How To Be a Real Data Monkey
Hacking the Infochimps API with R

Drew Conway

December 16, 2010

Introduction

What is infochimps?

- Data clearinghouse
- API

The `infochimps` R package

- Basic usage framework
- Looking at the guts

Examples

- Geo-location of blog hits
- Programming language mentions on Twitter

Infochimps.com

DISCLAIMER: I do not work for Infochimps

- I just think they're awesome
- Much more info at `http://infochimps.com/about/`

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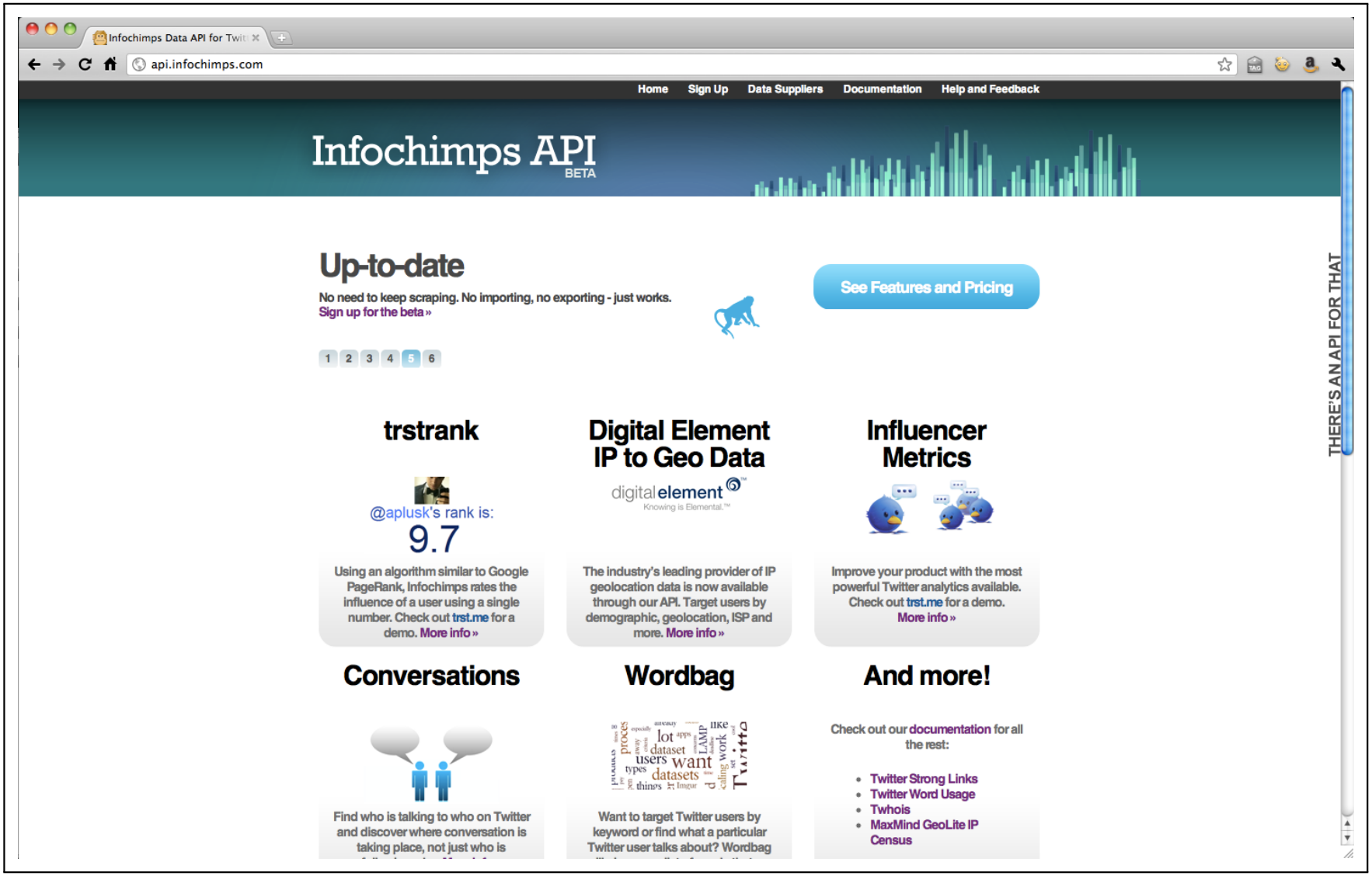
We make lists, spreadsheets and datasets easy to find and monkey around with.

