



Signal Processing and Systems (SP&S) Seminar

You are invited to attend a lecture by

הנכם מוזמנים להרצאה של

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Technion

בנושא :

Artificial Bandwidth Extension of Band Limited Speech Based on Vocal Tract Shape Estimation

This research addresses the challenge of improving the degraded telephone narrowband speech quality caused by signal band limitation of 0.3 - 3.4 kHz. We introduce a new speech bandwidth extension (BWE) algorithm which tries to estimate and produce the high-band spectral components from 3.4 kHz to 7 kHz, and emphasize lower spectral components around 300 Hz.

Using the source-filter speech model, the high-band production is separated into two independent algorithms of spectral envelope estimation and excitation generation. The excitation is generated using a simple spectral copying technique. The spectral envelope is estimated using statistical approaches. It involves phonetic and speaker dependent estimation of the spectral envelope. Speech phoneme information is extracted by using a hidden Markov model. Speaker vocal tract shape information, corresponding to the wideband signal, is extracted by a codebook search. The proposed method provides better estimation of high-band formant frequencies, especially for voiced sounds, as well as improved estimation of spectral envelope gain, especially for unvoiced sounds. Postprocessing of the estimated vocal tract shape reduces artifacts in cases of erroneous estimation of speech phoneme or vocal tract shape.

The low-band is emphasized using an equalizer filter, which improves speech naturalness, especially for voiced sounds.

We present objective experimental results that demonstrate improved wideband quality for different speech sounds in comparison to other BWE methods. Subjective experimental results show improved speech quality of the BWE speech signal compared to the received narrowband speech signals.

* M.Sc. research under the supervision of Prof. David Malah (EE) and Prof. Israel Cohen (EE).

* סטודנט לתואר שני בהנחיית פרופ' דוד מלאך ופרופ' ישראל כהן.

The lecture will take place on Wednesday, 30/11/2011
at 13:30 in room 1061
Electrical Eng. Building
Technion City

ההרצאה תתקיים ביום רביעי, 30/11/2011
בשעה 13:30 בחדר 1061
בבניין הפקולטה להנדסת חשמל
קריית הטכניון

כיבוד קל יוגש לפני תחילת ההרצאה

הזמנה זו מהווה אישור כניסה עם רכב לטכניון