

A Literature Survey on SpeakSmart: AI – Enhanced Language Learning Guide

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Abstract: *This extensive review of the literature examines the pervasive impact of artificial intelligence (AI) on language learning and teaching, covering innovative uses like real-time language practice, personalized language learning, and automated testing methods in the teaching of English as a foreign language (EFL). The survey covers a wide range of topics, such as the use of Natural Language Processing (NLP) to extract Business Process Models in Business Process Management (BPM), the deployment of English-language chat-bots operating on the WeChat platform that are based on transfer learning, and the incorporation of NLP tools and virtual reality in the e-learning platform Exills. Additionally, it delves into cutting-edge technologies such as chat-bots for language learning, low-resource spoken language learning applications with AI support, and the broad application of AI in EFL teaching, tackling issues and offering encouraging results. The poll also addresses the use of AI in language learning tools, focusing on transparency and ethical issues while utilizing chat-bots, machine translation, speech recognition, and AI-generated content. The study highlights the importance of exposure to different cultures, community interaction, and multilingual voice recognition in creating a comprehensive language learning environment. It also highlights the limitations and enormous possibilities of integrating AI into language instruction.*

Keywords: AI in Language Teaching, Chat GPT, Natural Language Processing, Gamified Language Learning, Sentiment Analysis, Cross-Language Transfer, Spoken Language Learning, Intelligent Tutoring Systems, Multilingual Speech Recognition, Machine Translation

I. INTRODUCTION

Artificial Intelligence (AI) has become appearing across multiple sectors, demonstrating its capacity to transform conventional methodologies. This review of the literature explores eight different works that provide insight into the use of AI in language acquisition, ranging from gamified apps to sophisticated tutoring systems. Together, these studies examine the complex relationship between artificial intelligence (AI) and language acquisition, taking into account elements of deep learning, natural language processing, and machine learning.

A virtual community-based personalized language learning tool is at the heart of the presented proposal. The aim is to boost students' motivation and language proficiency by combining gamified activities with virtual networks. The review talks about the issue of language students regularly neglecting recently scholarly capacities since they don't practice them enough, featuring the need of imaginative instruments to help proceeded with language advancement[1]. The significance of taking into account student variability is emphasized by the acquisition. It emphasizes the need to abandon the "one size fits all" approach in favor of individualized training, particularly in technologically advanced and online-based learning environments. As well as examining a few innovations supporting clever and versatile language guidance, the paper groups ITS inside the bigger setting of PC helped language learning [3].

A strategy for rapidly making voice acknowledgment models for new dialects is introduced in multilingual voice, which tends to multilingual discourse acknowledgment preparing using language-explicit door units. The common stowed away layer multilingual profound brain network design is introduced in this paper, along with language-explicit entryway units that show how well the framework adjusts to various dialects [4]. In the paper, an investigation into machine learning for language translation rules is conducted in order to discover translation rules between regulated

languages. Revised rules comprised of component developments are the fundamental subject of conversation, with applications in the interpretation of mail-request item depictions. The term "controlled languages" refers to domain-specific, vocabulary-limited sublanguages that aid in accurate machine translation. [5]. Guess it! , A gamified app is made available to make peer assessment for learning foreign languages easier. The virtual community that the software provides for language practice aims to boost student motivation and engagement. The review examines the requirement for additional devices to help students beyond the homeroom, given the power of free learning in language courses [6]. It centers around the meaning of close to home jargon during the time spent learning a second or unknown dialect and inspects how opinion investigation can be utilized to further develop language capability. To fabricate understudies inclination language, the survey presents resolve, a setting careful inclination identical proposing structure that uses assessment methods. To help with acceptable language use, the system proposes counterparts for sentiments and gives usage information [7]. The goal is to recognize shared talk features among source and target lingos through cross-language move talk affirmation. Without depending upon named target language data, the suggested strategy semi-supervisedly learns get language shared talk features through significant learning. While presenting it, the review highlights the possibility of a one-of-a-kind design for cross-language move voice recognition in resolving language-explicit challenges. [8].

