

Impact of an Artificial Intelligence in Language Learning - A survey

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ABSTRACT

Bully Scan, an artificial intelligence system for identifying offensive language on social media, is proposed in "A Natural Language Processing and Machine Learning-Based Framework to Automatically Identify Cyberbullying. This paradigm, which aims to reduce the negative impacts of cyberbullying and encourage healthy online interactions, is a critical step in using AI for social well-being. The paper, "Research and Practice of Hybrid Teaching Based on AI technology for Foreign Language Translation," offers a novel strategy for teaching foreign languages through the incorporation of AI. The project investigates a hybrid teaching approach that combines AI-powered language translation tools with conventional classroom training. This method seeks to improve accuracy and efficiency of language learning by providing real-time translation support. Through the use of AI technologies, such as machine learning and natural language processing, the system offers students helpful translation assistance, enhancing their educational experience. The study demonstrates encouraging outcomes in terms of raising students' proficiency and effectiveness in translation in a blended learning setting.

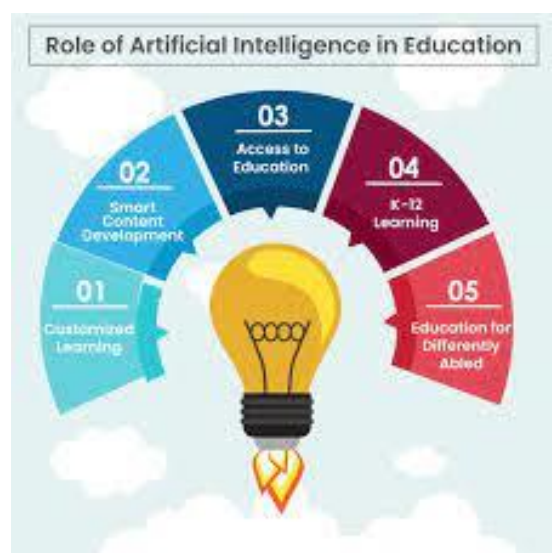
The paper "Modular Design of English Pronunciation Level Evaluation System Based on Deep Learning Algorithm" offers a novel method for determining pronunciation levels in English by utilizing deep learning algorithms. The study uses techniques like support vector machines and BP neural networks to address the problem of computational intensity in language teaching technologies. Through the application of machine deep learning, the system seeks to improve the precision and efficacy of pronunciation level assessments, providing insightful information for the development of theories for foreign language instruction in the rapidly changing field of artificial intelligence. The study's modular design approach offers a viable foundation for enhancing pronunciation assessment in language instruction.

Keywords: Artificial intelligence, Natural Language Processing, Hybrid teaching, Machine Learning, education, Deep learning

I. INTRODUCTION

MOTIVATION:

Using artificial intelligence (AI) and natural language processing (NLP) to transform language learning, improve educational systems, detect cyber threats, and create interactive systems for a range of linguistic needs is the driving force behind the aforementioned topics. These developments attempt to address real-world difficulties in language understanding, teaching, and application across multiple domains, from education to cybersecurity and beyond, while establishing inclusive, effective, and personalised learning environments.



PROBLEM STATEMENT:

The problem statement for the topic "AI-based Conversational Agents: A Scoping Review From Technologies to Future Directions" is: "This scoping review aims to analyze the landscape of AI-based conversational agents, exploring their technologies, applications, and future directions. It investigates the advancements, challenges, and potential impact of these agents in various fields, providing insights into their evolution, effectiveness, and opportunities for

further development and integration into diverse domains of human interaction."

OBJECTIVES

"AI-based Conversational Agents: A Scoping Review From Technologies to Future Directions" has the following goals in mind:

The objective of this research is to perform a thorough examination of conversational agents that are powered by artificial intelligence, examining their existing features, uses, and possible future developments. The aim is to ascertain patterns, obstacles, and nascent prospects inside the domain, offering discernments into the development, efficiency, and prospective progressions of conversational agents throughout diverse spheres of human communication."