Data clearinghouse

- Buy and sell data sets
- Handle all overhead
- Many free data sets, very useful for researchers

Infochimps API



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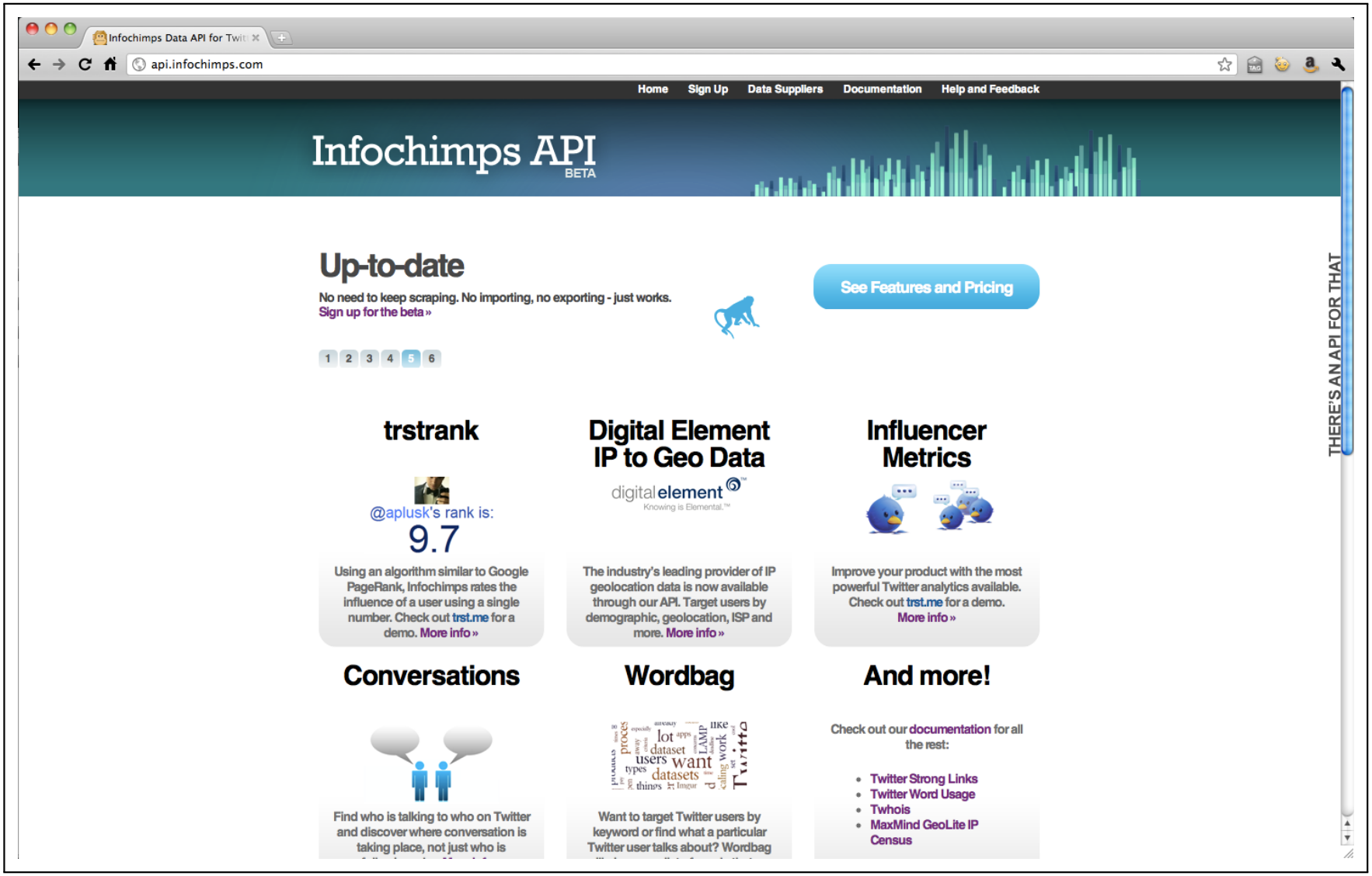

