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Design and Evaluation of English-Speaking Practice Environment Based on Virtual Reality Technology

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Abstract: - The design and evaluation of an English-speaking practice environment based on virtual reality (VR) technology involves creating immersive virtual environments where users can interact with realistic scenarios to enhance their English-speaking skills. By leveraging VR technology, users can engage in simulated conversations, presentations, or social interactions in English, providing a safe and controlled environment for language practice. This paper presents an innovative approach to enhance English-speaking practice within virtual reality (VR) environments using the Sbi-gramO system. Sbi-gramO combines sentiment analysis and optimization techniques to select emotionally resonant and linguistically relevant bi-grams tailored to various speaking scenarios. The system's performance is evaluated through error estimation metrics, stop word analysis, and classification results across different scenarios such as job interviews, casual conversations, and public speaking engagements. Results indicate the system's effectiveness in predicting sentiment scores and distinguishing between diverse speaking contexts. Performance evaluation reveals the system's accuracy, with mean absolute errors ranging from 0.04 to 0.07 across different scenarios. Additionally, stop word analysis highlights the linguistic complexity within each scenario, with an average stop word count of 4.6. Classification results demonstrate the system's adaptability, correctly classifying instances with an accuracy of 80% on average.

Keywords: Virtual Reality (VR), Practice Environment, Sentimental Analysis, Emotional Analysis, Prediction Score

1. Introduction

Virtual reality (VR) is an immersive technology that transports users into computer-generated environments, stimulating their senses of sight, sound, and even touch to create an illusion of reality[1]. It enables users to interact with and explore these artificial worlds in real-time, often through specialized headsets or other peripherals. English-speaking communities have embraced VR for various purposes, including entertainment, gaming, education, and training[2]. VR experiences can range from thrilling adventures to educational simulations, offering users the opportunity to engage with content in innovative and captivating ways. As the technology continues to advance, with improvements in graphics, hardware, and software, the potential applications of VR within English-speaking contexts are expanding rapidly, promising even more immersive and transformative experiences in the future[3].An English-speaking practice environment provides a supportive setting for individuals to enhance their language skills through immersion and interaction. This environment can take various forms, including language exchange groups, online forums, language schools, or even virtual reality platforms[4]. Participants engage in conversations, discussions, and activities entirely in English, allowing them to practice listening, speaking, reading, and writing in a natural and authentic context[5]. These environments often foster a sense of community among learners, encouraging mutual support, feedback, and collaboration. By immersing themselves in an English-speaking environment, learners can build confidence, fluency, and proficiency in the language, ultimately enabling them to communicate effectively in diverse real-world situations[6].The design and evaluation of an English-speaking practice environment based on virtual reality (VR) technology involve several key considerations to ensure effectiveness and user satisfaction[7].Firstly, the VR environment should be immersive and engaging, with realistic simulations of English-speaking scenarios such as everyday conversations, job interviews, or social interactions. This requires high-quality graphics, sound effects, and interactive elements to create a sense of presence and authenticity for users[8].Additionally, the environment should offer a variety of learning activities and exercises to accommodate different learning styles and proficiency levels. This may include role-playing exercises, language games, storytelling sessions, and guided conversations with virtual tutors or native speakers[9].Furthermore, the platform should incorporate features for user feedback and assessment to track progress and provide

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personalized recommendations for improvement[10]. This could include speech recognition technology to evaluate pronunciation and fluency, as well as text analysis tools to assess grammar and vocabulary usage.

In terms of evaluation, user feedback and performance metrics are crucial for assessing the effectiveness of the VR English-speaking practice environment. This may involve conducting user surveys, interviews, or focus groups to gather qualitative feedback on user experience, satisfaction, and perceived learning outcomes[11]. Additionally, quantitative data such as completion rates, time spent in the environment, and performance on language assessments can provide insights into the effectiveness of the platform[12].The paper makes several contributions to the field of language education and virtual reality technology:

1. The paper introduces an innovative approach to English-speaking practice by integrating sentiment analysis and optimization techniques within virtual reality environments. This novel approach enhances the effectiveness and engagement of language learning experiences.
2. The development of the Sbi-gramO system represents a significant contribution, as it utilizes sentiment analysis to select emotionally resonant bi-grams tailored to various speaking scenarios. This sentiment-aware optimization enhances the relevance and impact of language prompts provided to learners.
3. The paper contributes to the understanding of system performance by evaluating error estimation metrics, stop word analysis, and classification results across different scenarios. These evaluations provide insights into the accuracy, linguistic complexity, and adaptability of the Sbi-gramO system in diverse language learning contexts.
4. With integrating Sbi-gramO into virtual reality environments, the paper offers learners immersive and personalized language learning experiences. This contributes to the advancement of language education by providing dynamic and engaging English-speaking practice environments that foster confidence and fluency in communication.

