Counting Words:
The zipfR Toolkit

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Outline

zipfR

A guided tour

Playtime

zipfR

- http://purl.org/stefan.evert/zipfR
- http://www.r-project.org/

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Loading

```
library(zipfR)
```

```
?zipfR
```

```
data(package="zipfR")
```

Importing data

```
data(ItaRi.spc)
data(ItaRi.emp.vgc)

my.spc <- read.spc("my.spc.txt")
my.vgc <- read.vgc("my.vgc.txt")

my.tfl <- read.tfl("my.tfl.txt")
my.spc <- tfl2spc(my.tfl)
```

Looking at spectra

```
summary(ItaRi.spc)
print(ItaRi.spc)

N(ItaRi.spc)
V(ItaRi.spc)
Vm(ItaRi.spc,1)
Vm(ItaRi.spc,1:5)

# Baayen's P
Vm(ItaRi.spc,1) / N(ItaRi.spc)

plot(ItaRi.spc)
plot(ItaRi.spc, log="x")
```

Looking at vgcs

```
summary(ItaRi.emp.vgc)
print(ItaRi.emp.vgc)

N(ItaRi.emp.vgc) # NB!

plot(ItaRi.emp.vgc, add.m=1)
```

Creating vgcs with binomial interpolation

```
# interpolated vgc

ItaRi.bin.vgc <- vgc.interp(ItaRi.spc,
N(ItaRi.emp.vgc), m.max=1)

summary(ItaRi.bin.vgc)

# comparison

plot(ItaRi.emp.vgc, ItaRi.bin.vgc,
legend=c("observed","interpolated"))
```

Estimating LNRE models

```
# ZM model

ItaRi.zm <- lnre("zm", ItaRi.spc)
summary(ItaRi.zm)

# ZM estimated fitting V and V_1 only

ItaRi.mmax1.zm <- lnre("zm", ItaRi.spc, m.max=1)
summary(ItaRi.mmax1.zm)

# fZM model

ItaRi.fzm <- lnre("fzm", ItaRi.spc, exact=F) # NB!
summary(ItaRi.fzm)
```

Observed/expected spectra at estimation size 1

```
# expected spectra

ItaRi.zm.spc <- lnre.spc(ItaRi.zm, N(ItaRi.zm))

ItaRi.mmax1.zm.spc <- lnre.spc(ItaRi.mmax1.zm,
N(ItaRi.mmax1.zm))

ItaRi.fzm.spc <- lnre.spc(ItaRi.fzm, N(ItaRi.fzm))
```

Observed/expected spectra at estimation size 2

```
# compare

plot(ItaRi.spc, ItaRi.zm.spc,
ItaRi.mmax1.zm.spc, ItaRi.fzm.spc,
legend=c("observed","zm","zm1","fzm"))

# plot first 10 elements only

plot(ItaRi.spc, ItaRi.zm.spc,  ItaRi.mmax1.zm.spc,
ItaRi.fzm.spc, legend=c("observed","zm","zm1","fzm")
m.max=10)
```

Expected spectra at 10 times the estimation size

```
# extrapolated spectra

ItaRi.zm.spc <- lnre.spc(ItaRi.zm, 10*N(ItaRi.zm))

ItaRi.fzm.spc <- lnre.spc(ItaRi.fzm,
10*N(ItaRi.fzm))

# compare

plot(ItaRi.zm.spc, ItaRi.fzm.spc,
legend=c("zm","fzm"))
```

Evaluating extrapolation quality 1

```
# taking a subsample and estimating a model (if you
# repat you'll get different sample and different
# model!)

ItaRi.sub.spc <- sample.spc(ItaRi.spc, N=700000)

ItaRi.sub.fzm <- lnre("fzm", ItaRi.sub.spc,
exact=F)

ItaRi.sub.fzm
```

Evaluating extrapolation quality 2

```
# extrapolate vgc up to original sample size

ItaRi.sub.fzm.vgc <- lnre.vgc(ItaRi.sub.fzm,
N(ItaRi.emp.vgc))

# compare

plot(ItaRi.bin.vgc, ItaRi.sub.fzm.vgc,
N0=N(ItaRi.sub.fzm), legend=c("interpolated","fZM"))
```

Compare growth of two categories 1

```
# the ultra- prefix

data(ItaUltra.spc)

summary(ItaUltra.spc)

# cf.

summary(ItaRi.spc)

# estimating model

ItaUltra.fzm <- lnre("fzm",ItaUltra.spc,exact=F)

ItaUltra.fzm
```

Compare growth of two categories 2

```
# extrapolation of V to ri- sample size

ItaUltra.ext.vgc <- lnre.vgc(ItaUltra.fzm,
N(ItaRi.emp.vgc))

# compare

plot(ItaUltra.ext.vgc, ItaRi.bin.vgc,
N0=N(ItaUltra.fzm), legend=c("ultra-","ri-"))

# zooming in

plot(ItaUltra.ext.vgc, ItaRi.bin.vgc,
N0=N(ItaUltra.fzm), legend=c("ultra-","ri-"),
xlim=c(0,1e+5))
```

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Now, try it yourself

- Pick comparable datasets
- Explore spc, empirical vgc, interpolated vgc
- Compute LNRE model(s)
- Compare vgc and spectra of classes at different sample sizes

Data

- `data(package="zipfR")`
- E.g.:
  - Brown adjectives vs. verbs
  - Tiger NP vs. PP rules
  - Great Expectations vs. Oliver Twist
  - ...
- Or import your own frequency lists

Explore

- Remember: `?zipfR`
- Summaries, spectrum plots
- Empirical and interpolated vgcs
- Plot vgcs of two classes together

LNRE modeling

- Try more than one model
- Play with `exact` and `m.max` arguments
- Look at goodness of fit, expected V and V_m
- Comparative spc plots at estimation size and larger sizes

Class comparison

- Extrapolate class with shorter sample
- Extrapolate both classes to very large sample size
- Look at spectra for matching sample sizes

Already done?

Try Case Study 2 from the tutorial (or go to get some lunch!)