Nanotechnology Perceptions
ISSN 1660-6795
www.nano-*ntp.com*

A Study On "Computational Communication In Language E-Learning"

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This study investigated the communicated themes in journal articles of e-learning. The aim was to reveal the common issues and patterns of communication as written in the published articles of e-learning. A corpus of 152 journal articles in computer-based language learning was used from reputable journals in Computer Science between the years of 2017-2023. The results showed the themes of mobile learning, distance learning, situated learning, blended learning, teaching, and learning, as well as informal learning to be recurring in the past three years. In addition, e-learning for language was always focused on learning vocabulary. In conclusion, despite the development of technology in e-learning, human factors were identified to be at the center of discussion. Future implications included the use of e-learning as an organic technology for language learning in the future.

Key Words: computation, development, e-learning, language, linguistics, progress, technology.

Introduction

Computational Linguistics (CL)

Computational linguistics is an interdisciplinary field that uses computer science (and algorithms) to analyze and comprehend written and spoken language. The field combines linguistics, computer science, artificial intelligence (AI), engineering, neuroscience, and even anthropology to understand language from a computational perspective. When a computer can understand language, whether written or spoken, this helps facilitate our interaction with software and machines and enables progress in fields such as customer service, scientific research, AI tools, and much more.

Computational linguistics vs. national language processing

Computational linguistics focuses on the system or concept that machines can be computed to understand, learn, or output languages, while natural language processing is the application of processing language that enables a computer program to understand human language as it is written or spoken. Computational linguistics encompasses more than just NLP because it also covers text mining, information extraction, machine translation, and more.

Importance of Computational Linguistics

CL is important because, today, humans are using technology to develop tools for completing tasks more efficiently. Computational linguistics first emerged to translate languages, such as Chinese to English, using computers. Now, it supports customer service, such as when you try to refund a product with a chatbot or find information quickly with the help of Siri on iPhones. Computational linguistics is the process of deciphering what customers are asking and prompting AI to deliver accurate responses to their questions based on internal data.

Data scientists often analyze large amounts of written text in unstructured formats to build artifacts that can process or produce language. They ensure a chatbot or app is giving high-quality service so that engineers can use computational models to define the system's guidelines.

ROLE OF COMPUTATIONAL LINGUISTS

There are many applications of CL in the real world. Here are just a few.

Machine translation: Using AI to translate from one language to another, such as from Chinese to English. Google Translate is a good example.

Chatbots: Software programs that simulate human conversation via spoken or written language, usually for customer service purposes. Many companies, such as Amazon and Verizon, have live chat available alongside phone and email options.

Knowledge extraction: Creating knowledge from unstructured and structured text sources. An example is Wikipedia, which is the product of random editors, and can be used to train an open information extractor's precision and recall.

Natural language interface: These types of tools allow humans to interact with our devices' operating systems using spoken words. Examples include Siri and Alexa.

Sentiment analysis: This is a type of NLP that identifies emotional tone in text or spoken language. Grammarly is an example of sentiment analysis.

APPROACHES TO COMPUTATIONAL LINGUISTICS

Since its inception in the 1950s, computational linguistics has gone through several iterations.

Developmental approach: Like a child learning a language over time, the developmental approach simulates a similar language acquisition strategy. Algorithms are programmed to adopt a statistical approach that does not involve grammar.

Structural approach: This approach is more theoretical and runs large samples of a language through CL models to better understand underlying structures of the language.

Production approach: The production approach uses a CL algorithm to produce text, which can be broken down into text-based or speech-based interactive approaches.

Text-based interactive approach: This falls under the production approach, where text written by a human is used to generate an algorithmic response. The computer can then recognize patterns and produce a response based on user input and keywords.

Speech-based interactive approach: Similar to the text-based approach, this one uses algorithms to screen speech inputs for sound waves and patterns.
Comprehension approach: With this approach, the NLP engine is programmed to naturally interpret written commands using simple rules.

Despite all the facts, the topic of the use of artificial intelligence and computational linguistics in e-Learning is basically non-existent, not only in theory in academic papers but also in practice of the use of mobile apps. The opportunities of the use and implementation of computational linguistics and artificial intelligence are vast and it is a question why this topic still lacks attention of the creators of various online learning courses, i.e. e-Learning tools and platforms. Naturally, there are many apps which have implemented the computational linguistics practice, deep learning and artificial intelligence, however, the trend in e-learning and m-Learning is still rather old fashioned, i.e. these platforms are still used more like repository warehouses for data and texts to be studied and don't use their full potential, i.e. information analysis through modern means of artificial intelligence.

