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MEELARP RUANGRATANAWICHA : SPEECH COMPRESSION BY DIGITAL
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The main objective of this research is to develop speech compression programs of which the speech quality levels are high enough for communication applications. The programs employ methods based on linear predictive coding (LPC) i.e. LPC10, CELP (Code Excited Linear Prediction) and RPE-LTP (Residual Pulse Excitation - Long Term Prediction). In the first phase, the programs were developed for working on a PC and accepted speech in wave file format (.wav) as the input.

The characteristics of each compression method e.g. the compression ratio or data rate after compression, algorithm complexity and the quality of the speech were studied and used as the criteria to choose one of them to implement as the real-time version which intended to run on the digital signal processor ADSP2101. The data rate after compression is 2.4 Kbps for LPC10, 4.8 Kbps for CELP and 13 Kbps for RPE-LTP. CELP is found as the most complicated method, RPE-LTP is the second and LPC10 is the least of the three methods. The quality of the speech of each method was compared by using the opinion score from 12 listeners. The experiment was performed with two sample files of man and woman speech. LPC10 got the average score of 5.3, CELP got 6.7 and RPE-LTP got the highest score of 8.1. RPE-LTP was therefore selected for real-time implementation due to its good quality of speech and moderate complexity. The estimated compression and decompression time of the real-time compression program is 16.3 ms for 20 ms speech frame.

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