The Design and Implementation of English Language Transfer Learning Agent Apps: Language Chat-bot, This study inspects the improvement of Normal Language Handling innovation and the effect of man-made brainpower (simulated intelligence), with an emphasis on the latest thing of talk bots. It diagrams the shift from decide based talk bots that emulate human discourse to frameworks that depend on brain organizations and information recovery. The emphasis is on brain organizations' independent regular language age controlled by enormous information [9]. The topic of "Bots as Language Learning Tools" focuses on the challenges that students face when learning a new language, such as lack of motivation, incorrect pronunciation, and cultural differences. It talks on the shortcomings of conventional language learning techniques, such as software and language laboratories, and the need for more engaging and successful means of teaching languages [10]. Cultivating a man-made knowledge Aided Low-Resource Imparted in Language Learning Application for Young people researches the use of cell phones with game-based conveyed in language learning with an accentuation on language learning for kids. The making of an adaptable application for changed talk confirmation in low-asset dialects utilizing free PC based knowledge is covered. The objective is to moreover cultivate youthful students' bestowed in language advancing by offering a connecting with and game-based approach [11].

II. LITERATURE SURVEY

2.1 An App for Language Learners [1]

The paper presents an imaginative language learning application called "Lingua," created to address the developing significance of learning numerous dialects in the present globalized world. The creators accentuate the meaning of reasonable language practice through collaboration with networks and individuals communicating in the objective language. Lingua establishes a virtual climate where clients can drench themselves in language learning networks, connecting with others, and participating in different imaginative and fun exercises to improve their language abilities. By combining social interaction with technological advancements, Lingua aims to provide an enjoyable and effective language learning experience.

A comprehensive approach to language learning that combines interpersonal interaction, gamification, and vivid encounters to improve language abilities is offered by the proposed application, which appears to address the limitations of a few existing devices.

Advantages: Lingua addresses the importance of practical language practice by creating a virtual environment where users can interact with communities and people speaking the target language. This immersive approach enhances real-world language skills.

Disadvantages: Users might face an initial learning curve when adapting to the virtual environment and diverse features offered by Lingua. Ensuring a user-friendly interface and providing adequate tutorials can help mitigate this challenge.

2.2 Extracting Business Process Models using Natural Language Processing (NLP) Techniques [2]

In order to automatically generate business process models from existing organizational documentation, this Doctoral Consortium paper investigates the application of Natural Language Processing (NLP) techniques in the field of Business Process Management. Activities, resources, tasks, and patterns are just some of the components of a business process model that can be derived using the proposed method's syntactic and grammatical structure. Using NLP strategies, for example, Grammatical feature labelling, Named Substance Acknowledgment, and Co-reference Goal, the point is to ease framework examiners from the time-serious assignment of physically demonstrating business processes. The exploration frames a far reaching strategy including writing survey, issue order, improvement of an original change approach, making of a test dataset, and assessment utilizing chart alter distance.

The proposed arrangement includes a three-stage change approach, using computational phonetics devices like Stanford Parser, WordNet, and FrameNet. Anaphora resolution, syntactic parsing, and mapping to BPMN elements are all part of the first two phases, which are centered on sentence and text level analysis.

Advantages: By automating the generation of business process models from textual documentation, the proposed NLP approach can significantly reduce the time and effort required by system analysts. This efficiency can lead to faster analysis and decision-making in the business process management domain.

Disadvantages: Some business processes may be inherently complex and involve nuanced information that is challenging to capture accurately through NLP techniques. The system's ability to handle intricate scenarios may be limited.

2.3 Intelligent Tutoring Systems for Language Learning [3]

The paper discusses the role of Intelligent Tutoring Systems (ITS) in computer-assisted language learning (CALL), emphasizing the importance of individualized approaches in education. It explores the historical evolution of CALL from the "computer-as-a-tool" to the "computer-as-a-tutor" modality, highlighting the transformative impact of artificial intelligence, natural language processing, and user modeling.

