

Lab 7 Prosodic features – Part II

In this lab we will use R for doing exploratory data analysis. We will further explore the acoustic characteristics of President Obama's speech, from analyzing the prosodic difference between stressed and unstressed vowels.

A. [R tutorial](#)

B. Duration

Compute the mean duration of the stressed vowels and the mean duration of the unstressed vowels, and then compute the ratio of the two means by following these steps:

- `a <- read.table("/users/jiahong/tmp/duration.txt", header = T)`
- `stressed = a[a$stress == 1,]`
- `unstressed = a[a$stress == 0,]`
- `s = tapply(stressed$duration, stressed$name, mean)`
- `s`
- `u = tapply(unstressed$duration, unstressed$name, mean)`
- `u`
- `ratios = s/u`
- `ratios`
- `barplot(ratios)`
- `plot(0, 0, xlim= c(0.06, 0.12), ylim=c(0.04,0.08), type='n', xlab='stressed', ylab='unstressed',main='duration')`
- `text(s,u,c('alison','antony','jim','jordan','nirav','obama'))`
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- `# to save a graph in .png`
- `png('/home/jiahong/tmp/duration.png', width=400, height=400)`
- `plot(0, 0, xlim= c(0.06, 0.12), ylim=c(0.04,0.08), type='n', xlab='stressed', ylab='unstressed',main='duration')`
- `text(s,u,c('alison','antony','jim','jordan','nirav','obama'))`
- `dev.off()`
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- `# if your R is "unable to start device PNG", use pdf`
- `pdf('/home/jiahong/tmp/duration.pdf', width=400, height=400)`
- `plot(0, 0, xlim= c(0.06, 0.12), ylim=c(0.04,0.08), type='n', xlab='stressed', ylab='unstressed',main='duration')`
- `text(s,u,c('alison','antony','jim','jordan','nirav','obama'))`
- `dev.off()`

C. F0 and duration

Use the file stress.txt (wms-609.sas.upenn.edu/ling120/stress.txt), which contains the duration, the mean of f0, and the standard deviation of f0 for each stressed and unstressed vowel (the vowels that have less than three f0 points in the data were excluded). Compute and plot the following parameters using R (as what you did in B):

1. The difference of f0 mean between stressed and unstressed vowels;
2. The difference of f0 standard deviation between stressed and unstressed vowels;

Draw one or more graphs which best represent the difference of the speakers' prosody to your impression, for example, a graph in which x-axis is the duration difference between stressed and unstressed vowels, and y-axis is the difference of f0 mean between stressed and unstressed vowels.

Discuss the results of B and C, and the results from lab 6. What do they tell us about the prosodic characteristics of President Obama's speech?

D. Extra credits

From stress.txt, you can also compare other parameters such as the correlation between vowel duration and f0 standard deviation, the distribution of the f0 mean or f0 standard deviation on the stressed vowels, etc.

You can also analyze other acoustic features such as intensity. You can use Praat -> Read -> "To Intensity..." -> "Down to Intensity Tier" -> "Write to short text file..." to save intensity into a text file, and then write a script to extract some intensity features.

Do any of these parameters show significant difference among the speakers?

The lab is due next Friday, Oct. 30.