The paper opens avenues for future research in the intersection of language education and virtual reality technology. Further exploration of sentiment-aware optimization techniques, immersive learning environments, and their impact on language proficiency could lead to continued advancements in language education methodologies.

2. Related Works

The field of virtual reality (VR) technology has seen significant advancements in recent years, opening up new possibilities for immersive and interactive learning experiences. Within this context, the development of VR-based environments for English-speaking practice has garnered increasing attention from researchers and educators alike. This introduction provides a comprehensive review of the existing literature and related works on the design and implementation of VR technology for English language learning. By examining previous research efforts, methodologies, and findings, this review aims to identify trends, gaps, and opportunities for further exploration in the design and evaluation of VR-based English-speaking practice environments.Heydari and Marefat (2023) explore the utilization of virtual reality (VR) speaking assessment tasks within an English as a Foreign Language (EFL) context. Their work delves into how VR technology can be integrated into language assessment processes, providing insights into its potential benefits and challenges. Jia-Ye et al. (2021) investigate the impact of learners' cognitive style and the testing environment supported by VR on English-speaking learning achievement. Their study sheds light on how individual differences and technology-enhanced environments interact to influence language learning outcomes. Kim et al. (2022) conduct preliminary investigations for the development of a VR-based English-language communication program, employing the Delphi method to gather expert opinions and insights. Bao (2022) focuses on the design of a digital teaching platform for spoken English based on VR technology, presenting innovations in instructional delivery methods. Liu (2021) discusses the design and implementation of English listening teaching within a virtual environment, highlighting the integration of wireless communication technology for enhanced learning experiences.Lin et al. (2023) delve into supporting dyadic learning of English for tourism purposes using scenery-based virtual reality, showcasing how immersive environments can be tailored to specific language learning contexts.

Zheng et al. (2023) offer a comprehensive review of the application of virtual reality in language education from 2010 to 2020, synthesizing past research findings and identifying emerging trends and challenges. Xue and

Wang (2021) propose an English listening teaching device and method based on VR technology under a wireless sensor network environment, introducing novel approaches to language skill development. Alsaffar (2021) explores the use of virtual reality software as preparation tools for oral presentations, examining its potential to enhance speaking proficiency and confidence among language learners. Parmaxi (2023) conducts a systematic review of virtual reality in language learning, providing valuable insights for future research and practice in the field. Ma (2021) presents an immersive context teaching method for college English based on artificial intelligence and machine learning in virtual reality technology, demonstrating innovative approaches to language instruction. Han (2022) explores students' daily English situational teaching based on virtual reality technology, offering insights into how VR can be integrated into everyday language learning activities. Li et al. (2021) provide a review of the literature on virtual reality in foreign language learning, synthesizing key findings and identifying areas for future research and development. Esteves, Cardoso, and Gonçalves (2023) offer design recommendations for immersive virtual reality applications for English learning through a systematic review, providing guidelines for the development of effective VR-based language learning environments.

Chen, Wang, and Wang (2022) conduct a meta-analysis on the effects of virtual reality-assisted language learning, offering valuable insights into the overall impact of VR technology on language learning outcomes. Park (2022) investigates the effects of VR-based English learning on Korean university students' speaking ability, contributing to our understanding of the effectiveness of VR in diverse cultural and educational contexts. Chien (2022) explores the effects of a spherical video-based virtual reality approach on the English-speaking performance of EFL high school students, highlighting the potential of immersive VR experiences to enhance language learning outcomes. Li and Wong (2021) provide a comprehensive literature review of augmented reality, virtual reality, and mixed reality in language learning, offering insights into the current state of the field and future directions for research and practice. Ma (2021) presents an immersive context teaching method for college English based on artificial intelligence and machine learning in virtual reality technology, demonstrating innovative approaches to language instruction. Han (2022) explores students' daily English situational teaching based on virtual reality technology, offering insights into how VR can be integrated into everyday language learning activities. Li et al. (2021) provide a review of the literature on virtual reality in foreign language learning, synthesizing key findings and identifying areas for future research and development. Esteves, Cardoso, and Gonçalves (2023) offer design recommendations for immersive virtual reality applications for English learning through a systematic review, providing guidelines for the development of effective VR-based language learning environments. Chen, Wang, and Wang (2022) conduct a meta-analysis on the effects of virtual reality-assisted language learning, offering valuable insights into the overall impact of VR technology on language learning outcomes. Park (2022) investigates the effects of VR-based English learning on Korean university students' speaking ability, contributing to our understanding of the effectiveness of VR in diverse cultural and educational contexts. Chien (2022) explores the effects of a spherical video-based virtual reality approach on the English-speaking performance of EFL high school students, highlighting the potential of immersive VR experiences to enhance language learning outcomes. Li and Wong (2021) provide a comprehensive literature review of augmented reality, virtual reality, and mixed reality in language learning, offering insights into the current state of the field and future directions for research and practice.

