Abstract

Analyzing the cognitive load generated in the brain is the most important issue for specific applications such as voice stress analysis (VSA) systems in which the detection of stressed speech caused by an act of deception under law enforcement interview questioning or military interrogation.

The most widely used algorithm for VSA systems is the empirical mode decomposition (EMD). Currently EMD that uses the cubic spline interpolation technique to find the envelopes of the non-periodic signal takes a long processing time, and to achieve accurate results the process is very time consuming and expensive otherwise some tests tend to produce inaccurate results. On the other hand EMD that uses Hilbert analysis method to speed up the process and provide more accurate results, suffer from finding the envelopes of the non-periodic signal.

In this paper, a new algorithm is proposed for VSA, named fast Fourier transform (FFT) with a modified Hilbert analysis method (MH) for EMD algorithm, (FTT_MH_EMD), which provides a
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new technique that modifies the conventional Hilbert analysis method and combines it with the fast Fourier transform algorithm to overcome the previous limitations of using individually the FTT algorithm, the cubic spline interpolation technique or the conventional Hilbert analysis method and that can speed up the processing time and gives accurate results.

Simulations and results witness that the proposed algorithm provides higher accuracy than the other attempts and also the processing time has dropped by 10 times faster than those in the products currently available in the market for VSA.

References

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Index Terms

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Keywords