The possibilities are vast, however, still neglected, and this paper brings this topic into attention of the creators and professionals who are active in IT business and therefore responsible for the implementation of the modern tools into various technological aspect of human communication, interaction and learning. The efficiency of the use of e-Learning, m-Learning, blended learning, etc., has already been proven significantly and it must be taken into consideration so that it is added to traditional approaches in educational processes and mostly in language acquisition of grammar and vocabulary]. The use of e-Learning tools is so ubiquitous in our universities and other educational institutions that it is complicated to acknowledge the fact that a systematic approach to creation of the courses is still missing and the implementation of artificial intelligence into these courses is still more or less non-existent.

Computational Linguistics in e-Learning

Computational linguistics has been used for decades, not only by linguistics but also by IT specialists, however, the massive use of this extremely useful tool is still expected and this paper is an attempt to urge this process. The use of artificial intelligence and computational linguistics in mobile platforms has been proven to be extremely useful in the learning process as the student receives updated motivation based on their progress in the learning process. Computational linguistics uses very efficient tools of data analysis which can be very beneficial when creating larger texts, assessing of the progress of students, creating more systematic approach to the learning process by analysing big data and using data mining so that the input is more optimised and the output more targeted to the current needs of the users of the app or mobile platform. The most important use of these modern tools is in data processing based on the development of the situation, i.e. the progress of the information is important for further information processing. For example, if the students use a mobile platform, they are provided with the information based on their previous information processing - if the 3 student is tested and makes mistakes, they will be provided with the information which still contains the yet not acquired information until it is acquired properly. This beneficial tool supported by computational linguistics is simple, however, brings incredible progress if implemented in the learning platforms which are already in use. When using computational linguistics and even

artificial intelligence, we are equipped with the tools we never had available and these tools bring many opportunities to data processing and management that must be used and exploited as much as possible.

The author of the paper claims that the use of electronic platforms with the implementation of computational linguistics and deep learning is not at all sufficient and is rather a misunderstanding of modern technological tools which equip us with so many opportunities. They are merely used as a classic pen and paper tests and simple electronic communication tools. If we do not move forward, both designers and creators of these courses in favour of artificial intelligence and computational linguistics, we can never succeed and it will present a potential threat to our global competitiveness and sustainability. The paper attempts to show the absolute lack of the use of artificial intelligence and computational linguistics in our universities e-Learning platforms and claims that it is one of the biggest problems in the further development of educational processes. It also ought to stimulate professionals who are in IT industry such as the creators of various apps and platforms to enhance the need to implement artificial intelligence into these tools.

In the last two decades,e-learning has also been linked to environmental issues and sustainability. It was noticed in several studies that the emerging learning cultures have reduced the number of printed materials altogether. The virtual mode of e-learning with e-books and other electronic materials supports green environment and zero-waste movements all over the globe. As a result, e-learning becomes the new coveted way for sustainable education. On the other hand, the accessible materials provided by e-learning brought forward equal opportunities for people. Regardless of nationalities and locations, people could access the same learning materials. Once given the access learners would be able to use and share knowledge provided by the e-learning platforms. Opportunities were also thought to be awarded to learners regardless of any cultural or social backgrounds. Using online materials, learners of all gender would be able to access the knowledge. Equal opportunities for learners in underprivileged areas have also been discussed widely. There has been continuous discussion on e-learning as the learning culture of the future. E-learning has been known to be used for studying language since the 1960s. Since the 1960s, vast developments from both computer science and linguistic disciplines have created enjoyable and sustainable language learning experience. Learning language has also been identical to human or interpersonal communications. Regardless, learning with a computer or learning through computer has raised the issue of replacing human-to-human interactions. There were also proponents and opponents to the ideas of e-learning for language since then on. Considering all the facts, this study aimed at investigating the issues in e-learning and language learning. It would be necessary to identify: (1) what themes or issues are of importance in language e-learning, and (2) how these issues were being addressed for the developments of language e-learning.

Conclusion

Previous issues in e-learning and language learning studies of e-learning for the past 30 years have been covering many areas of learning and technology. Language learning has also become increasingly oriented toward computer-based technology throughout

those years. This is because one of the main training materials in early professional training through computer was to train how to speak English correctly. Previous studies have identified the issues of massive language training, such as for preparing students from overseas to colleges in the U.S.. The industrial spin-off on language learning was also criticized in many studies, amongst which was in-relation to the commercialization of language testing. Human aspects, as well as ethics remain the current issues in language e-learning. However, many studies have been conducted from the perspective of pedagogy and educational dilemmas. Not many studies provide balanced portrayals of accessibility and opportunities created through e-learning. Identifying the caveats as well as the benefits in language e-learning studies are vital for further comprehensive and thorough e-learning understanding. Communicating achievements and developments in language e-learning seemed to take a different route. Those who were keen to display the advancements of technology preferred to disseminate their findings in Computer Science journals. Not many publications provide equal opportunities to learn about the technical algorithm in e-learning while looking at the human users' perspectives of the technology. It is therefore necessary to gather more information from different publications to identify what issues have been discussed in language e-learning research. Equally important is to also to identify how these publications communicate the importance of the issues in the papers.

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