Recent years have witnessed a surge in research endeavors exploring the diverse applications of artificial intelligence (AI) across various domains. From language processing to cybersecurity and education, researchers globally are pioneering innovative approaches to leverage AI technologies effectively. This article provides a concise overview of selected research contributions in the field, highlighting advancements in Chinese sign language recognition, transfer learning in natural language processing (NLP), language-based AI chatbots, conversational agents, cyberbullying detection, and multilingual text-to-speech training.

The selected research articles showcase the breadth of AI applications, including an AI Chinese sign language recognition interactive system integrating audio-visual cues, robust transfer learning models accelerating NLP tasks, and language-based AI chatbots facilitating university admission processes. Additionally, the scoping review explores AI-based conversational agents' evolution and future directions. Furthermore, transformer-based architectures are introduced for detecting clickbait in Arabic headlines. The scope extends to cybersecurity with NLP-driven

vulnerability detection and real-time cyberbullying identification. Lastly, innovations in AI-driven education are presented, covering conversational programming agents and AI-assisted English teaching methodologies. These contributions collectively reflect the dynamic landscape of AI research and its multifaceted impact across diverse domains.

II. BACKGROUND AND CONTENT

Recent years have witnessed a surge in research endeavors exploring the diverse applications of artificial intelligence (AI) across various domains. From language processing to cybersecurity and education, researchers globally are pioneering innovative approaches to leverage AI technologies effectively. This article provides a concise overview of selected research contributions in the field, highlighting advancements in Chinese sign language recognition, transfer learning in natural language processing (NLP), language-based AI chatbots, conversational agents, cyberbullying detection, and multilingual text-to-speech training.

The chosen research articles demonstrate the variety of uses for AI, such as an interactive system for the recognition of Chinese sign language that integrates audio-visual cues, strong transfer learning models that speed up natural language processing, and language-based AI chatbots that streamline university admissions procedures. The scoping review also looks at the development and future prospects of AI-based conversational agents. Transformer-based architectures are also presented for the purpose of identifying clickbait in Arabic headlines. With real-time cyberbullying identification and NLP-driven vulnerability detection, the scope of the work is expanded to include cybersecurity. Finally, new developments in AI-driven education are discussed, including AI-assisted English teaching approaches and conversational programming agents. Together, these contributions capture the ever-changing field of

artificial intelligence research and its wide-ranging effects in several fields.

III.SCOPE AND FOCUS

The articles highlight developments in a variety of domains and span a wide range of AI applications. "AI Chinese sign language recognition interactive system" with an emphasis on audio-visual integration for improved accessibility is one of them. To speed up AI learning in NLP applications, "Robust Transfer Learning" is also investigated. An "Anglo-Bangla Language-Based AI Chatbot" is also intended to expedite the admissions process for universities. Additionally, a thorough analysis of "AI-Based Conversational Agents" provides insights into how conversational AI technologies are developing and where they may go in the future. Furthermore, showcasing advances in NLP, a "Transformer-Based Architecture" is developed for automatic clickbait identification in Arabic headlines. The collection of these papers advances artificial intelligence (AI) in a number of areas, such as cybersecurity, NLP, education, accessibility, and personalised learning.

They address a wide range of topics, including creating conversational AI teaching agents, investigating multilingual text-to-speech training techniques, assessing AI-based adaptive learning systems, and assessing the effects of AI technology on English language instruction based on the Noticing Hypothesis. They also explore interactive foreign language teaching modes with AI integration, the efficiency of blended learning modes with AI language learning platforms, and research on AI-enhanced foreign language education in the Big Data era. The articles also provide modular designs of AI-powered English pronunciation evaluation systems, collaborative immersive language learning environments using augmented imagery, hybrid teaching approaches based on AI technology for translation, and deep learning-based language models.

Together, these papers advance our knowledge of and ability to use artificial intelligence.

Framework" detects hate speech and cyberbullying. lastly, "AI-based Arabic Language and Speech Tutor".

