A Guide for the R Package rhythm_metrics

Cong Zhang, Radboud University

Contents

1	List of Functions
	1.1 Calculations
	1.2 Plotting
2	Installation
3	Import packages
4	Examples
	4.1 Create dataframe
	4.2 delta_cv
	4.3 varco_cv
	4.4 percentage_v
	4.5 rpvi_c
	4.6 npvi_v

1 List of Functions

1.1 Calculations

- \bullet delta_cv
- varco_cv
- percentage_v
- rpvi_c
- \bullet npvi_v

1.2 Plotting

- $\bullet \quad plot_delta_cv$
- plot_varco_cv
- $\bullet \quad plot_percentage_v$
- plot_rpvi
- plot_npvi

2 Installation

```
install.packages("devtools")
devtools::install_github("congzhang365/rhythm.metrics")
```

3 Import packages

```
library(rhythm.metrics)
library(dplyr)
```

4 Examples

4.1 Create dataframe

```
df <- data.frame (cv_label = c("consonant", "vowel", "consonant", "vowel",</pre>
                                 "consonant", "vowel", "consonant", "vowel",
                                 "consonant", "vowel", "consonant", "vowel",
                                 "consonant", "vowel", "consonant", "vowel"),
                  utterance_id = c("utt_1", "utt_1", "utt_1", "utt_1",
                                    "utt_2", "utt_2", "utt_2", "utt_2",
                                    "utt_3", "utt_3", "utt_3", "utt_3",
                                    "utt_4", "utt_4", "utt_4", "utt_4"),
                  cv_{duration} = c(0.1, 0.8, 0.2, 0.5,
                                   0.3, 0.3, 0.4, 0.7,
                                   0.3, 0.88, 0.5, 0.9,
                                   0.3, 0.57, 0.4, 0.97),
                  utterance_duration = c(2.4, 2.4, 2.4, 2.4,
                                          2.7, 2.7, 2.7, 2.7,
                                          3.4, 3.4, 3.4, 3.4,
                                          1.8, 1.8, 1.8, 1.8))
df
#>
       cv\_label\ utterance\_id\ cv\_duration\ utterance\_duration
#> 1 consonant
                        utt_{-}1
                                     0.10
                                                          2.4
#> 2
                        utt_{-}1
                                     0.80
          vowel
                                                          2.4
#> 3 consonant
                        utt_{-}1
                                     0.20
                                                          2.4
                                     0.50
#> 4
         vowel
                        utt 1
                                                          2.4
#> 5 consonant
                        utt_2
                                     0.30
                                                          2.7
#> 6
                        utt_2
                                     0.30
                                                          2.7
          vowel
#> 7 consonant
                        utt_2
                                     0.40
                                                          2.7
#> 8
          vowel
                        utt 2
                                     0.70
                                                          2.7
#> 9 consonant
                                     0.30
                        utt_3
                                                          3.4
#> 10
                        utt_3
                                     0.88
          vowel
                                                          3.4
#> 11 consonant
                        utt 3
                                     0.50
                                                          3.4
#> 12
                        utt_3
                                     0.90
          vowel
                                                          3.4
#> 13 consonant
                        utt_4
                                     0.30
                                                          1.8
                                     0.57
                                                          1.8
#> 14
          vowel
                        utt_4
#> 15 consonant
                        utt_4
                                     0.40
                                                          1.8
#> 16
                                     0.97
                                                          1.8
       vowel
                        utt_4
```

4.2 delta_cv

Delta C and Delta V are rhythm metrics based on Ramus, F., Nespor, M., & Mehler, J. (1999). Correlates of linguistic rhythm in the speech signal. Cognition, 73(3), 265-292.

Delta C: SD of total C duration Delta V: SD of total V duration

4.3 varco_cv

Varco C and Varco V are rhythm metrics based on Dellwo, Volker (2006). Rhythm and Speech Rate: A Variation Coefficient for deltaC. In: Karnowski, P; Szigeti, I. Language and language-processing. Frankfurt/Main: Peter Lang, 231-241.

```
Varco C: Delta C / mean(C duration) * 100
Varco V: Delta V / mean(V duration) * 100
```

plot_varco_cv(df, cv_label, utterance_id, cv_duration)

4.4 percentage_v

%V is a rhythm metrics based on Ramus, F., Nespor, M., & Mehler, J. (1999). Correlates of linguistic rhythm in the speech signal. Cognition, 73(3), 265-292. It calculates the ratio of vocalic material to the total duration of an utterance.

% V: total V duration / total utterance duration

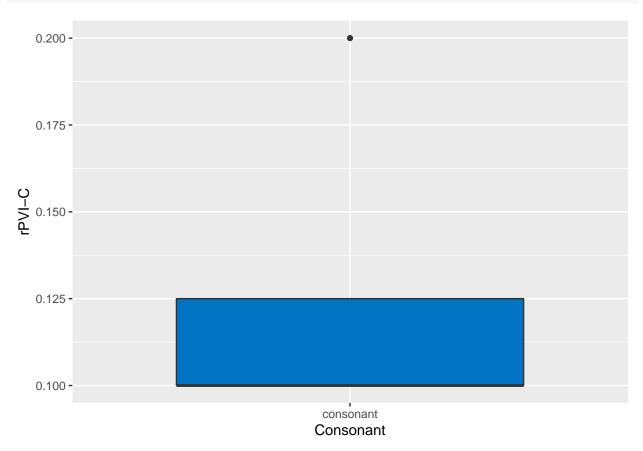
4.5 rpvi_c

rPVI C is a rhythm metrics based on Grabe, E., & Low, E. L. (2002). Durational variability in speech and the rhythm class hypothesis. In Laboratory phonology 7 (pp. 515-546). De Gruyter Mouton.

It calculates the sum of the absolute differences between pairs of consecutive consonantal intervals divided by the number of pairs in the speech sample.

```
rpvi_c(df, c_label="consonant")
#> # A tibble: 1 x 1
#> rpvi
#> <dbl>
#> 1 0.125
```

plot_rpvi(df, c_label="consonant", utterance_id, cv_duration)



4.6 npvi_v

nPVI V is a rhythm metrics based on Grabe, E., & Low, E. L. (2002). Durational variability in speech and the rhythm class hypothesis. In Laboratory phonology 7 (pp. 515-546). De Gruyter Mouton.

It calculates the normalised sum of the absolute differences between pairs of consecutive vocalic intervals divided by the number of pairs in the speech sample.

```
npvi_v(df, v_label="vowel")
#> # A tibble: 1 x 1
#> npvi
#> <dbl>
#> 1 45.1
```

plot_npvi(df, v_label="vowel", utterance_id, cv_duration)

