

Automatic Detection and Analysis of Dysphonia

Kamil Ekštein

Laboratory of Intelligent Communication Systems, Dept. of Computer Science
and Engineering, Faculty of Applied Sciences, University of West Bohemia,
Univerzitní 22, 306 14 Plzeň, Czech Republic

kekstein@kiv.zcu.cz

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Abstract: This article deals with automatic methods of dysphonia diagnostics and analysis. An automatic diagnostic and analysis system **DAn** (Dysphonia Analyser) is described. A detailed description of the implemented diagnostic and analysis methods is given together with some relevant physiological particulars of dysphonia.

The DAn project was started as a joint research activity between Laboratory of Intelligent Communication Systems and Teaching Hospital in Plzeň. The motive for the research and development of the system was the need to objectively diagnose patients with voice disorders. Before the DAn system was launched the used diagnostic method had been repeated subjective expert auscultation performed by several speech therapists (frequently only one due to capacity reasons).

Dysphonia is a voice disorder which is characterised mainly by presence of noise components in spectra of vocals (like e.g. long [a:] vowel which is usually used for testing). Thus, the detection and analysis methods are based primarily on a high-resolution spectral analysis and digital signal filtering.

Also the measuring setup was refined during the research stage of the project – a special, highly sensitive microphone with linear transmission characteristics was chosen and several experiments were performed to figure out the best microphone position and distance in order to maximise the possible dysphonia traits in the recording for both automatic analysis and expert listening.

The DAn system enables the therapist to either diagnose the patient in a fully automatic mode or examine him/her thoroughly in an expert-assisting mode and then make the diagnostic conclusions. In the fully automatic mode the system analyses the recording and informs the therapist about dysphonia symptoms it possibly found. The expert-assisting mode helps the therapist to decide him/herself. In this mode the system amplifies and filters the recorded signal and acoustically emphasises the spectral regions that are important for expert diagnose.

References

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