IV. METHODOLOGIES

The papers' methodology encompass a variety of approaches within the domains of artificial intelligence and natural language processing. The "AI Chinese sign language recognition interactive system" combines visual and auditory signals to recognise sign language. Using transfer learning approaches for NLP tasks, "Robust Transfer Learning Based Modelling for Accelerating the Learning of AI in NLP" Language processing is used by the "Anglo-Bangla Language-Based AI Chatbot" for college admissions procedures. A scoping review of technology is presented in "AI-Based Conversational Agents". Transformer models are the main subject of "A transformer-based architecture for the automatic detection of clickbait" in Arabic. NLP is used in "Cyber Security Vulnerability Detection" to analyse cyber threats. In real time, "A Natural Language Processing and Machine Learning-Based Framework" detects hate speech and cyberbullying. lastly, "AI-based Arabic Language and Speech Tutor".

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V. LITERATURE REVIEW

Within [1] He et al.'s (2023) interactive system for AI Chinese sign language recognition expands on earlier work in multimodal integration and sign language recognition. A variety of methods for sign language detection using computer vision and machine learning techniques have been investigated in earlier research. Notably, developments in audio-visual integration have demonstrated potential for raising the precision and effectiveness of systems for recognising sign language. By utilising the advantages of both audio and visual clues in sign language interpretation, this system seeks to improve communication accessibility for people with hearing impairments and add to the rapidly changing field of assistive technologies.

Within [2] Within the framework of transfer learning and its application to Natural Language Processing (NLP), the study of Ravimaram et al. (2023) on "Robust Transfer Learning Based Modelling for Accelerating the Learning of AI in the Field of NLP" is positioned. Transfer learning is a powerful tool for using pre-trained models to improve performance on downstream tasks, as previous NLP research has shown. The purpose of this work is to improve the robustness and efficiency of transfer learning techniques especially designed for NLP applications. Research on issues like domain adaptability and model generalisation advances the field of AI-driven natural language processing systems.

Within [3] An inventive "Anglo-Bangla Language-Based AI Chatbot" created especially for the Bangladeshi University Admission System is presented in the work of Sarker et al. (2023). This study tackles the need for an effective, locally relevant AI-driven solution to help university applicants in Bangladesh communicate and get support. The study enhances the

university admission process by offering a responsive, user-friendly interface for students, utilising advances in Natural Language Processing (NLP) and AI chatbot technology. Furthermore, the scoping study on "AI-Based Conversational Agents" by Kusal et al. (2022) provides insightful information about the state of technology, emerging trends, and potential paths for conversational AI system development. This thorough analysis covers a range of topics related to AI-powered conversational agents, such as their potential, difficulties, and applications.

A "Transformer-based architecture" specifically designed for identifying clickbait in Arabic headlines is shown in [4] by R'Baiti et al. (2023). In order to address the growing concern over sensationalism and disinformation, this research offers a methodology specifically tailored for Arabic language environments. The article presents an innovative method for automatically identifying clickbait content by utilising the Transformer architecture, which has demonstrated potential in natural language processing applications. By improving clickbait identification methods, especially in Arabic language domains, this work advances the field and offers a useful tool for media monitoring, content moderation, and disinformation removal in online environments.

At the IEEE World AI IoT Congress, Singh et al. (2022) present a work on "Cyber Security Vulnerability Detection Using Natural Language Processing" in [5]. The study explores how to improve cybersecurity procedures by utilising natural language processing (NLP) tools, with an emphasis on vulnerability detection. The project intends to automate the process of finding security holes in systems, supporting prompt mitigation efforts, by utilising NLP tools and techniques. By providing a novel means of supporting cybersecurity measures—specifically, by employing NLP-driven solutions for quick and accurate

vulnerability detection in digital environments—this work advances the discipline.

"A Natural Language Processing and Machine Learning-Based Framework to Automatically Identify Cyberbullying and Hate Speech in Real-Time" is the creative framework that Shrimali (2022) introduces at the IEEE MIT Undergraduate Research Technology Conference in [6]. To address concerns about online safety, the study presents a system that uses natural language processing (NLP) and machine learning (ML) to detect hate speech and cyberbullying in real-time. The framework makes a substantial contribution to the field of online safety and promotes a more secure digital environment for users by utilising sophisticated computational algorithms to give a proactive approach to prevent the propagation of hazardous content. In the fight against online harassment and in favour of appropriate digital interactions, our research is at the front.