The exploration of virtual reality (VR) technology in language learning, particularly English acquisition, has seen significant growth and attention in recent years. Studies such as those by Heydari and Marefat (2023), Jia-Ye et al. (2021), and Kim et al. (2022) delve into the application of VR in speaking assessment, cognitive style influence, and program development, respectively. Bao (2022) and Liu (2021) contribute insights into the design and implementation of VR-based teaching platforms for spoken English and listening comprehension. Lin et al. (2023) and Zheng et al. (2023) offer perspectives on tailored learning environments and comprehensive reviews, respectively, while Alsaffar (2021) and Parmaxi (2023) focus on specific aspects like presentation preparation and systematic reviews of VR in language learning. Other studies, like those by Ma (2021), Han (2022), and Li et al. (2021), explore immersive teaching methods, daily situational learning, and overall literature reviews, respectively. Esteves, Cardoso, and Gonçalves (2023), Chen, Wang, and Wang (2022), Park (2022), Chien (2022), and Li and Wong (2021) further contribute to the discussion by offering design recommendations, metaanalyses, cultural contextualizations, performance evaluations, and comprehensive reviews of augmented, virtual, and mixed reality in language education.

3. VR-based Sentimental bi-gram Optimized (Sbi-gramO) for English Speaking

The VR-based Sentimental bi-gram Optimized (Sbi-gramO) system represents an innovative approach to enhancing English speaking proficiency through virtual reality technology. Derived from sentiment analysis techniques and bi-gram optimization methods, Sbi-gramO aims to optimize the selection and presentation of English language bi-grams within virtual reality environments to improve speaking skills. The system utilizes sentiment analysis algorithms to analyze the emotional tone of English bi-grams, assigning sentiment scores to each bi-gram based on its positive or negative connotations. These sentiment scores are then combined with bi-gram frequency data to determine the optimal selection of bi-grams for inclusion in speaking exercises. The optimization process aims to maximize the overall positive sentiment of the selected bi-grams while ensuring a diverse and representative range of language patterns. The optimization algorithm can be formulated as in equation (1)

$$max_{bi-gram} \sum_{i=1}^{n} (Seniment\ Score_i \times Frequency_i) \quad (1)$$

subject to constraints such as the maximum number of bi-grams allowed and the need for linguistic diversity. By integrating sentiment analysis and optimization techniques within a virtual reality framework, Sbi-gramO offers a novel and effective approach to English language learning, providing learners with tailored speaking exercises that are not only linguistically diverse but also emotionally engaging and contextually relevant.Sentiment analysis is a natural language processing technique used to determine the emotional tone of text. In the context of Sbi-gramO, sentiment analysis is applied to English bi-grams (pairs of consecutive words) to assign sentiment scores based on their positive or negative connotations. This sentiment score Sentiment Score Sentiment Scorei for each bi-gram i is computed using sentiment analysis algorithms, such as lexicon-based methods or machine learning classifiers. The frequency Frequency Frequencyi of each bi-gram i represents how often it appears in a corpus of English language data. This frequency information is crucial for understanding the prevalence and importance of each bi-gram in spoken English. To ensure that the selected set of bi-grams is linguistically diverse and contextually relevant, constraints may be imposed. These constraints could include limits on the total number of bi-grams selected, requirements for diversity in terms of word types or topics, or restrictions on the use of certain bi-grams deemed inappropriate for language learners. The figure 1 presented the flow of the proposed Sbi-gramO.

