

LOGICIEL ET MANUEL ESPS / WAVES

FICHE N° 197

PRÉSERVER
SAUVEGARDER
VALORISER

Période de fabrication : 1975-1999

Fabricant : Entropic Research Laboratory

Domaines : Sciences humaines et sociales

Sous-domaines : Sciences du langage

Organisme : Laboratoire de Parole et Langage d'Aix-Marseille Université

Ville : Aix-en-Provence

Modèle :

Matériaux :

Description

Ce logiciel d'observation et de traitement du signal audio, en particulier du signal de parole, fut un standard de facto dans les années 1990 dans les laboratoires de phonétique, de sciences de la parole, d'acoustique, en particulier aux États-Unis. Développé initialement par des chercheurs (originaires) de AT&T, il était très « orienté Unix » de par son architecture (commandes indépendantes combinables par un langage de script) et nécessitait donc un environnement « Unix ». Assez coûteux, il disparut vers 1999.

La documentation du logiciel ESPS/Waves présente 4 volumes décrivant la version 5.0 de ESPS:

ESPS programs, 2 vol.

ESPS Library Functions & Files types

ESPS Applications notes

1 volume décrivant la version 3.1 de waves

Waves+

1 volume relatif à la version 4.0 (1992) :

ESPS Functions, Files types & Tech memos

Diverses documentations annexes relatives à l'installation du logiciel.

Un CD de la dernière distribution de logiciel (1998)

langue: anglais

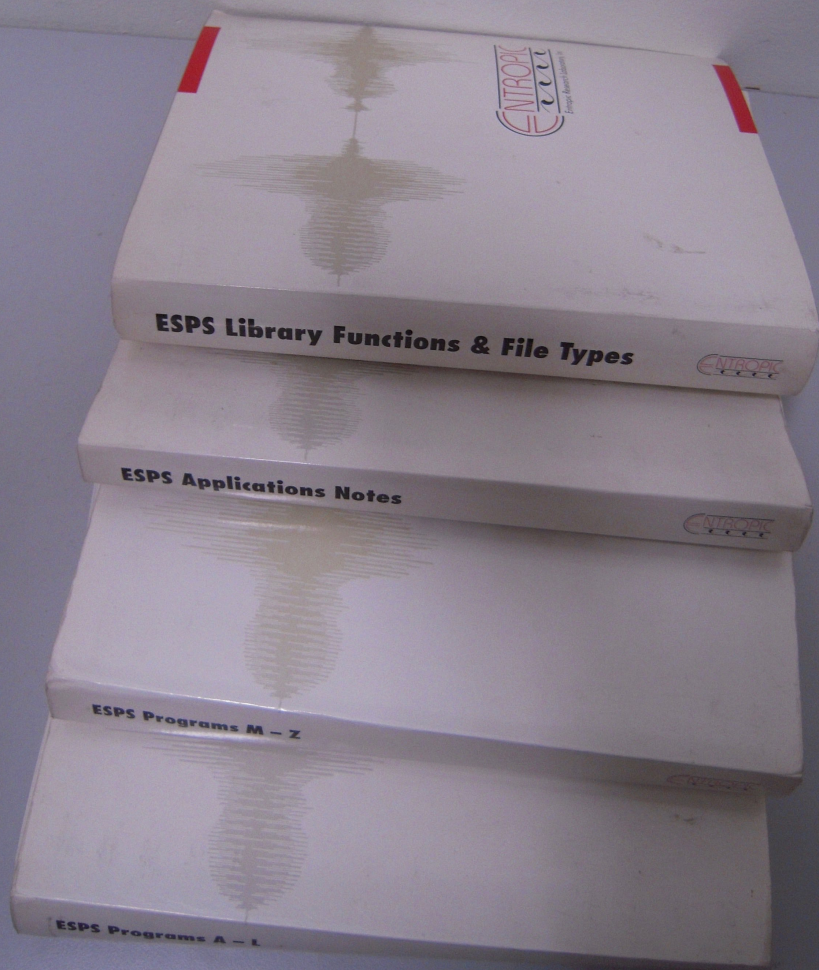
reliure: spirale

Utilisation

Ces documents sont conservés et utilisés dans les collections du Laboratoire de Parole et Langage à Aix-en-Provence.