Within [7] An "AI-based Arabic Language and Speech Tutor" is presented by Shao et al. (2022) at the IEEE/ACS International Conference on Computer Systems and Applications. Their work presents a novel approach to speech analysis and AI-driven teaching that will improve Arabic language acquisition. Through the use of AI technologies, the tutor offers students individualised learning opportunities that successfully support their improvement of Arabic language proficiency. Conversely, at the 2021 IEEE Symposium on Visual Languages and Human-Centric Computing, Zhu and Van Brummelen (2021) present "Convo," a Conversational Programming Agent. Their research aims to teach students about conversational AI by providing an engaging, hands-on method of learning programming topics through discussions with the bot.

Wu et al. (2022) at ICASSP 2022 introduce a novel method for "Multilingual Text-To-Speech Training" in [8]. Their study focuses on improving multilingual

speech synthesis systems through the use of self-supervised learning approaches and cross-language voice conversion. They hope to enhance the diversity and calibre of multilingual synthesised speech by utilising these techniques. This creative method offers more expressive and natural speech synthesis capabilities, which advances multilingual text-to-speech systems. Promising findings in generating multilingual voice synthesis with greater fidelity and authenticity are achieved by the study, which tackles the growing need for high-quality, cross-language speech synthesis in numerous applications, from virtual assistants to language learning tools.

In [9] At ICAIE 2021, Wei et al. (2021) examine "AI Technology Assisted English Teaching" under the prism of the Noticing Hypothesis. The study explores how AI-based technologies can improve learners' capacity to identify and understand linguistic patterns, hence expediting English language acquisition. The authors illuminated AI technology's potential to offer tailored and adaptive learning experiences by examining its effects on language acquisition. The goal of their study is to optimise language learning processes through targeted feedback and customised instruction depending on learners' requirements and progress. Their work offers insightful information about the integration of AI tools in language education.

At the Chinese Automation Congress (CAC) 2018, Cui et al. (2018) investigate the "Performance Comparison of an AI-Based Adaptive Learning System" in [10]. Their research focuses on assessing an AI-driven adaptive learning system's efficacy within the framework of Chinese education. The authors offer an analysis of the advantages and difficulties of incorporating artificial intelligence (AI) technology into educational environments by contrasting the system's performance with conventional learning techniques. The results demonstrate how AI-based solutions may optimise educational outcomes, increase student engagement, and improve personalised

learning experiences. This study adds to the current conversation about artificial intelligence's place in education and how it affects the efficacy of instruction.

"The Evaluation of a Blended Teaching Mode" is presented by Li and Peng (2021) in [11] at the 2nd International Conference on Information Science and Education. Their research looks into how successful a mixed learning strategy built around an AI language learning platform is. The authors provide insights into the pedagogical impact of the AI-driven teaching approach by evaluating student performance, engagement, and satisfaction. By emphasising the potential of such techniques to improve language learning outcomes and give students personalised learning experiences, the research adds to the expanding body of literature on blended learning and AI integration in education.

In [12], Luo and Cheng (2020) at the 2020 International Conference on Computer Vision, Image, and Deep Learning examine a "Interactive Foreign Language Teaching Mode" utilising artificial intelligence (AI). Their research explores how AI technology might be integrated to produce dynamic and captivating language learning environments. The authors add to the changing field of language instruction approaches by evaluating the efficacy of an AI-driven strategy. The study highlights the potential of artificial intelligence (AI) to create dynamic and flexible learning environments that open up new possibilities for boosting student participation in language learning and foreign language acquisition.

At the 2021 International Conference on Big Data Economy and Information Management, Li (2021) gives a paper on "Exploration and Reflection of Foreign Language Teaching" using "Artificial Intelligence + Education" in the Big Data Era [13]. This study explores the integration of artificial intelligence (AI) with teaching methodologies, specifically in the context of teaching foreign languages. Li provides insights into

cutting-edge methods of teaching languages by exploring the nexus of AI, education, and big data. The study adds to the current conversation on AI-enhanced pedagogical practices by reflecting on the possible advantages, difficulties, and future directions of integrating AI technologies into foreign language instruction.