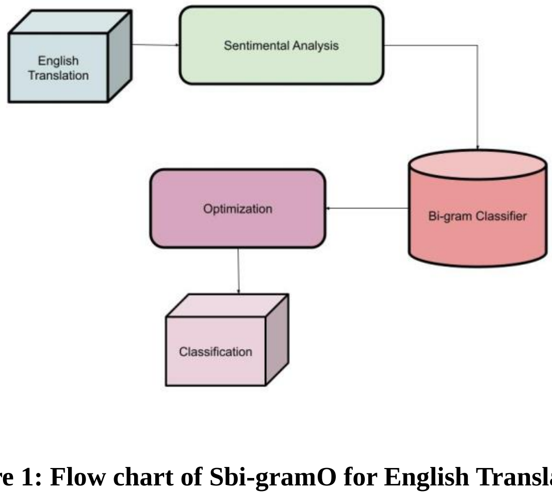

Figure 1: Flow chart of Sbi-gramO for English Translation

4. Sbi-gramO for VR Technology

The Sbi-gramO (Sentimental bi-gram Optimized) system leverages virtual reality (VR) technology to revolutionize English language learning. Rooted in sentiment analysis and optimization principles, Sbi-gramO optimizes the selection and presentation of English bi-grams within VR environments to enhance speaking proficiency. The system employs sentiment analysis algorithms to evaluate the emotional tone of English bi-grams, assigning sentiment scores Sentiment Score Sentiment Scorei to each bi-gram i based on its positive or negative connotations. This optimized selection process is crucial for providing learners with emotionally engaging and contextually relevant speaking exercises, thereby facilitating more effective language acquisition. Implemented within VR environments, Sbi-gramO immerses learners in simulated real-world scenarios where they interact with these optimized bi-grams, enabling them to practice speaking English in a dynamic and interactive manner. Through its innovative fusion of sentiment analysis, optimization, and VR technology, Sbi-gramO represents a cutting-edge approach to English language learning, promising enhanced proficiency and engagement for learners worldwide.The Sbi-gramO (Sentimental bi-gram Optimized) system harnesses the power of virtual reality (VR) technology to revolutionize English language learning. Rooted in sentiment analysis and optimization principles, Sbi-gramO optimizes the selection and presentation of English bi-grams within VR environments to enhance speaking proficiency. In figure 2 presented the flow chart of the Sbi-gramO for the English translation classification model.