For more info see vid by Flip Kromer: `http://vimeo.com/16819171`

infochimps R package

Idea: create functions for every API call to integrate querying in R

- My first package accepted to CRAN!
- http://cran.r-project.org/web/packages/infochimps/
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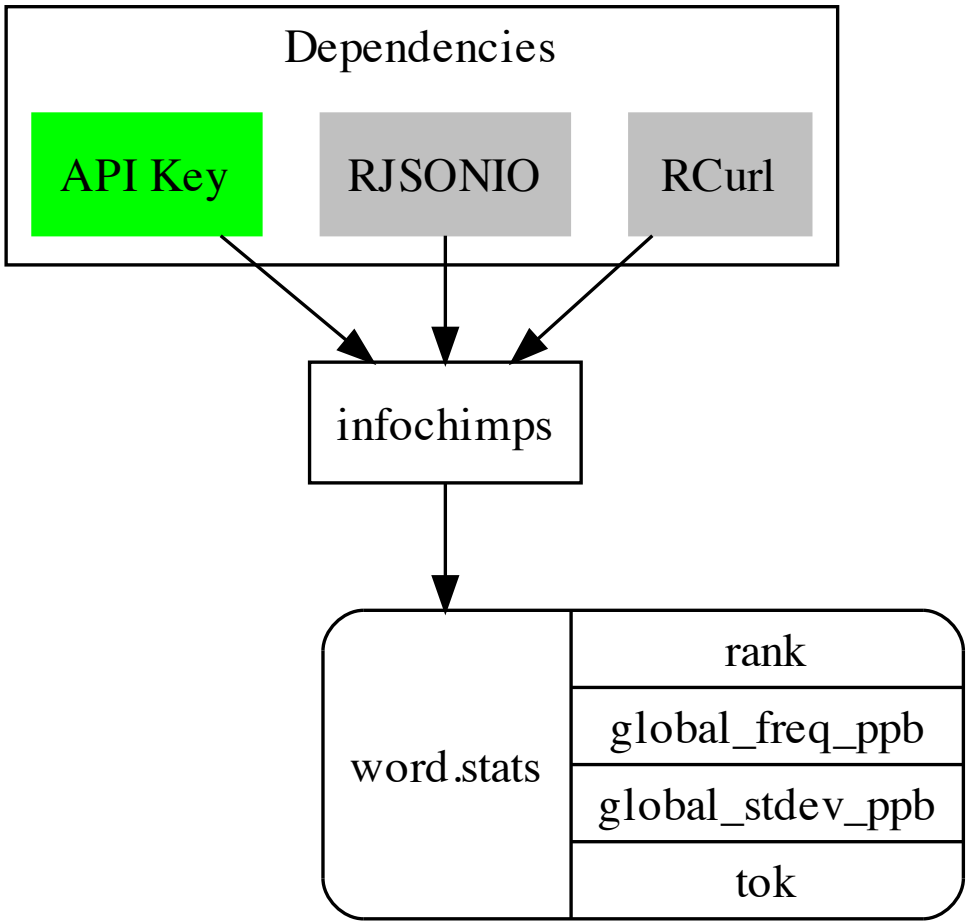
Twitter related

- conversations
- influence
- strong.links
- trstrank
- word.bag
- word.stats

Geo-location related

- census
- demographics
- domain
- ip.geo

Basic usage framework



My first infochimps call

Generate infochimps session

```
> library(infochimps)
> my.api<-''some.long.alpha.numeric''
> ic<-infochimps(my.api)
```

Get statistics for word "data"

```
> data.stats<-word.stats(''data'',ic)
> print(data.stats)
$global_stdev_ppb
[1] 2376464

$range
[1] 0.01266617

$tok
[1] ''data''

$global_freq_ppb
[1] 151562.4
```

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The word.stats function

```
word.stats <-
function(tok,session) {
    word.url<-paste(session$base,"word_stats.json?tok=",
        tok,"&apikey=",session$api.key,sep="")
    word.get<-getURL(word.url)
    word.data<-fromJSON(word.get)
    # Simple error checking
    if(is.null(word.data$error)) {
        return(word.data)
    }
    else {
        warning(word.data$message[[1]])
        return(NA)
    }
}
```

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All function follow this basic framework

Visualizing the location of blog visitors

The `ip.geo` function provides detailed geo-location data for a given IP address

- City, metro, country and continent codes (with confidence)
- Zip codes
- Latitude/Longitude
- Much more...