The authors argue that the goal of CALL, particularly in the context of language learning, should be to simulate human teachers' pedagogical competence using ITS. The paper outlines the theoretical framework for ITS in language learning, covering components such as the domain model, learner model, tutoring model, user interface model, and feedback module.

Advantages: The integration of artificial intelligence (AI) and natural language processing (NLP) technologies enables ITS to understand and respond to learners' language use in a more sophisticated and context-aware manner, enhancing the overall learning experience.

Disadvantages: Effective use of ITS relies on reliable technology infrastructure, including hardware, software, and internet connectivity. In areas with limited access to these resources, learners may face challenges in fully benefiting from ITS.

2.4 Multilingual Speech Recognition Training and Adaptation with Language-Specific Gate Units [4]

In this research, the Shared-Hidden-Layer Multilingual Deep Neural Network (SHL-MDNN) framework is explored within the context of multilingual speech recognition. The SHL-MDNN architecture involves common hidden layers shared across multiple languages, with individual output layers specific to each language. The study introduces language-specific gate units as an adaptation technique, adding them to the output layers based on language-specific context-dependent states. These LGUs leverage language identification information obtained from the multi task framework, demonstrating competitive performance compared to conventional SHL-MDNNs.

The experiments involve adapting the SHL-MDNN with LGUs, incorporating language vectors extracted from both bottleneck layers and pre-soft max layers. The LGU adaptation enhances the language-dependent outputs, and results show that the bottleneck-style and pre-soft max-style language vectors yield comparable performance. Overall, the proposed SHL-MDNN model, with LGU adaptation, showcases improved recognition accuracy across multiple languages, highlighting the potential of this approach in addressing the challenges of building multilingual speech recognition systems.

Advantages: The SHL-MDNN with LGUs leverages a multi task learning framework, which can enhance the model's ability to learn representations across languages simultaneously. This approach can be beneficial when there is limited labelled data for certain languages.

Disadvantages: Imbalances in the amount of training data available for different languages may lead to biased representations and performance disparities. Techniques to address data imbalances need to be considered for equitable model adaptation.

2.5 Machine Learning of Language Translation Rules [5]

The paper talks about AI techniques for making language interpretation rules with regards to controlled dialects (CLs), which are space explicit sublanguages with limited jargon and grammar. The creators present a regulated, human-helped learning way to deal with produce summed up interpretation rules, planning to facilitate the transformation of machine interpretation frameworks to new dialects.

The authors evaluate their strategies through tests of sentence alignment, split alignment, semantic classification, and generalization. The sentence game plan procedure achieved an overall precision of 98.1%, showing the sufficiency of the proposed approach. The split game plan really made more unassuming standards for less complex language definition variety.

Advantages: The paper introduces generalization techniques, which contribute to creating generalized translation rules. These techniques enable the system to capture broader patterns and structures, enhancing its ability to handle variations within controlled languages.

Disadvantages: While the paper demonstrates promising results in the context of a mail-order product catalogue, scalability to larger and more diverse datasets or domains may pose challenges. The effectiveness of the proposed methods in handling a broader range of texts needs further exploration.

2.6 Foreign language learning using a gamified APP to support peer-assessment [6]

The paper discusses the development and implementation of the Guess it! Language Trainer APP, a gamified mobile application designed to enhance foreign language learning through peer-assessment and collaborative knowledge construction. The APP focuses on interactive and constructive learning approaches, encouraging learners to actively participate in tasks such as guessing and explaining words in the target language. The study, conducted with students in a German Foreign Language course, shows positive results in terms of language acquisition, student engagement, and the automated assessment of various competencies. The APP's dynamic content generation, peer-assessment features, and integration of gamification elements contribute to a versatile and motivating tool for language learners outside the classroom.

