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Collaboration of Computer Science and Linguistics

Ever since humanity developed intelligence, forms of communication have been prominent in the species’ survival. Humans are social beings and require communication amongst each other to convey their own thoughts and emotions. It began with pictures, drawings, and scripts, but now, communication has become a wonderful combination of art, speaking, writing, and much more. Due to the development of the Internet and computers, communication has skyrocketed globally, and computers are learning to communicate as well. Through collaborative research between computer science and linguistics, mankind has advanced drastically. The study, *Application of Sentiment Analysis to Language Learning* by Mei-Hua Chen, Wei-Fan Chen, and Lun-Wei Ku, demonstrates how humans can use a machine learning program, RESOLVE, to better convey emotions through written communication. Another study, *End-to-End Speech Emotion Recognition with Gender Information* by Ting-Wei Sun, shows how machines can accurately detect emotions from one’s speech and convey that meaning to a user. Both of these studies thoroughly explain the benefits of collaboration between the two industries.

RESOLVE’s machine learning methods evidently prove that the collaborative research between linguistics and computer science can significantly improve society. This machine uses machine learning techniques to provide users with better word choice depending on what context they provide. This allows for users to better convey their sentiments and emotions. RESOLVE helps “develop language learners’ vocabulary knowledge as well as help facilitate their word use” (Chen 24433). The system was developed through the extraction of “2.8 million example sentences… and 3,785 emotion words in those sentences” (24434). After conducting an experiment with real users for RESOLVE, the team determined that “26 out of 33 participants saw RESOLVE as a practical reference aid… [and] less proficient participants showed greater improvements” (24440). This system can be used in educational institutions to improve language learning, in online websites to assist new learners, and in the industry to improve team communication. Using such systems, everyone can deeply progress their communication skills through improved conferment of emotions.

Another form of communication that can be improved is oral communication. Ting-Wei Sun used deep learning algorithms to assign emotion tags to each input by breaking apart raw speech data into different classification layers based on gender information as seen on page 152423. After conducting experiments with real users, Sun was able to “improve [speech emotion] recognition accuracy” by “add[ing] speaker gender information” and using “raw speech data… which prevents the omission of emotional information” (Sun 152436). Sun achieved “significantly higher-accuracy predictions compared to existing speech emotion recognition algorithms” (152436). He applied his algorithm to multiple datasets from diverse languages (English, Chinese Mandarin, and German) and unique noise levels/interruptions (crowd noise, footsteps, etc). This study clearly proves that the collaboration between machine learning and oral linguistics can deeply improve the understanding of emotions in human actions.

The collaboration between computer science and linguistics has become a crucial component in the development of technologies that can truly advance the world. Creating a system to model languages and analyze them has been an endeavour humanity has pursued for centuries. When the Internet was released in the 1990’s, “people started to explore statistical methods of analyzing all that data and build probabilistic models” (Myers). Currently, developers of chatbots and AI systems such as Siri, Alexa, and others are attempting to allow computers to “understand and do tasks that people ask for” (Myers). After further research is done in linguistics and recognition through machine learning, AI systems will be able to truly understand human communication instead of simple “if statements.” This will revolutionize the capabilities of technology and change the world as people know it.

Many studies published on IEEE Open Access demonstrate unique capabilities for communication improvement through collaborative research in computer science and linguistics. *Application of Sentiment Analysis to Language Learning* shows how society can progress through improved written communication, linguistic education, and more using the help of machine learning algorithms. *End-to-End Speech Emotion Recognition with Gender Information* depicts how oral communication can be analyzed by deep learning algorithms to recognize emotions from raw speech data, which can be applied to several situations to improve a user’s understanding of another subject’s emotions based on their speech. There are many other studies, which combine the research in computer science and the research in linguistics, that can also be used to greatly improve society in several ways. In conclusion, the collaborative research between the two industries; computer science and linguistics, has shown clear benefits to society, education, and workplace through improved oral and written communication.

Works Cited

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