[14] At the 2020 International Conference of the Immersive Learning Research Network, Chabot et al. (2020) present a novel "Collaborative, Immersive Language Learning Environment" that makes use of augmented panoramic images. Their work focuses on using immersive technologies to provide a dynamic and interesting platform for language learners. Their goal is to improve the experiential and interactive elements of language learning by incorporating augmented reality into the curriculum. By investigating novel approaches for immersive and collaborative learning environments, this study adds to the changing field of language training and may even completely transform the way that languages are taught and acquired.

At the 2020 International Conference on Computer Engineering and Application, Liu et al. (2020) present their work on "Research and Practice of Hybrid Teaching Based on AI technology for Foreign Language Translation" in [15]. The project explores the use of AI technology in teaching foreign languages, with a special emphasis on translation. The goal of the authors' hybrid teaching approach is to improve language learning accuracy and efficiency by fusing traditional training with AI-based tools. This study advances the field of AI-driven language education by highlighting the advantages of using cutting-edge technologies to speed up the translation and language learning processes.

The IEEE Access publication "Framework for Deep Learning-Based Language Models Using Multi-Task Learning in Natural Language Understanding" by

Samant et al. (2022) offers a thorough analysis of [16]. The field of deep learning models for natural language interpretation is examined in this systematic study, with a particular emphasis on multi-task learning frameworks. The study highlights how multi-task learning can improve language model performance by synthesising previous literature. The authors also suggest future research avenues, highlighting how this strategy could progress the field of natural language processing. In order to get insight into the most recent developments in deep learning for natural language processing, scholars and practitioners can benefit greatly from this work.

In [17] Li (2022), the modular design of an English Pronunciation Level Evaluation System developed with a deep learning algorithm is explored. In the areas of language assessment and deep learning applications for educational goals, this work expands on previous research. Li's project aims to improve language learning outcomes through exact evaluation and personalised feedback, which is in line with the broader trends in AI-driven language assessment tools. Li's modular method contributes to the expanding corpus of research on adaptive learning systems by shedding light on the possible advantages of customised language evaluation programmes. This study responds to the growing need for automated language assessment systems, particularly in the classroom where students' success depends on individualised instruction.

VI. SYNTHESIS AND DISCUSSION

The collection of articles presents a comprehensive view of the evolving landscape of AI applications in language-related fields. From the development of an "AI Chinese sign language recognition interactive system" to "Anglo-Bangla Language-Based AI Chatbot for Bangladeshi University Admission System," diverse linguistic contexts are addressed. The synthesis reveals

an expanding frontier in AI's role in language learning and communication, as seen in "Multilingual Text-To-Speech Training" and "AI-Based Conversational Agents" which explore innovative techniques in NLP. Moreover, the focus on "Cyber Security Vulnerability Detection" showcases AI's crucial role in safeguarding digital spaces. The integration of AI in education, exemplified by "Teaching Students About Conversational AI," "Exploration of Interactive Foreign Language Teaching," and "Hybrid Teaching Based on AI technology for Foreign Language Translation," underlines its transformative impact. Finally, the "Framework for Deep Learning-Based Language Models" and "Modular Design of English Pronunciation Level Evaluation System" reflect a trend towards sophisticated AI models for nuanced language understanding. This synthesis underscores AI's potential to enhance language education, communication, and security on a global scale

VII. CONCLUSION

The selection of articles that are displayed demonstrates the broad and significant application of Artificial Intelligence (AI) in several linguistic fields. AI has the ability to transform learning and communication, as demonstrated by the creation of "AI Chinese sign language recognition interactive system" and "Anglo-Bangla Language-Based AI Chatbot for Bangladeshi University Admission System," among other research. As demonstrated by "Robust Transfer Learning Based Modelling" and "A transformer-based architecture for automatic detection of clickbait for Arabic headlines," the combination of AI with Natural Language Processing (NLP) advances the field's comprehension and analysis of language. Furthermore, the emphasis on "Automatically Identifying Cyberbullying and Hate Speech" and "Cyber Security Vulnerability Detection" highlights the crucial role AI plays in guaranteeing online safety. The amalgamation of "Exploration of Interactive Foreign Language" and "Teaching Students About Conversational AI".

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