Advantages: The mobile nature of the app ensures flexibility and accessibility. Learners can engage with language tasks on their mobile devices, facilitating learning anytime and anywhere. This accessibility is particularly beneficial for learners with varying schedules.

Disadvantages: The app involves the collection and processing of user data for assessment and personalized learning. Ensuring data privacy and security is crucial to address concerns related to the protection of learner information.

2.7 Application of Sentiment Analysis to Language Learning [7]

This study addresses the frequently ignored issue of feeling jargon in second or unknown dialect learning. Emotion words assume a vital part in opinion examination, however students frequently face difficulties because of lacking educational materials. The review presents RESOLVE, a setting mindful feeling equivalent word idea framework, created through AI methods. RESOLVE helps students by recommending proper inclination words in view of logical data and gives use subtleties to improve vocabulary information.

This imaginative methodology, incorporating feeling investigation innovation into language learning, offers a promising answer for the dismissed area of emotion vocabulary. The positive results saw in the review recommend that such devices can be important augmentations to language schooling, assisting students with growing their vocabulary and work on their capacity to communicate feelings in a more nuanced way.

Advantages: The integration of sentiment analysis technology into language learning is an innovative and effective approach. It addresses a specific linguistic challenge related to emotion vocabulary, showcasing the potential of advanced technologies in enhancing language education.

Disadvantages: The effectiveness of RESOLVE is highly dependent on the accuracy of sentiment analysis technology. Inaccuracies in analysing the sentiment of a given context may lead to inappropriate or irrelevant emotion word suggestions.

2.8 Cross-language transfer speech recognition using deep learning [8]

The goal is to change phoneme models made in one language to see another dialect without stamped data from the objective language. The proposed system utilizes solo sorting out some way to construe shared talk features between the source and target lingos, allowing the goal phones to be wanted to the relating phones of the source language. The survey evaluates the philosophy on lingos like German, Japanese, and Spanish, including English as the source language, and suggests that the significant learning method truly gets shared phone depictions in talk signals.

In conclusion, the paper discusses a novel use of sparse auto-encoding in semi-supervised learning for cross-language transfer speech recognition. The examination features the capability of profound learning in catching shared phonetic portrayals across dialects, offering promising outcomes for cross-language discourse acknowledgment without the requirement for named information in the objective language.

Advantages: By utilizing unsupervised learning through sparse auto-encoder, the model can autonomously discover shared speech features between languages. This enables the system to adapt to new languages without explicit supervision, enhancing its flexibility.

Disadvantages: While the study reports positive outcomes, further evaluation on a broader range of languages and diverse linguistic structures is necessary to validate the method's robustness and general applicability.

2.9 Language Chat-bot–The Design and Implementation of English Language Transfer Learning Agent Apps [9]

The paper examines the plan and execution of an English Learning visit bot with an emphasis on move learning in true applications. The talk bot is created with three degrees of language learning, in particular phonetics, semantics, and a reproduction of "free-form discussion" in English. The framework incorporates acknowledgment administrations from Google and the GPT-2 model from OpenAI, with a UI executed as a small program on WeChat.

The creators direct a writing survey, contrasting their talk bot and well known applications like Duolingo and LiuliShuo, while likewise investigating scholastic exploration on visit bot specialists like AliMe and Xiao Ice. They stress the significance of their talk bot's extraordinary spotlight on language getting the hang of, coordinating high level computer based intelligence innovation to give an exhaustive and intuitive English growth opportunity.

Advantages: The use of transfer learning, particularly fine-tuning GPT-2, enhances the chat-bot's language generation capabilities. Transfer learning allows the chat-bot to leverage pre-trained models and adapt them to specific language learning contexts, potentially improving efficiency and performance.

Disadvantages: The chat-bot's reliance on recognition services from external providers, such as Google, may introduce a dependency on the availability and reliability of these services. Downtimes or changes in service functionality could impact the chat-bot's performance.