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Using web log data from `http://drewconway.com/zia`, visualize one days worth of blog hits

1. Parse log file by IP address and date/time
2. Use `ip.geo` to find lat/long for each hit
3. Plot on map using `ggplot2`

Step 1: Parse log file

```
# Load libraries
library(infochimps)
library(ggplot2)
library(maps)

# Need to load and clean the data
log.data<-read.delim("data/drewconway_com-Dec-2010.txt",
    sep="-", header=FALSE, as.is=TRUE)
log.data<-data.frame(list("IP"=log.data$V1, "Date.Time"=log.data$V3,
    "Log"=log.data$V4), stringsAsFactors=FALSE)
log.data$IP<-gsub(" ","", log.data$IP)

# First, get the dates in useable format
log.data$Date.Time<-gsub("[\\[ ]","",log.data$Date.Time)
log.data$Date.Time<-strptime(log.data$Date.Time, format="%d/%b/%Y:%H:%M:%S ")

# Filter out only those logs accessing the right blog post
log.data<-log.data[grep("(\\?p\\=|index\\.php)",log.data$Log),]
```

Step 2: Get lat/long data

```
# Create infochimps session
api.key<-"my.long.alpha.numeric"
ic<-infochimps(api.key)

# Get lattitude and longitude data for all of the IPs
ips<-unique(log.data$IP)

get.latlong<-function(ip) {
    geo.data<-ip.geo(ip,ic)
    return(c(ip, geo.data$lat,geo.data$longitude))
}

# Create data frame to merge into log data
geo.data<-lapply(ips, get.latlong)
geo.df<-as.data.frame(do.call("rbind", geo.data),stringsAsFactors=FALSE)
names(geo.df)<-c("IP","Latitude","Longitude")
log.geo<-merge(log.data,geo.df,by="IP")
log.geo$Latitude<-as.numeric(log.geo$Latitude)
log.geo$Longitude<-as.numeric(log.geo$Longitude)

# Create counts, and sort chronologically
log.count<-ddply(log.geo,.(IP, Date.Time, Latitude, Longitude),
    summarise, Count=length(Log))
log.count<-log.count[with(log.count, order(Date.Time)),]
```