Documentation suppl :

<http://research.microsoft.com/en-us/groups/srg/downloads.aspx>



ESPS Programs M - Z

ENTROPIC
RESEARCH

ESPS Library Functions & File Types

ENTROPIC
RESEARCH

ESPS Applica

ESPS Programs

A-L

Version 5.0

A-D

E-H

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NAME

formant - estimate formants, fundamental frequency (pitch, F0), and voicing

SYNOPSIS

```
formant | -p preemphasis | [-n num_formants] | [-o lpc_order] | [-l frame_step] | [-w
window_duration] | [-W window_type] | [-t lpc_type] | [-F] | [-O output_path] | [-r range] |
[-S] | [-f ds_freq] | [-B max_buff_bytes] | [-R maxrms_duration] | [-M maxrms_value] |
[-x debug_level] infile
```

DESCRIPTION

Formant estimates speech formant trajectories, fundamental frequency (F0) and related information. In particular, for each frame of sampled data, *formant* estimates formant frequencies, formant bandwidths, pole frequencies corresponding to linear predictor coefficients, and voicing information (fundamental frequency, voiced/unvoiced decision, rms energy, first normalized autocorrelation, and the first reflection coefficient).

Dynamic programming is used to optimize F0 and formant trajectory estimates by imposing frequency continuity constraints. The formant frequencies are selected from candidates proposed by solving for the roots of the linear predictor polynomial computed periodically from the speech waveform. The local costs of all possible mappings of the complex roots to formant frequencies are computed at each frame based on the frequencies and bandwidths of the component formants for each mapping. The cost of connecting each of these mappings with each of the mappings in the previous frame is then minimized using a modified Viterbi algorithm.

The input file *infile* is an ESPS FEA_SD file. *Formant* produces various output files that have the same file name body as *infile* (the name body results from removing the last of any extensions - e.g., the name body of "foo.sd" is "foo"), but with different extensions. Voicing information is stored in a FEA file with extension ".f0", formants and bandwidths are stored in a FEA file with extension ".fb", and pole frequencies are stored in an ASCII file with extension ".pole". For details on these and related files that are relevant for use with *xwaves*, see "FILE FORMATS", below. The *-O* option permits specification of an alternate output path in cases where it is undesirable or impossible to write in the input directory.

If the sampling frequency of the input speech file is greater than 10 kHz (or the *-f* specified value), *formant* downsamples the input file to the appropriate sampling rate and saves the results in an ESPS FEA_SD file with a ".ds" extension. The input signal, possibly downsampled, is then high pass-filtered to remove low frequency rumble (cut-off at approximately 80 Hz), with the result stored in an ESPS FEA_SD file with a ".hp" extension. The ".hp" file is then used for the F0 and formant frequency estimates in the manner described above.

Preemphasis is applied prior to the linear prediction analysis in order to compensate partially for voice source and radiation characteristics. The high-pass filtering is intended to provide a zero-mean signal for linear prediction analysis when there is a possibility of residual DC because the real zero of the preemphasis filter is within the unit circle. For reliable F0 estimation based on cross correlations, it is essential that the DC and rumble be removed, which is another reason for the high pass filtering.

If ".ds" or ".hp" files already exist in the current directory when *formant* is run, they are used directly and not re-computed. This shortcut is intended to save time when analysis conditions are varied. It is, however, somewhat error prone so you should be aware of what files are around.

OPTIONS



Pour nous citer :

Base de la Mission nationale de sauvegarde et de valorisation du patrimoine scientifique et technique contemporain, PATSTEC, Logiciel et manuel ESPS / Waves (Entropic Research Laboratory), <https://www.patstec.fr/ressources/objets/detail?id=24342>, consulté le 2026-07-29