2.10 EMERGING TECHNOLOGIES: Bots as Language Learning Tools [10]

This paper investigates the likely job of online talk bots in tending to the restricted open doors for Unknown dialect Learning (FLL) understudies to rehearse their objective language outside the homeroom. The review includes 211 understudies who involved notable visit bots in class, and their criticism was gathered through a concise composed overview. The majority of students, according to the findings, enjoyed using the chatbots and felt more at ease conversing with them than with student partners or teachers.

Chat-bots, defined as computer programs simulating intelligent conversations with users, have evolved from their early stages in the 1960s to become potential language learning tools. The article traces the historical development of chat-bots, highlighting their increasing capabilities and applications. It underscores the convenience, novelty, and potential usefulness of chat-bots for language learners.

Advantages: Chat-bots offer a convenient and accessible platform for language learning. Students can engage with chat-bots anytime, anywhere, providing flexibility that may not be possible with traditional classroom-based practice.

Disadvantages: The success of chat-bot-based language learning relies on access to technology. Students without regular access to devices or the internet may face barriers to utilizing chat-bots for language practice.

2.11 Developing an AI-Assisted Low-Resource Spoken Language Learning App for Children [11]

The introduced work centers around the improvement of a PC Helped Language Learning (CALL) framework that use progressions in computer based intelligence, especially discourse acknowledgment innovation, to make a web-based elocution preparing framework for small kids. The discoveries feature the capability of joining gaming and ASR for powerful language learning.

The discoveries feature the capability of joining gaming and ASR for successful language learning, particularly for low-asset dialects and kids with SSD. The coordinated framework exhibits diminished idleness and serious execution, tending to difficulties, for example, taking advantage of non-discourse data in sound documents. Likely arrangements include efficient educational assessments involving the created game application and further information assortment for growing language abilities.

Advantages: Utilizing external recognition services allows the chat-bot to offload resource-intensive tasks to specialized providers. This can lead to resource optimization for the chat-bot's hosting environment, potentially improving efficiency and reducing operational costs.

Disadvantages: Reliance on external services may introduce latency in processing user inputs. Depending on the responsiveness of the external recognition service and the network conditions, users may experience delays in receiving chat-bot responses, impacting the overall user experience.

2.12 NLP serving the cause of language learning [12]

The paper named "NLP serving the justification behind language learning" by Frederique Segond and Thibault Parmentier discusses the improvement of a fascinating e-learning system called Exills, which facilitates Standard Language Taking care of (NLP) advancements and PC created reality for language learning. Instead of just focusing on students' skills, Exills emphasizes the use of functional language in everyday work situations. The makers highlight the importance of NLP propels, expanded reality, and agreeable gadgets in making a natural and modified language learning experience. The paper emphasizes the transformative impact of e-learning on traditional teaching methods, providing a more student-centred, granular, on-demand, and highly interactive approach.

Advantages: The highly interactive nature of Exills enhances learner engagement. Interactive elements can include simulations, exercises, and real-world scenarios that encourage active participation and practical application of language skills.

Disadvantages: The adoption of advanced technologies, such as virtual reality and NLP, may result in a learning curve for both educators and learners. Adequate training and support may be necessary to ensure effective utilization of these features.

2.13 Detailed Study of Deep Learning Models for Natural Language Processing [13]

The paper provides an extensive review of deep learning models applied to Natural Language Processing (NLP) tasks, emphasizing the increasing use of deep learning in NLP with the availability of large multilingual datasets. Various models such as Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), and Recursive Neural Network are discussed, highlighting their architectures and applications in tasks like text classification, sentiment analysis, and machine translation.

Furthermore, the review underscores the significance of these deep learning models across various NLP applications, such as information retrieval, information extraction, and text clustering. While the review provides a comprehensive overview of these models and their applications, the future research direction is suggested to focus on evaluating the performance of these models on diverse languages and addressing challenges specific to certain linguistic structures, emphasizing the need for ongoing advancements in NLP.

Advantages: Deep learning enables end-to-end learning, allowing models to directly map input to output, simplifying complex NLP tasks.

