

A Chinese spoken language assessment system that utilizes computational linguistics techniques

1) Purpose of Study

The Chinese spoken language assessment system (C-SLA system) is a semi-automatic system that assists speech therapists and researchers in conducting comprehensive screening evaluations on subjects' spoken language production. Supplementary materials can also be output for therapists' diagnosis. It can also be used for academic analysis, as the models and outputs are quantitatively and qualitatively feasible.

2) Methods

Utilizing the techniques from natural language processing (NLP) and speech signal processing, the C-SLA system provides an automatized, convenient procedure for recording, processing, and archiving the subjects' speech data. Speech intelligibility is evaluated by quantitative, acoustic-prosodic features such as formants, F0, and temporal properties as well as qualitative illustrations such as tonal contour, vowel space, and rhythm pattern, etc. Automatically segmented quasi-semantic units, based on part of speech information, serve as basic units for assessing the coherence of continuous speech and the co-occurrences of word use, if evaluations on complex ability of speech production performance are requested.

3) Results

We will show the C-SLA system procedure and the related output, including vowel space and F0 contour pattern by comparing speech produced by normally hearing children and children with hearing loss. Intelligibility of vowel production will be represented by the distance among vowels, i.e., the space size. Normally hearing children produce larger vowel space, compared with the counterparts. Similarly, hearing-impaired children tend to produce relatively flat tonal patterns.

4) Conclusion

The C-SLA system combines techniques from information science and domain knowledge from computational linguistics. It not only facilitates efficient collection and management of speech data. It also provides comprehensive, linguistically grounded assessment of speech production performance. For the next development stage, an audio-visual self-learning interface is in progress.