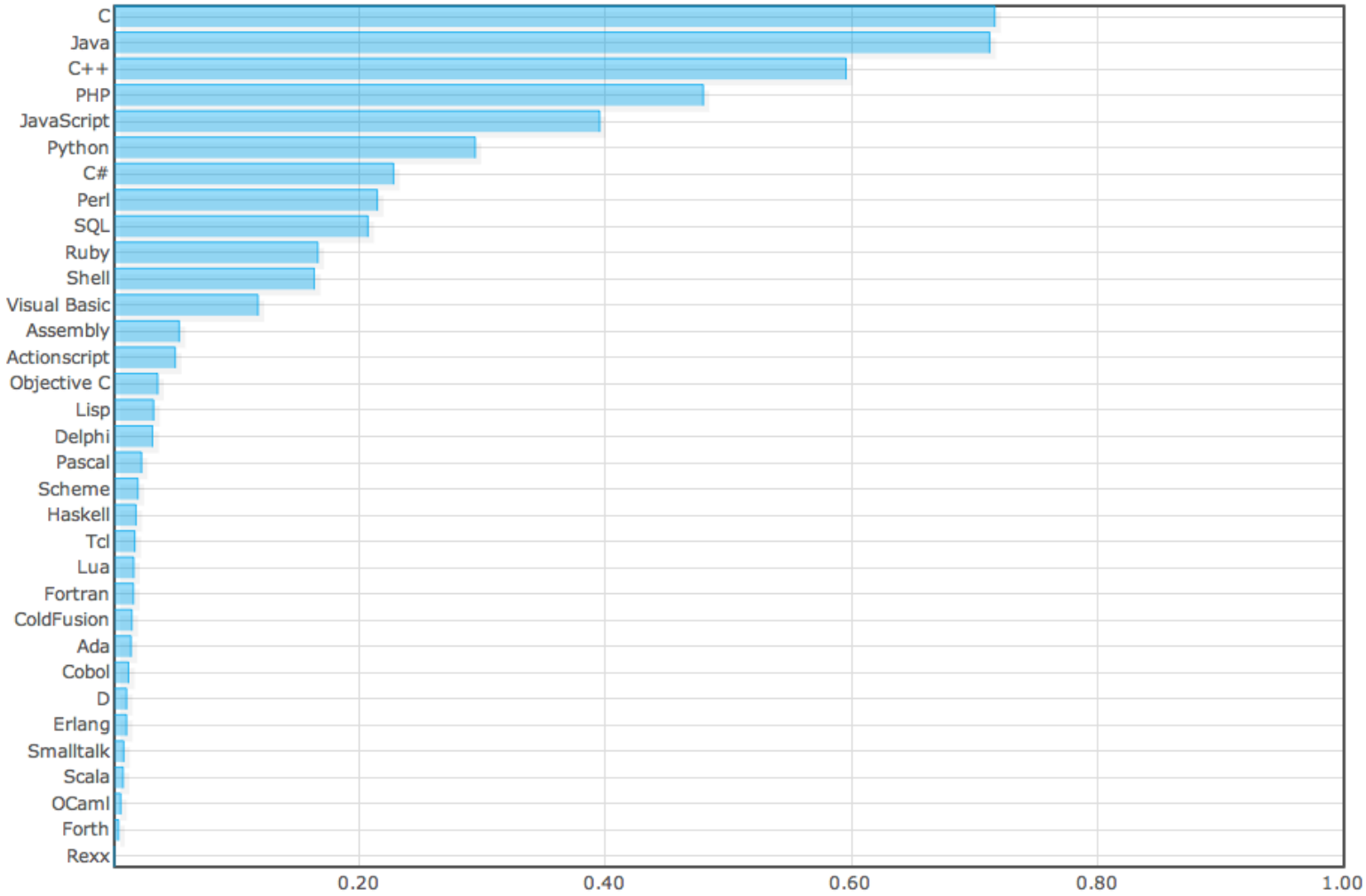
Step 3: Visualize on global map

```
# Ready to visualize
world.map<-data.frame(map(plot=FALSE)[c("x","y")])

# Create frame for every second in data
plot.num<-1
for(d in strftime(log.count$Date.Time)) {
    log.sub<-log.count[which(strftime(log.count$Date.Time)==d),]
    geo.plot<-ggplot(world.map, aes(x=x,y=y))+geom_path(aes(colour=``grey''))
    geo.plot<-geo.plot+geom_point(data=log.sub, aes(x=Longitude, y=Latitude,
        color=``red'', alpha=0.75, size=Count))+
      annotate(``text'',x=-125,y=-5,label=strftime(d, format=``%H:%M:%S''))+
      theme_bw()+scale_colour_manual(values=c(``grey''=``grey'',``red''=``red''),
        legend=FALSE)+
      scale_alpha(legend=FALSE)+scale_size(legend=FALSE)+
        coord_map(projection=``lagrange'',ylim=c(-40,70),xlim=c(-145,155))+
      opts(panel.grid.major=theme_blank(),axis.ticks=theme_blank(),
        axis.text.x=theme_blank(),axis.text.y=theme_blank())+
      xlab(````)+ylab(````)
    ggsave(plot=geo.plot,filename=paste(``images/maps/'',plot.num,``.png'',sep=````),
      width=6,height=4)
    plot.num<-plot.num+1
}

# Run this at the command-line to join the files as a movie
# ffmpeg -f image2 -r 5 -i images/maps/%d.png -b 600k blogpost.mp4
```

The movie

Blog hits map

How do people tweet about different languages?



Source: http://langpop.com/, Last updated Sat Nov 27 08:45:50

Use the word.stats function

The word.stats function returns token frequency data

- Global frequency (parts per-billion)
- Standard deviation of frequency (parts per-billion)
- Range (normalized number of unique users who have used it)

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Use the global frequency to create chart for Twitter mentions

