



The importance of computational linguistics in student's life

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Abstract. In the last decade, information and communication technology has been the essence of our life. New electronic devices such as smartphones, tablets and computers, and offer different possibilities of accessing the internet anytime, anywhere. The computer is one of the innovative technologies that is used as a medium between the human-being and language teaching and learning which is called Computational Linguistics. Computational linguistics is a twofold field that combines principles of linguistics and computer science to develop computational models and algorithms for understanding, processing, and generating human language. The primary goal of computational linguistics is to enable computers to interact with human language meaningfully and efficiently. It also provides tools and frameworks that can help students better understand language patterns, grammar, syntax, and semantics. For instance, Natural Language Processing (NLP) tools can help in learning new languages, offering translation, grammar correction, and text-to-speech features.

Key words; Natural language processing, Grammar correction, Translation, Text-to-speech forms, Linguistics, Language patterns, Language principles.

Introduction.

Our modern era is defined by the continuous and quick development of electronic devices like computers. As we know, language is one of the most natural and versatile means of communication, this is what makes it complicated (Seddiki, 2018). For learners, computational linguistics is not just about realizing how computers process language; it provides essential tools for improving communication, which will enhance critical thinking, and open up career opportunities in modern fields (Ahmad, 2022).

As digital tools and language-based technologies become an integral part of everyday life, computational linguistics offers students the knowledge and skills which are needed to get competitive in this technology-driven world (Blasband, 2018). As Ahmad (2022) stated: Computer-oriented studies have changed into a hybrid type called computational linguistics. As an interdisciplinary field, computational linguistics has a history of nearly half a century. The ultimate goal of computational linguistics is to explain the basic techniques used to create computer models for the generation and understanding of natural language. In other words,



Whether for language learning, academic research, computational linguistics offers students a powerful means of bridging the gap between human language and machine understanding.

Literature review.

Brief history of Computational Linguistics (CL)

Though the concept of computational linguistics is often connected with AI development, CL predates AI's development, according to the Association for Computational Linguistics (Nerbonne, 2019). One of the first examples of CL could be traced from an attempt to translate text from Russian to English. The thought was that computers could make systematic calculations faster and more accurately than a person, so it would not take long to process a language (Yamaguchi, 2017). However, the complexities found in languages were underestimated, taking much more time and effort to develop a working program. Early researchers in the 1950s were wildly optimistic. Researchers thought that with a little bit more work in engineering the rules and a more complete dictionary of words, they could develop a passable system. They were wrong. Up until the late 1980s, much work in CL involved coming up with formal analyses of natural language using carefully designed rules (Hutchins, 2012). This led to very precise systems that could give you lots of information about the small fragment of language it knows about, but which are limited in domain and scope.

Starting in the late 80s, early 90s, the trend became to learn grammar rules from data, rather than specify them. In the 1980s, researchers began to explore statistical models for machine translation, marking a major departure from the rule-based systems that had dominated early MT. Statistical machine translation uses large corpora of bilingual text data to learn translation probabilities. This shift greatly improved the quality and scalability of machine translation systems.

Applications of Computational Linguistics in Natural Language Processing

The fast-growing research area of computational linguistics and natural language processing (NLP) is fueled by the hands-on creative roles which the underlying language technologies play in numerous industrial or scientific applications (Bansal, 2020). Computational linguistics plays a fundamental role in the development and enhancement of Natural Language Processing (NLP), which is the field of AI concerned with enabling machines to understand, interpret, and generate human language. It accelerates translation speed, improving accuracy. One of the earliest and most prominent applications of computational linguistics in NLP is machine translation (MT), which allows for automatic translation of text or speech from one



language to another (Seddiki,2020). Furthermore, Computational linguistics has significantly advanced speech recognition systems, which convert spoken language into text, enabling machines to understand spoken words and respond accordingly. Sentiment analysis also involves determining the emotional tone behind a body of text. This application uses NLP to gauge the sentiment or opinion expressed in online content, reviews, social media, and customer feedback. Finally, Chatbots and conversational agents use NLP to interact with users in natural, human-like conversations. These systems are often powered by computational linguistics models that enable understanding and generating text based on user input (Muslim, 2018).

Deep Learning and Neural Networks

Computational linguistics plays a key role in the development and application of learning patterns and neural networks, particularly in the field of Natural Language Processing (NLP). The intersection of these fields has led to groundbreaking advancements in machine learning models that can understand, generate, and process human language in the same ways that were once thought to be in the field of science fiction (Silliman, 2014). One of the fundamental challenges in using deep learning to natural language is how to represent human language in a way that neural networks can understand (Makatchev, 2014). Computational linguistics provides the theoretical framework and the techniques that make this possible. Computational linguistics emphasizes the importance of linguistic structures such as syntax, semantics, and morphology—all of which help improve the performance of neural networks in NLP tasks (Massaro, 2018). Computational linguistics contributes to the enhancement of deep learning models in areas like speech recognition and text-to-speech (TTS) systems. Understanding the intricacies of spoken language, phonetics, and prosody is essential to improving how neural networks process speech data. The ability to generate human-like language is a key challenge in NLP. Computational linguistics provides the theoretical knowledge about sentence structure, coherence, and meaning that helps guide neural networks in generating fluent, contextually appropriate text.

Conclusion.

To conclude, Computational Linguistics (CL) is an important science in 21st century, which studies human language production, comprehension, and acquisition through using computers. computational linguistics holds significant importance in a student's life because it enhances various aspects of education and personal development. By integrating language with computational methods, students learn valuable skills that not only improve their understanding of language itself but also





open doors to emerging fields like artificial intelligence, data science, and machine learning.

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