Package ‘AcousticNDLCodeR’

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Type Package

Title Coding Sound Files for Use with NDL

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Depends R (>= 3.0.0)

Description Make acoustic cues to use with the R packages 'ndl' or 'ndl2'. The package implements functions used in the PLoS ONE paper:
Words from spontaneous conversational speech can be recognized with human-like accuracy by an error-driven learning algorithm that discriminates between meanings straight from smart acoustic features, bypassing the phoneme as recognition unit. PLoS ONE 12(4):e0174623
<doi:10.1371/journal.pone.0174623>
More details can be found in the paper and the supplement.
'ndl' is available on CRAN. 'ndl2' is available by request from <konstantin.sering@uni-tuebingen.de>.

Imports tuneR, zoo, seewave, parallel

License GPL (>= 2)

LazyData TRUE

RoxygenNote 6.0.1

NeedsCompilation no

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AcousticNDLCodeR-Package

Description

Package to make acoustic cues to use with ndl or ndl2.

Details

The packages main function is `makeCues`, `readTextGridFast`, `readTextGridRobust`, `readESPAnnotation` and `readWavesurfer` are helper functions that read the corresponding annotation files and return a data.frame. `CorpusCoder` codes a whole corpus given a vector with the path to and names of wave files and a vector for the annotation files. `word_classification_data` provides data from Arnold et al 2017 https://doi.org/10.1371/journal.pone.0174623

Author(s)

Denis Arnold

References

Reference to to paper in accepted form.

Examples

```r
# Not run:  
# assuming the corpus contains wave files and praat textgrids

setwd("/home/user/Data/MyCorpus") # assuming everything is in one place
#assuming you have one wav for each annotation

Waves=list.files(pattern="*.wav",recursive=T)
Annotations=list.files(pattern="*.TextGrids",recursive=T) # see above

# Lets assume the annotation is in UTF-8 and you want everything from a tier called words
# Lets assume that you want to dismiss everything in <|
# Lets assume that have 4 cores available
```
# Let's assume that you want the default settings for the parameters

```r
Data = CorpusCoder()
```

```r
CorpusCoder(Waves, Annotations, AnnotationType = "TextGrid",
TierName = "words", Dismiss = "<>", Encoding, Fast = F, Cores = 4,
IntensitySteps = 5, Smooth = 800)
```

```r
## End(Not run)
```

---

**CODE**

### Helper function for makeCues

**Description**

Helper function for makeCues

**Usage**

```r
CODE(SPEC, num)
```

**Arguments**

- **SPEC**: Spectrum representation made in makeCues()
- **num**: Number of the part

**Value**

A string containing the coding. Each band is separated by "_".

**Author(s)**

Denis Arnold

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**CorpusCoder**

**Description**

Codes a corpus for use with NDL with vector of wavefile names and a vector of TextGrid names provided

**Usage**

```r
CorpusCoder(Waves, Annotations, AnnotationType = c("TextGrid", "ESPS"),
TierName = NULL, Dismiss = NULL, Encoding, Fast = F, Cores = 1,
IntensitySteps, Smooth)
```
Arguments

Waves Vector with names (and full path to if not in wd) of the wave files.
Annotations Vector with names (and full path to if not in wd) of the TextGrid files.
AnnotationType Type of annotation files. Supported formats are praat TextGrids (set to "TextGrid") and ESPS/Wavesurfer (set to "ESPS") files.
TierName Name of the tier in the TextGrid to be used.
Dismiss Regular expression for Outcomes that should be removed. Uses grep. E.g. "<|>" would remove <noise>,<xxx>, etc. Default is NULL.
Encoding Encoding of the annotation file. It is assumed, that all annotation files have the same encoding.
Fast Switches between a fast and a robust TextGrid parser. For Fast no "\n" or "\t" may be in the transcription. Default is FALSE.
Cores Number of cores that the function may use. Default is 1.
IntensitySteps Number of steps that the intensity gets compressed to. Default is 5
Smooth A parameter for using the kernel smooth function provided by the package zoo.

Value

A data.frame with $Cues and $Outcomes for use with ndl or ndl2.

Author(s)

Denis Arnold

Examples

```r
## Not run:
# assuming the corpus contains wave files and praat textgrids

setwd(~OdataOmycorpusI) # assuming everything is in one place

# assuming you have one wav for each annotation

Waves=list.files(pattern=".*wav",recursive=T)
Annotations=list.files(pattern=".*TextGrids",recursive=T) # see above

# Lets assume the annotation is in UTF-8 and you want everything from a tier called words
# Lets assume that you want to dismiss everything in <|>
# Lets assume that have 4 cores available
# Lets assume that you want the default settings for the parameters

Data=CorpusCoderCorpusCoder(Waves, Annotations, AnnotationType = "TextGrid", TierName = "words", Dismiss = "<|>", Encoding, Fast = F, Cores = 4, IntensitySteps = 5, Smooth = 800)

## End(Not run)
```
getBoundary

Helper function for makeCues that splits the signal based on the envelope of the signal

Description

Helper function for makeCues that splits the signal based on the envelope of the signal

Usage

getBoundary(Wave, smooth = 800)

Arguments

Wave
A Wave object (see tuneR)

smooth
A parameter for using the kernel smooth function provided by the package zoo.

Value

A vector with the sample numbers of the boundaries.