1. Create vector of computer languages
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1. Create vector of computer languages
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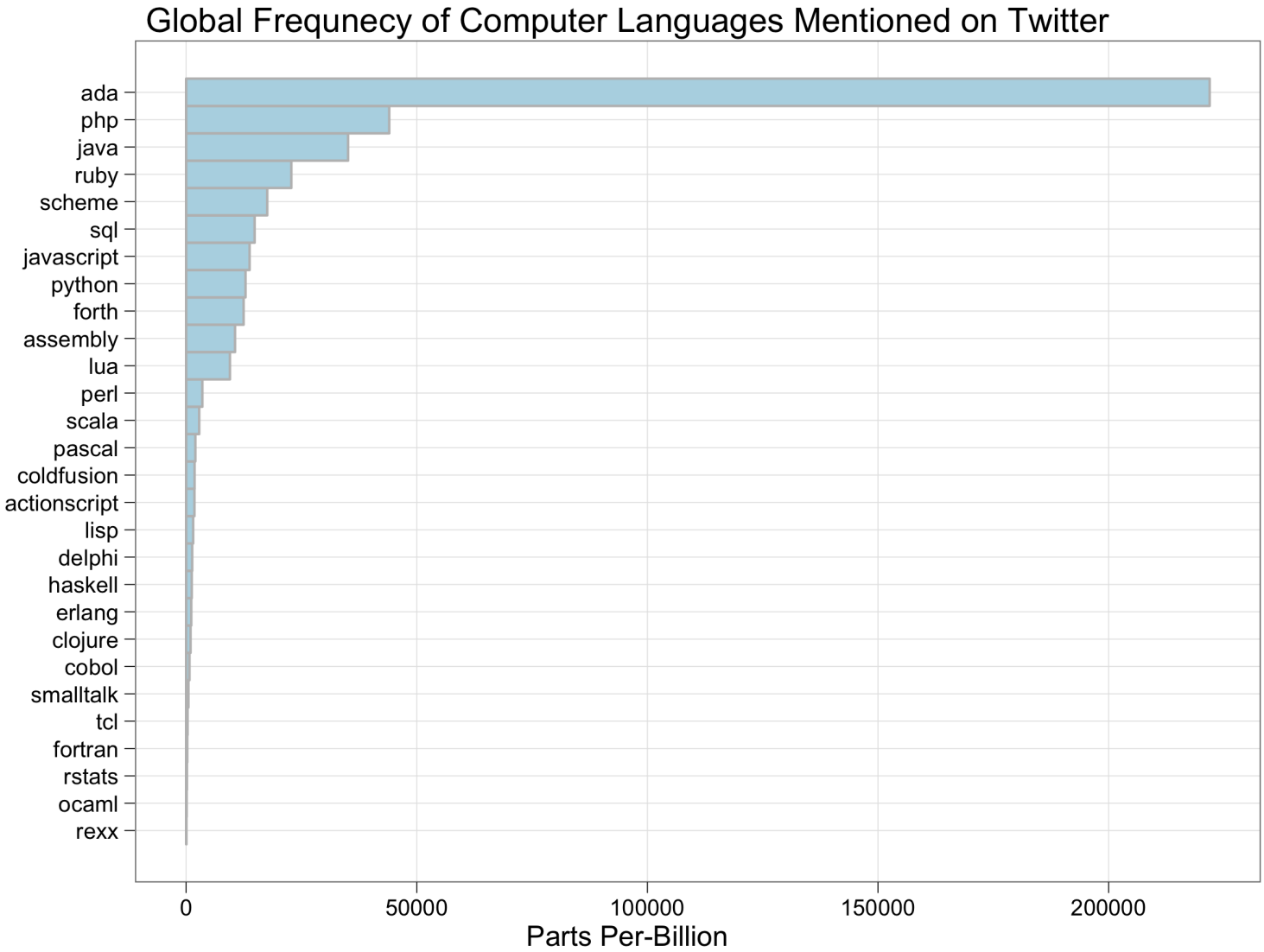
Disadvantage: cannot get stats for languages like C, C, C++