Disadvantages: Deep learning enables end-to-end learning, allowing models to directly map input to output, simplifying complex NLP tasks.

III. ANALYSIS TABLE

NAME OF THE PAPER	YEAR OF PUBLICATION	ALGORITHMS	FINDINGS
Extracting Business Process Models using Natural Language Processing (NLP) Techniques	2017	Named Entity Recognition (NER), Relation Extraction, and Dependency Parsing.	Process Mining Text Mining Computational Linguistics Information Extraction
Language Chatbot–The Design and Implementation of English Language Transfer Learning Agent Apps	2020	Deep neural networks (DNN), Convolutional Neural Networks (CNN), recurrent neural networks (RNN)	Natural Language Processing (NLP) Artificial Intelligence (AI) Language Learning
NLP serving the cause of language learning	2019	Named Entity Recognition (NER) Part-of-Speech (POS) tagging Sentiment Analysis Text summarization	Computer-Assisted Language Learning (CALL) Language Acquisition Linguistics
EMERGING TECHNOLOGIES Bots as Language Learning Tools	2016	NLP algorithms, Dialogue management	Language Acquisition Chatbots Language Teaching
Developing an AI-Assisted Low-Resource Spoken Language Learning App for Children	2023	Automatic Speech Recognition (ASR) algorithms, which may include Hidden Markov Models (HMMs), Gaussian Mixture Models (GMMs)	Educational Technology Language Acquisition Language Learning App
Application of Sentiment Analysis to Language Learning	2017	Tokenization: Breaking down text into words or tokens. Named Entity Recognition (NER): Identifying entities like emotion words in the text	Sentiment Analysis Language Learning
Foreign Language Learning using a gamified APP to support peer-assessment	2018	Integrating learning content into versatile tasks rather than delivering content in isolation, Task-based content delivery	Gamification Mobile Application Peer Assessment
Chatbot learning partners: Connecting learning experiences, interest and competence.	2018	Recommendation Algorithms, Competency Assessment Algorithms, Interest Matching Algorithms	Personalized Learning Natural Language Processing Learning Motivation
Intelligent Tutoring Systems for Language Learning	2016	Decision-Making Algorithms, Feedback Generation Algorithms, Interactivity Enhancement	Intelligent Tutoring Systems Language Learning Educational Technology

		Algorithms	
Machine Learning of Language Translation Rules	2019	Statistical Machine Translation (SMT), unsupervised Machine Learning	Statistical Machine Translation (SMT) Deep Learning
Cross-language Transfer Speech Recognition using Deep Learning	2018	Deep Learning Techniques, Semi-Supervised Learning, Cross-Language Phone Recognition	Deep Neural Networks (DNN) Transfer Learning Models
An App for Language Learners	2017	Machine Translation, Speech Technology, Part-of-Speech (POS)	Pedagogy Interactive Learning
Multilingual Speech Recognition Training and Adaptation with Language-Specific Gate Units	2018	Multi-Task Learning (MTL), Shared-Hidden-Layer Multilingual Deep Neural Network (SHL-MDNN), Language-Specific Gate Units (LGU).	Multilingualism Deep Learning Neural Networks

IV. CONCLUSION

In conclusion, the wide range of research articles examined emphasizes how artificial intelligence (AI) and associated technologies are revolutionizing language instruction and acquisition. In addition to presenting exciting opportunities for individualized and real-time language practice, the integration of AI, Chat GPT, Natural Language Processing (NLP), and other developing technologies also presents a number of difficult issues, such as equal access, content quality, and ethical concerns. The usefulness of these technologies is demonstrated by successful case studies like Chat GPT apps in EFL classrooms and Duolingo's AI-powered language learning platform. To maximize the benefits of AI in language instruction while addressing ethical concerns and potential injustices, researchers, educators, and legislators must work together. The successful and ethical integration of these technologies into language learning environments requires a balanced strategy that emphasizes the cooperation between human teachers and AI.

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