Signal Processing in Text-to-Speech Synthesis

Advanced Signal Processing Seminar SS 2010

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Abstract

The last years showed a constant improve of the quality of text-to-speech synthesis systems. Applying text-to-speech synthesis is becoming more and more popular in commercial devices, like car nagivation systems, smart phones, or ebook readers. In this seminar, we want to give an overview of the current status of text-to-speech synthesis approaches with a focus on speech signal processing and statistical approaches.

1 Introduction

This is a LaTeX template for the text that you should prepare together with the presentation slides for the Advanced Signal Processing Seminar SS 2010. Please change author name, title and content according to your needs.

The following commands will generate a pdf file from your LaTeX text:

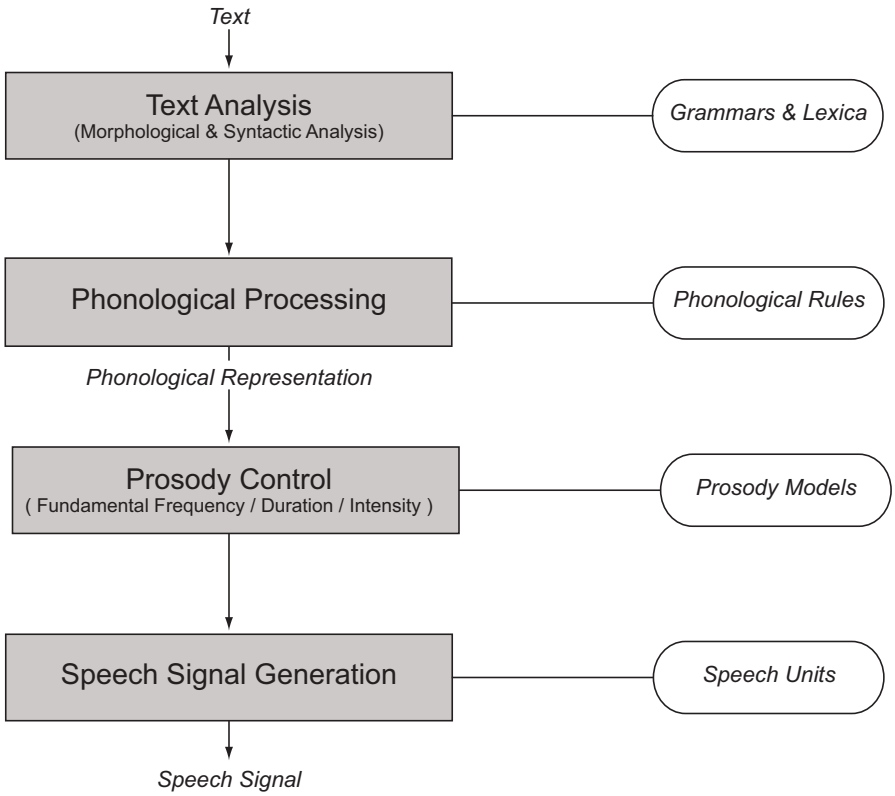
```
latex AdvSE2.tex
bibtex AdvSE2
latex AdvSE2.tex
latex AdvSE2.tex

dvips AdvSE2.dvi
ps2pdf AdvSE2.ps
```

A very good introduction to typesetting with LaTeX can be found in (1) and in the "classic" book of (2).

1.1 Administrative Information

- *I*nstructor: Harald Romsdorfer
- *M*eeting Date/Time: Fr 25.6., 16:00 - 19:00 and Di 29.6., 16:00 - 19:00 in meeting room IDEG134
- *M*ode: Each group of 1-2 students should select one topic. They should give an in-depth presentation of this topic and the referenced work therein (for about 1 - 1.5 hours). Following the presentation, we would like to discuss the presented topic. Therefore, it is necessary that each participant reads the presented article.
- *G*rading: Grades are given based on the presentation and the participation in discussions (50% :: 50%). The presentation slides and presentation text (approx. 6-10 pages) must be sent before the presentation to `romsdorfer@tugraz.at`.

1.2 Text-to-Speech Synthesis Overview



2 Topics

2.1 Analysis of Speech Signals (Feature Extraction)

- STFT, MFFC, RASTA, PLP, LSF
- Cepstral Smoothing
- Phone Clustering

see (3; 4)

2.2 Speech Corpus Segmentation

- HMM-based Forced Alginment
- DTW-based Pattern Matching

see (5; 6)

2.3 Prosodic Modification of Speech Signals

- Source-Filter Models: LPC, Spectral Coeffs (STRAIGHT)
- TD-PSOLA
- FD-PSOLA

see (7; 8)

2.4 Prosody Generation

- F0 Modeling
- Segment Duration Modeling
- Intensity Modeling

see (9; 10; 11)

2.5 Concatenative Speech Synthesis

- Diphone Synthesis
- Unit Selection Synthesis
- Source-Filter Synthesis: LPC, Fourier, MFCC

see (12; 13; 14; 15)

2.6 Statistical Parametric Speech Synthesis

- HMM-based Speech Synthesis: MFCC, LPC

see (16; 3)

2.7 Voice Transformation Algorithms

- Statistical Parametric Speech Synthesis
- Concatenative Speech Synthesis

see (17; 18; 19)

2.8 Language Transformation Algorithms

- Statistical Parametric Speech Synthesis
- Concatenative Speech Synthesis

see (20; 21)

2.9 Polyglot Speech Synthesis

- Foreign Inclusion Detection
- Polyglot Speech Synthesis: Concatenation-based, HMM-based

see (22; 23; 24; 11; 20)

3 Literature

Beside of the literature references given with each topic, the following books can be recommended for a more detailed overview of speech processing and especially of speech synthesis:

- Corpus-based speech synthesis (15)
- Speech and Language Processing (4)
- Text-to-Speech Synthesis (3)
- The HTK Book (5)

References

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