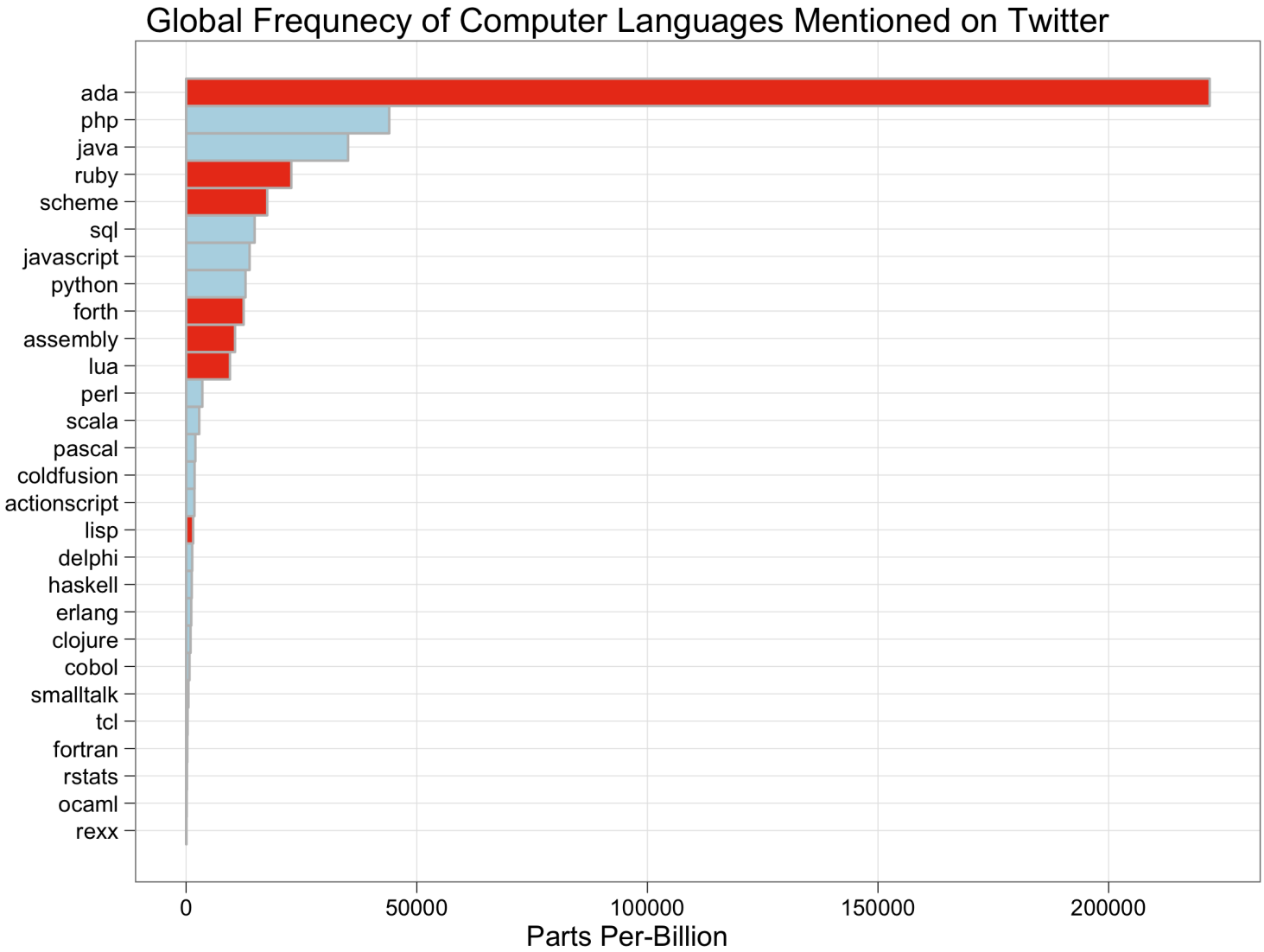
Getting the data

```
# rogramming languages
prog.langs<-c("java","php","javascript","python","sql","perl","ruby",
    "actionscript","assembly","lisp","delphi","pascal","scheme","haskell",
    "tcl","lua","fortran","coldfusion","ada","cobol","erlang","smalltalk",
    "scala","ocaml","forth","rexx","rstats")

# Get word stats for all languages
lang.stats<-lapply(prog.langs,function(t) unlist(word.stats(t,ic)))
lang.df<-as.data.frame(do.call("rbind",lang.stats), stringsAsFactors=FALSE)
lang.df$global_stdev_ppb<-as.numeric(lang.df$global_stdev_ppb)
lang.df$range<-as.numeric(lang.df$range)
lang.df$global_freq_ppb<-as.numeric(lang.df$global_freq_ppb)

# Dummy for common words
common<-rep(0,nrow(lang.df))
common[match(c("ruby","assembly","lisp","scheme","ada","forth"),lang.df$tok)]<-1
lang.df$common<-as.factor(common)

# Sort by frequency
lang.df<-lang.df[with(lang.df, order(global_freq_ppb)),]
```