Author(s)

Denis Arnold

Examples

## Not run:
library(tuneR)
Wave=readWave("MyWaveFile.wav")
Boundaries=getBoundary(Wave,800)

## End(Not run)

makeCues

Creates a string with the cues for each frequency band and segment separated by "_"

Description

Creates a string with the cues for each frequency band and segment separated by "_"

Usage

makeCues(WAVE, IntensitySteps = 5, Smooth = 800)
Arguments

WAVE A Wave object (see tuneR). Currently it is implemented for use with 16kHz sampling rate.
IntensitySteps Number of steps that the intensity gets compressed to. Default is 5.
Smooth A parameter for using the kernel smooth function provided by the package zoo.

Value

A string containing the coding. Each band and part is separated by "_".

Author(s)

Denis Arnold

Examples

```r
## Not run:
library(tuneR)
library(seewave)
Wave=readWave("MyWaveFile.wav")
if(Wave@samp.rate!=16000){
  Wave=resamp(Wave,f=Wave@samp.rate,g=16000,output="Wave")
}
Cues=makeCues(Wave,IntensitySteps=5,Smooth=800)

## End(Not run)
```

readESPSAnnotation

Reads a ESPS/Old Wavesurfer style annotation file and returns a data.frame with times and labels

Description

Reads a ESPS/Old Wavesurfer style annotation file and returns a data.frame with times and labels

Usage

readESPSAnnotation(File, Encoding)

Arguments

File Name (with full path, if not in wd) of the annotation file
Encoding Encoding of the annotation file. Typically encodings are "ACSII", "UTF-8" or "UTF-16"
Value

A data.frame with $Output for the lable $start and $end time of the lable.

Author(s)

Denis Arnold

Examples

```r
## Not run:
# Assume that NameOfAnnotation is encoded in "UTF-8"
Data=readESPSAnnotation("NameOfTextGrid","UTF-8")

## End(Not run)
```

readTextGridFast  

*Reads a TextGrid made with praat and returns a list with a vector of all tier names and a data.frame for each tier.*

Description

Reads a TextGrid made with praat and returns a list with a vector of all tier names and a data.frame for each tier.

Usage

```
readTextGridFast(File, Encoding)
```

Arguments

- **File**: Name (with full path, if not in wd) of the TextGrid
- **Encoding**: Encoding of the TextGrid. Typically encodings are "ACSII", "UTF-8" or "UTF-16"

Details

This method has sometimes problems with certain sequences like "\n" in the annotation file. If the method fails, try readTextGridRobust()

Value

A list containing a vectors with the names and data.frames for each tier in the TextGrid.

Author(s)

Denis Arnold
Examples

```r
## Not run:
# Assume that NameOfTextGrid is encoded in "UTF-8"
Data=readTextGridFast("NameOfTextGrid","UTF-8")

## End(Not run)
```

---

**readTextGridRobust**

*Reads a TextGrid made with praat and returns a list with a vector of all tier names and a data.frame for each tier*

---

**Description**

Reads a TextGrid made with praat and returns a list with a vector of all tier names and a data.frame for each tier.

**Usage**

```r
readTextGridRobust(File, Encoding)
```

**Arguments**

- **File**
  
  Name (with full path, if not in wd) of the TextGrid

- **Encoding**
  
  Encoding of the TextGrid. Typically encodings are "ACSII","UTF-8" or "UTF-16"

**Value**

A list containing a vectors with the names and data.frames for each tier in the TextGrid.

**Author(s)**

Denis Arnold

**Examples**

```r
## Not run:
# Assume that NameOfTextGrid is encoded in "UTF-8"
Data=readTextGridRobust("NameOfTextGrid","UTF-8")

## End(Not run)
```
**readWavesurfer**

*Reads a New Wavesurfer style annotation file and returns a data.frame with times and labels*

**Description**

Reads a New Wavesurfer style annotation file and returns a data.frame with times and labels.

**Usage**

```r
readWavesurfer(file, encoding)
```

**Arguments**

- `file` Name (with full path, if not in wd) of the annotation file
- `encoding` Encoding of the annotation file. Typically encodings are "ACSII", "UTF-8" or "UTF-16"

**Value**

A data.frame with Output for the label $start and $end time of the label.

**Author(s)**

Denis Arnold

**Examples**

```r
## Not run:
# Assume that NameOfAnnotation is encoded in "UTF-8"
Data=readWavesurfer("NameOfTextGrid","UTF-8")
## End(Not run)
```

---

**word_classification_data**

*Data of PLoS ONE paper*

**Description**

Dataset of a subject and modeling data for an auditory word identification task.

**Usage**

```r
data(word_classification_data)
```
Format

Data from the four experiments and model estimates

ExperimentNumber  Experiment identifier
PresentationMethod  Method of presentation in the experiment: loudspeaker, headphones 3. Trial:
  Trial number in the experimental list
TrialScaled  scaled Trial
Subject  anonymized subject identifier
Item  word identifier - german umlauts and special character coded as 'ae' 'oe' 'ue' and 'ss'
Activation  NDL activation
LogActivation  log(activation+epsilon)
L1norm  L1-norm (lexicality)
LogL1norm  log of L1-norm
RecognitionDecision  recognition decision (yes/no)
RecognitionRT  latency for recognition decision
LogRecognitionRT  log recognition RT
DictationAccuracy  dictation accuracy (TRUE: correct word reported, FALSE otherwise) 15.
  DictationRT: response latency to typing onset

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