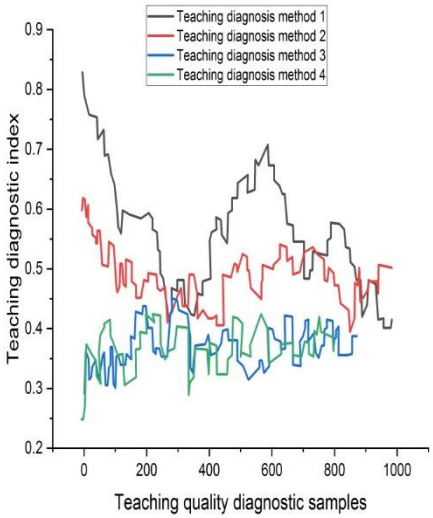

Figure 6: Teaching diagnostic index

4.4 Score

The process of awarding points to a person based on their performance in a particular activity is known as scoring. This research also used descriptive statistical analysis, followed by a paired T-test to determine if the student's English listening ability score had increased following prior research findings and the findings of the student's statistical analysis. The learners' overall English hearing and speaking skills are somewhat below the required value; thus, it is necessary to enhance the scoring capability. The student's academic score is shown in Figure 7. Table 5 displays the scoring result.

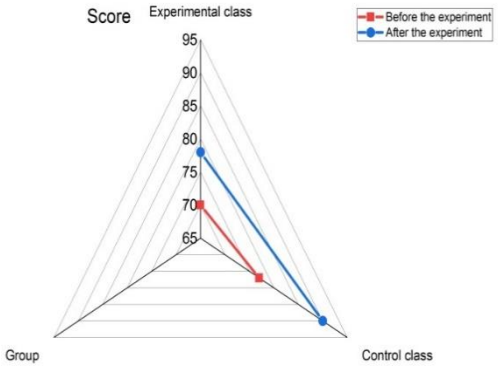

Figure 7: Score of the students learning

Table 5: Results score of the students.

Group	Score
Before the experiment	After the experiment
Experimental class	70
Control class	77

4.5 Students' English test score

English proficiency may be quickly and accurately determined with the help of an English test score. This exam may be used for personal development purposes as it evaluates your skills in the areas of grammar, vocabulary, reading, and listening. The best test scores were obtained using the approach recommended in this article, proving that teachers and students are serious about the assessment scales and have planned the learning objectives for each session. Figure 8 shows the student's English test scores. Table 6 shows the result of the student's English test scores. It indicates that the suggested approach is more effective than the current approach.

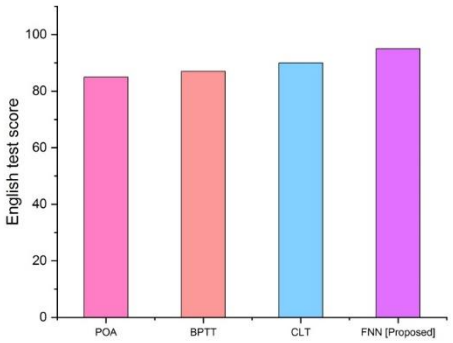

Figure 8: Students' English test score

Table 6: Results of the student's English test scores

Techniques	English test score
POA	85
BPTT	87
CLT	90
FNN [Proposed]	95

The satisfaction level in teaching spoken English for tourism pertains to the extent of gratification and achievement experienced by learners regarding the efficacy of the

language training. Figure 9 and Table 7 show the satisfaction level. The proposed system FNN has 94%, compared to the existing systems POA, BPTT, and CLT, which are respectively 87 %, 83 %, and 89 %. As a result, the proposed system achieves a better satisfaction level in teaching spoken English for tourism.