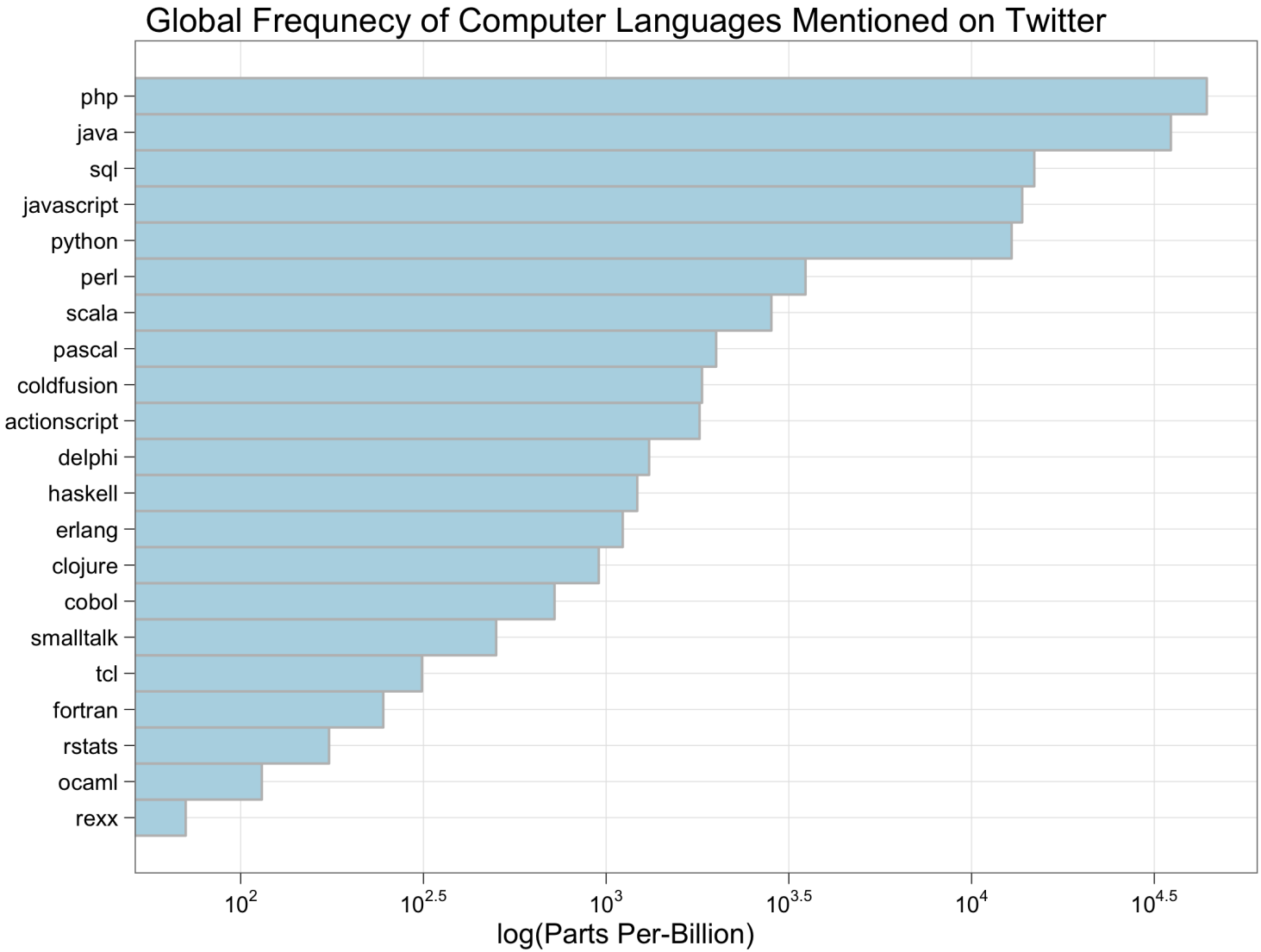
Visualizing computer languages mentioned on Twitter



Ambiguous terms



Terms cleans and logs taken



Thank You!

E-mail: drew.conway@nyu.edu
Web: http://drewconway.com/zia
Twitter: @drewconway