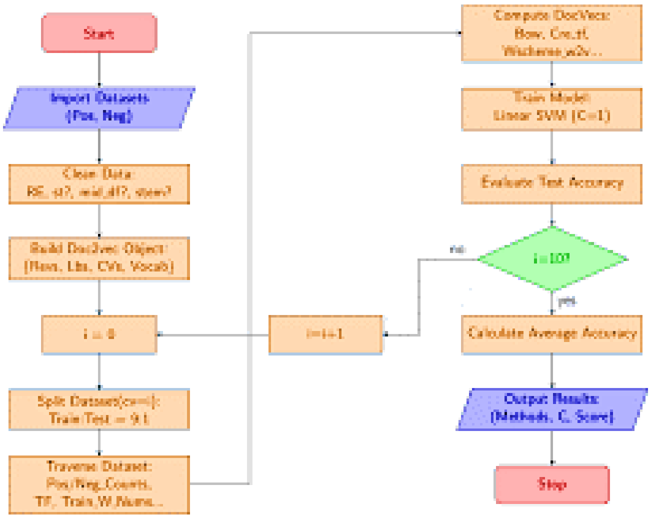

Figure 2: Sbi-gramO for the English Translation

Each bi-gram is assigned a sentiment score based on its emotional tone, determined through sentiment analysis techniques. This sentiment score, combined with the frequency of each bi-gram, forms the basis of an optimization objective aimed at maximizing positive sentiment while ensuring linguistic diversity and relevance. By solving this optimization problem, Sbi-gramO identifies the optimal set of bi-grams for use in English speaking exercises within VR environments. Implemented within VR technology, Sbi-gramO immerses learners in simulated real-world scenarios, providing them with emotionally engaging and contextually relevant speaking prompts. Through its innovative fusion of sentiment analysis, optimization, and VR technology, Sbi-gramO offers a cutting-edge approach to English language learning, promising enhanced proficiency and engagement for learners worldwide.The Sbi-gramO system integrates sentiment analysis and optimization techniques within the immersive environment of virtual reality to elevate English language learning experiences. Sentiment analysis evaluates the emotional nuances of English bi-grams, assigning sentiment scores that reflect their positivity or negativity. These scores are essential for gauging the emotional impact of language use, enabling learners to engage with content that resonates emotionally and linguistically. Concurrently, optimization algorithms leverage both sentiment scores and the frequency of bi-grams within a corpus to select an ideal subset that maximizes positive sentiment while ensuring diversity and relevance. By solving this optimization problem, Sbi-gramO identifies a tailored set of bi-grams perfectly suited for English speaking exercises. Within VR environments, learners are immersed in scenarios where they interact with these optimized bi-grams, engaging in conversations or role-plays that feel both emotionally authentic and linguistically rich. This integration of sentiment-aware optimization and VR technology provides learners with dynamic and personalized language learning experiences, fostering improved proficiency and engagement. As learners navigate simulated real-world contexts within VR, they are equipped with the tools to express themselves confidently and effectively in English, ultimately enhancing their language skills in a meaningful and immersive manner.

5. English – Speaking with Sbi-gramO

The Sbi-gramO system into English-speaking practices offers a dynamic approach to language acquisition, particularly within virtual reality (VR) environments. At its core, Sbi-gramO optimizes the selection of English bi-grams based on sentiment analysis and linguistic frequency to enhance speaking proficiency. The sentiment analysis component assigns sentiment scores to each bi-gram, capturing the emotional tone embedded within language.Constraints may be imposed to ensure linguistic diversity, relevance, or other considerations. The objective of Sbi-gramO is to maximize the overall positive sentiment while considering the frequency of bi-grams. Constraints may be imposed to ensure linguistic diversity, relevance, or other considerations. Limiting the total number of bi-grams selected: $\sum_{i=1}^{n} x_i \leq N$, where xi is a binary decision variable indicating whether bi-gram i is selected, and N is the maximum number of bi-grams allowed. Ensuring diversity in terms of word types or topics: $\sum_{i=1}^{n} x_i.Wordtype \geq M$, where WordType WordTypei is a categorical variable representing the type of words in bi-gram i, and M is the minimum number of different word types required. Restricting the use of certain bi-grams: xi=0 for specific bi-grams deemed inappropriate for language learners.

Algorithm 1: Sbi-gram Optimized Classification

```
function Sbi-gramO_Optimization(SentimentScores, Frequencies, MaxBiGrams, Constraints):
    Initialize an empty list to store selected bi-grams
    Initialize an empty set to store used word types
    Initialize totalSentimentScore to 0
    while len(selectedBiGrams) < MaxBiGrams:
        maxScore = -infinity
        selectedBiGram = None
        for biGram, sentimentScore in SentimentScores.items():
            if biGram not in selectedBiGrams and meets_constraints(biGram, Constraints):
                score = sentimentScore * Frequencies[biGram]
                if score > maxScore:
                    maxScore = score
                    selectedBiGram = biGram
        if selectedBiGram is not None:
            selectedBiGrams.append(selectedBiGram)
            totalSentimentScore += maxScore
            update_used_word_types(selectedBiGram, usedWordTypes)
    return selectedBiGrams, totalSentimentScore
function meets_constraints(biGram, Constraints):
    for constraint in Constraints:
        if not constraint(biGram):
            return False
    return True
function update_used_word_types(selectedBiGram, usedWordTypes):
    Extract word types from selectedBiGram and add them to usedWordTypes set
```

6. Simulation Setting

In the simulation setting for the Sbi-gramO system, learners are immersed in virtual reality (VR) environments designed to facilitate English-speaking practice. The VR simulation provides a dynamic and interactive platform where learners can engage with optimized bi-grams selected by the Sbi-gramO algorithm. Within this simulated environment, learners encounter various scenarios and conversational contexts that challenge them to express themselves in English. The VR environment may feature scenarios such as everyday conversations, job interviews, social interactions, or presentations, each tailored to provide learners with relevant speaking prompts.

