CASTLE: a Computer-Assisted sentence Stress Teaching and Learning Environment

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Abstract

A Computer-Assisted sentence Stress Teaching and Learning Environment (CASTLE) is proposed and developed, in order to help learners of English as a Second Language (ESL) to perceive and produce English stress correctly.

Sentence stress plays an important role in English verbal communication. Incorrect stress may confuse listeners, and even break down a conversation. Stress is also challenging for ESL learners to master. It is neither easy for them to produce nor easy to perceive stress. Learners tend to transfer the stress patterns of their first language into English, which is not always appropriate. However, stress has been overlooked in English language teaching classes, due to the time limits of a class and teachers' lack of confidence of teaching stress. Thus, CASTLE is intended to help ESL learners to use sentence stress correctly.

There are three modules in CASTLE: an individualised speech learning material providing module, a perception assistance module and a production assistance module.

Through conducting an investigation into which voice features (i.e. gender, pitch and speech rate) makes a teacher's voice preferable for learners to imitate, we find that learners' imitation preferences vary, according to many factors (e.g. English background and language proficiency). Thus, the speech material providing module of CASTLE can provide individualised speech material for different learners, based on their preferred voice features.

In the perception assistance module of CASTLE, we propose *a set of* stress exaggeration methods that can automatically enlarge the differences between stressed and unstressed syllables in teachers' voice. These stress exaggeration methods are implemented by the manipulation of different prosodic features (i.e. pitch, duration and intensity) of the teachers' voice. Our experimental results show that all our proposed exaggeration methods could help ESL learners to perceive sentence stress more accurately.

In the production assistance module of CASTLE, we propose a clapping-based sentence stress practice model that is intended to help ESL learners to be aware of the rhythm of English language. By analysing the limitation of conventional categorical representation of stress, we propose a fuzzy representation which is intended to better represent the subjective nature of stress. Based on the fuzzy representation of stress, we propose three feedback models in order to help the learners correct their stress errors.

In addition to the development of CASTLE, we also propose an enhanced fuzzy linear regression model which can overcome the spreads increasing problem encountered by previous fuzzy linear regression models.

Dedicated to my parents for their love,
encouragement and endless support.

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