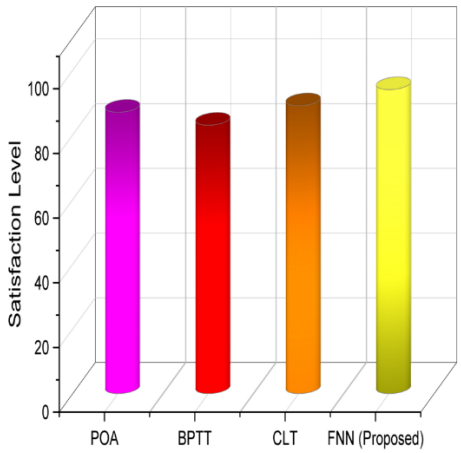

Figure 9: Student's satisfaction level

Table 7: Students satisfaction level

Techniques	Satisfaction Level
POA	87
BPTT	83
CLT	89
FNN (Proposed)	94

Language proficiency in Teaching Spoken English for Tourism relates to the student's ability to utilize the English language effectively and competently in the context of tourism-related communications. Figure 10 and Table 8 show the Language proficiency level. The proposed system FNN has 93%, compared to the existing systems POA, BPTT, and CLT, which are respectively 86 %, 85 %, and 88 %. As a result, the proposed system achieves a better Language proficiency level in teaching spoken English for tourism.

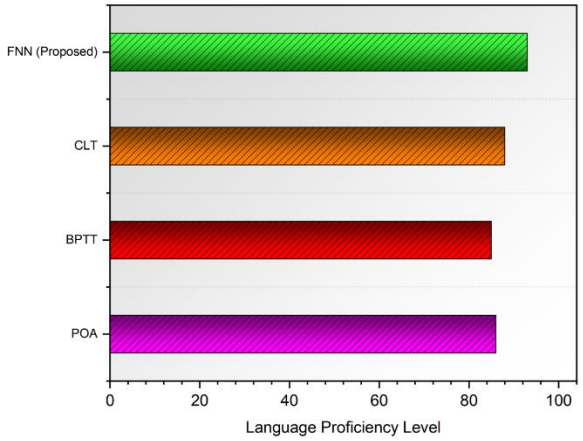

Figure 10: Language proficiency level

Table 8: Language proficiency level

Technique	Language proficiency level
POA	86
BPTT	85
CLT	88
FNN (Proposed)	93

4.6 Discussion

Fluency could be provided priority over accuracy while teaching English as a language for tourism, which is a possible drawback of the POA. Encouragement of students to concentrate on expression and communication is beneficial, but placing too much emphasis on the process could lead them to ignore the significance of proper grammar and pronunciation. It's possible that spoken English in tourist contexts becomes too dynamic and context-dependent for recurrent neural network training algorithms like BPTT to adequately symbolize. The model could have trouble adjusting to the unpredictability and variety of communication in the actual world, which would make it more difficult for it to provide replies that are acceptable for the given context. CLT places a strong emphasis on communication in authentic settings, it is important to remember that specific vocabulary is frequently necessary for efficient communication in the tourist industry. Since correctness and appropriateness are crucial in tourism contexts. FNN provides learners with organized chances to enhance language skills that are essential for effective interactions in the tourist sector, while also striking a balance between correctness and fluency. With this approach, spoken English competency could be developed more thoroughly and carefully to meet the unique needs of the travel and tourist industry.

4.7 Limitation

An inherent constraint in instructing Spoken English for Tourism is the possible disagreement between classroom pedagogy and actual communication situations. Although the classroom provides a structured learning environment, it could prove difficult to adjust to the various linguistic obstacles and cultural distinctions encountered during real-life tourism encounters. Furthermore, the availability of resources and chances for immersion language experiences could be limited, which could affect the extent to which learners are practically exposed to the language.

7 Conclusion

This study focuses on the understanding of FNN and discusses its use in teaching spoken English. It primarily concentrates on the investigation of FNN and English teaching quality evaluation. This study examines the FNN algorithm and the FRs in the approach section and applies the algorithm to a real-world scenario. According to the results, there is now an increasing amount of research on English teaching quality evaluation, which suggests that this field of study has a significant influence on the teaching profession. Previous spoken English education techniques were ineffective and time-consuming. The test score for the proposed method is 95% higher than the existing method's. The research method is simplified, and spoken English teaching is more effective when using an FNN to evaluate the efficiency of teaching English. Consequently, a thorough, in-depth investigation based on associations is essential for analyzing the quality of spoken teaching in English evaluation research.

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