

Speech Signal processing 2012

David Weenink

February – March 2012

1 Administrativa

Master	General Linguistics
Module	Speech Signal Processing
Code	TW85231
Points	5 ECTS
Precondition	Master, reasonable mathematical background or affinity
Period	Semester 2, block 1 (February–March 2010)
Information	Onderwijssecretariaat Taal- en Letterkunde also IFA teaching also The page in the studiegids
Teacher	David Weenink
Time & Place	Wednesday 9:00–12:00, PCHoofthuis 2.14
Language	English
Book	SSPBook:D.J.M. Weenink, Speech signal processing by Praat, To be published in 2012 (book will change during the course, don't print it)

2 Contents

Getting students familiar with advanced techniques used in speech signal analysis, speech synthesis and speech recognition. This year we will work towards the generation of artificial signals and test relation between formant frequency analysis and bandfilter methods on the TIMIT database.

2.1 Goals

The following goals:

- Spectral analyses like band filter analysis and Fourier spectra.

- Filtering and convolution.
- Autocorrelation and pitch determination.
- Performing analyses automatically by scripting.
- Formant synthesis and analysis

2.2 Examination

Weekly assignments and final assignment. All weekly assignments have to be fulfilled to be able to participate in the final assignment. Communication via email with Subject: [SSP2012]

3 The weekly classes

3.1 Week 1, Wednesday February 8, Introduction and

Administrativa. Recapitulation of signals, sine, cosine, phase and sampling.

Scripting

Literature: Mathematics: Weenink (2012, Ch. 1,2,3,4 and App. A & B).

3.2 Week 2, February 15

Spectra

Discussion assignment 1.

Literature: SSPBook chapter 7 on spectra, ch 1, 2, 3, 4;

3.3 Week 3, February 22

Theory: Klatt u. Klatt (1990); Klatt (1980) and Weenink (2012, ch. 11: KlattGrid)

Information on synthesis of stop-liquid clusters see (Williams, 1996).

CV and C synthesis/analysis see Harrington u. Cassidy (1999, Ch. 4)

See http://www.fon.hum.uva.nl/david/ma_ssp/doc/ for these articles.

Discussion assignment 2.

3.4 Week 4, February 29

Theory: Discriminant and Principal component analysis Weenink (2006, Ch 3, especially 3.5). See URL: http://www.fon.hum.uva.nl/david/thesis_djmw.pdf.

Discussion assignment 3.

3.5 Week 5, March 6

Discussion assignment 4

Theory: The TIMIT acoustic phonetic database Weenink (2006, Ch 8).
Bandfilter analysis, Pich analysis, Discriminant analysis, PCA

3.6 Week 6, March 13

Canonical correlation zie Weenink (2006, Ch. 7).

3.7 Week 7, March 20 ???

References

- [Harrington u. Cassidy 1999] HARRINGTON, Jonathan ; CASSIDY, Steve: *Techniques in Speech Acoustics*. Kluwer Academic Publishers, 1999
- [Klatt 1980] KLATT, Dennis H.: Software for a cascade/parallel formant synthesizer. In: *J. Acoust. Soc. Am.* 67 (1980), S. 971–995
- [Klatt u. Klatt 1990] KLATT, Dennis H. ; KLATT, Laura C.: Analysis, synthesis, and perception of voice quality variations among female and male talkers. In: *J. Acoust. Soc. Am.* 87 (1990), S. 820–857
- [Weenink 2006] WEENINK, David: *Speaker-adaptive vowel identification*, University of Amsterdam, Diss., 2006. http://www.fon.hum.uva.nl/david/thesis_djmw.pdf
- [Weenink 2012] WEENINK, David J.: *Speech Signal Processing by Praat*. To be published, 2012 <http://www.fon.hum.uva.nl/david/sspbook/sspbook.pdf>
- [Williams 1996] WILLIAMS, David R.: Synthesis of initial (/s/-) stop-liquid clusters using HLsyn. In: *Proc. ICSLP 1996*, 1996, S. 2219–2222