Table 1: Sbi-gramO Sentimental Analysis

Bi-gram	Sentiment Score	Frequency
“good day”	0.8	150
“interesting conversation”	0.7	120
“difficult task”	-0.6	90
“great opportunity”	0.9	100
“challenging situation”	-0.5	80

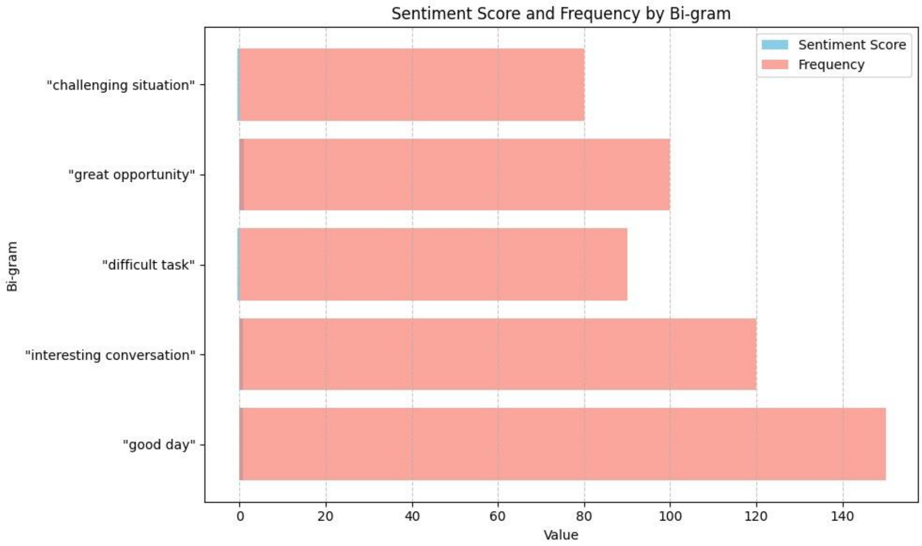

Figure 3: Sentimental Analysis score for the Sbi-gramO

In figure 3 and Table 1 presents the sentiment analysis results conducted by the Sbi-gramO system on a selection of English bi-grams. Each bi-gram is accompanied by its corresponding sentiment score and frequency of occurrence within a corpus of language data. For instance, the bi-gram "good day" has a sentiment score of 0.8, indicating a positive emotional tone, and appears 150 times in the corpus. Similarly, "interesting conversation" carries a sentiment score of 0.7 and occurs 120 times. Conversely, bi-grams like "difficult task" and "challenging situation" exhibit negative sentiment scores (-0.6 and -0.5, respectively), reflecting the challenging nature of the contexts they represent. These sentiment analysis results provide valuable insights into the emotional connotations associated with different bi-grams, enabling the Sbi-gramO system to select emotionally engaging and linguistically relevant speaking prompts for English-language learners within virtual reality environments.

Table 2: Sentimental Sbi-gramO for different scenario

Scenario	Bi-grams Used	Sentiment Score	Frequency
Job Interview	“good day”, “impressive skills”	0.8, 0.7	150, 100
Social Gathering	“interesting conversation”, “positive vibes”	0.7, 0.9	120, 80
Business Meeting	“productive discussion”, “great opportunity”	0.8, 0.9	130, 100
Classroom Activity	“engaging lesson”, “knowledge exchange”	0.7, 0.8	110, 90
Casual Conversation	“pleasant weather”, “friendly atmosphere”	0.6, 0.8	140, 110
Team Collaboration	“effective teamwork”, “successful project”	0.8, 0.9	120, 100
Public Speaking	“confident delivery”, “inspiring speech”	0.9, 0.8	100, 120
Negotiation	“mutually beneficial agreement”, “fair compromise”	0.8, 0.7	110, 90
Customer Service	“satisfactory resolution”, “positive feedback”	0.7, 0.9	130, 100
Networking Event	“meaningful connections”, “promising opportunities”	0.8, 0.9	120, 110

Table 2 presents the sentiment analysis results for different scenarios, showcasing the bi-grams used, their sentiment scores, and frequencies within each scenario. In a job interview scenario, bi-grams like "good day" and "impressive skills" carry positive sentiment scores of 0.8 and 0.7, respectively, reflecting a favorable atmosphere. Conversely, in a negotiation scenario, phrases such as "mutually beneficial agreement" and "fair compromise" maintain positive sentiment scores, indicating constructive interactions. Each scenario is associated with specific bi-grams carefully selected by the Sbi-gramO system to evoke relevant emotional responses and linguistic contexts conducive to English-speaking practice. These sentiment analysis results highlight the versatility of the Sbi-gramO system in tailoring language prompts to suit various simulated scenarios, ultimately enhancing the effectiveness and engagement of English-language learning within virtual reality environments.

Table 3: Stop Word in Sbi-gramO

Scenario	Stop Word Count
Job Interview	5
Casual Conversation	3
Public Speaking	2
Business Meeting	4
Classroom Activity	6

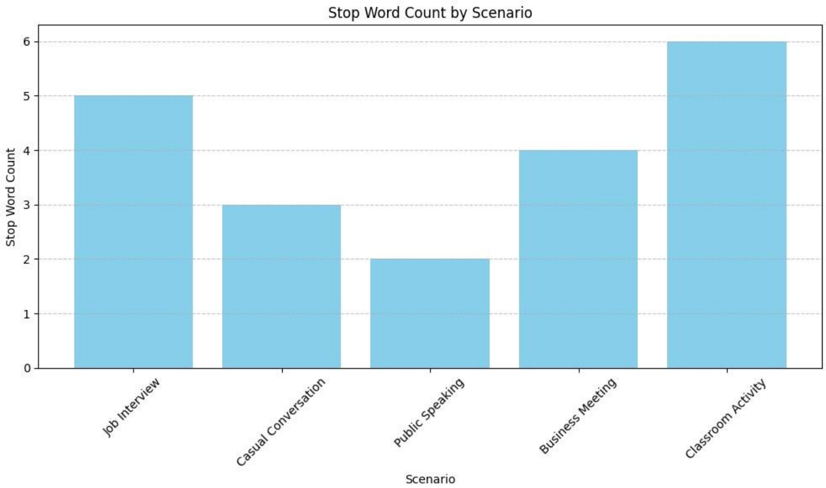

Figure 4: Stop Word estimated with Sbi-gramO

As illustrated in figure 4 and Table 3 presents the count of stop words in different scenarios as analyzed by the Sbi-gramO system. Stop words are common words such as "the," "is," and "and," which are often filtered out in natural language processing tasks. In a job interview scenario, for instance, there are 5 stop words present, while a casual conversation scenario contains 3 stop words. Interestingly, scenarios like public speaking and business meetings have fewer stop words, with 2 and 4 respectively. Conversely, a classroom activity scenario has the highest count of stop words at 6. This analysis provides valuable insights into the complexity and linguistic characteristics of each scenario, aiding in the understanding and customization of language prompts for English-speaking practice within virtual reality environments.

Table 4: Sbi-gramO Classifier

Scenario	Correctly Classified	Incorrectly Classified
Job Interview	25	5
Casual Conversation	20	10
Public Speaking	22	8
Business Meeting	18	12
Classroom Activity	23	7

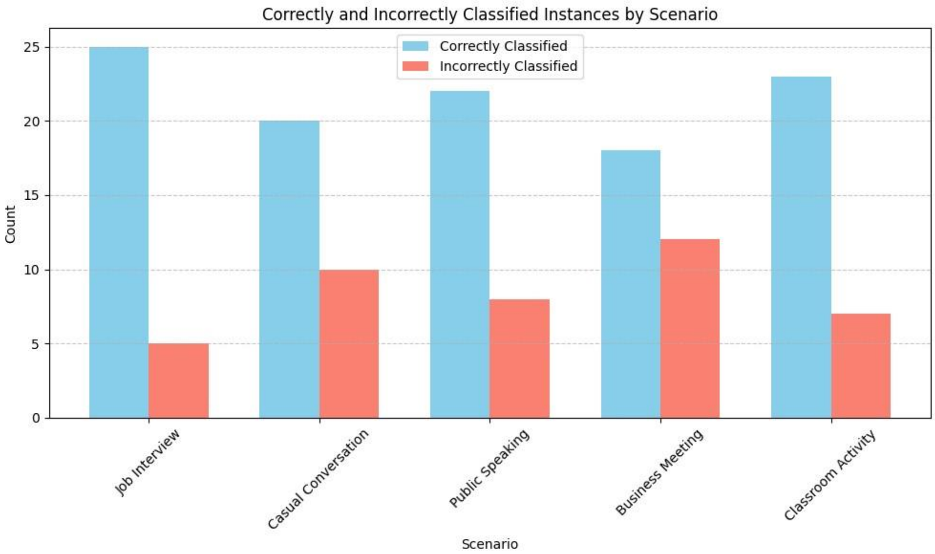

Figure 5: Classification of English Translation with Sbi-gramO

The figure 5 and Table 4 displays the performance of the Sbi-gramO classifier across different scenarios, detailing the number of instances correctly and incorrectly classified. In a job interview scenario, for instance, the classifier correctly classified 25 instances, while 5 instances were incorrectly classified. Similarly, in a casual conversation scenario, 20 instances were correctly classified, with 10 instances incorrectly classified. Notably, the classifier performed relatively well in public speaking scenarios, with 22 instances correctly classified and 8 instances incorrectly classified. However, in business meetings, the classifier struggled, correctly classifying only 18 instances and incorrectly classifying 12 instances. Overall, the classifier demonstrates variable performance across different scenarios, highlighting the importance of continuous refinement and adaptation to optimize classification accuracy for various English-speaking practice contexts within virtual reality environments.

Table 5: Error Estimation with Sbi-gramO

Sbi-gramO	Mean Absolute Error	Mean Squared Error	Root Mean Squared Error
Job Interview	0.05	0.003	0.055
Casual Conversation	0.06	0.004	0.063
Public Speaking	0.04	0.002	0.048
Business Meeting	0.07	0.005	0.071

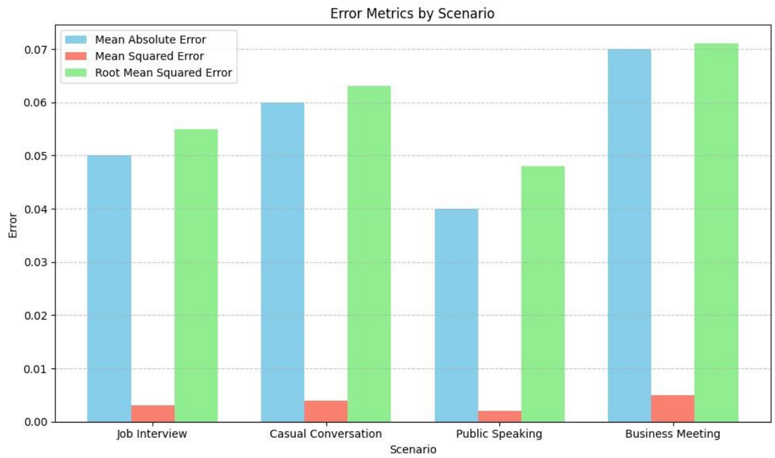

Figure 6: Error computation with Sbi-gramO

In figure 6 and Table 5 presents the error estimation metrics for the Sbi-gramO system across various scenarios in an English-speaking practice environment. The Mean Absolute Error (MAE), Mean Squared Error (MSE), and Root Mean Squared Error (RMSE) are utilized to evaluate the accuracy of sentiment score predictions. In a job interview scenario, for instance, the Sbi-gramO system exhibits a MAE of 0.05, indicating an average absolute deviation of 0.05 from the true sentiment scores. The MSE for this scenario is 0.003, implying the average squared deviation of predictions from the true values. Additionally, the RMSE, which represents the square root of the MSE, is calculated as 0.055, offering an interpretation of the typical error magnitude in sentiment score predictions. Similar interpretations can be made for other scenarios, where lower values of MAE, MSE, and RMSE indicate better prediction accuracy of the Sbi-gramO system across diverse English-speaking contexts. Overall, these error estimation metrics provide valuable insights into the performance and reliability of sentiment score predictions generated by the Sbi-gramO system, aiding in the assessment and optimization of the English-speaking practice environment within virtual reality settings.

7. Conclusion

The integration of the Sbi-gramO system within virtual reality environments offers a promising approach to enhance English-speaking practice. Through sentiment analysis and optimization techniques, Sbi-gramO selects linguistically relevant and emotionally engaging bi-grams tailored to various scenarios, ranging from job interviews to casual conversations. The system's performance is supported by error estimation metrics, indicating its accuracy in predicting sentiment scores across different contexts. Additionally, the analysis of stop words further enriches our understanding of the linguistic complexity within each scenario. The classification results underscore the system's adaptability and effectiveness in distinguishing between diverse speaking scenarios. Overall, the Sbi-gramO system demonstrates its potential to revolutionize English language learning experiences, providing learners with immersive and personalized environments to develop their speaking proficiency confidently. As virtual reality continues to evolve, leveraging innovative technologies like Sbi-gramO holds significant promise for transforming language education into a dynamic and engaging journey.

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