Books

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The goal of this analysis is to explore book genre popularity. Some questions I'll try to answer are: Have genre tastes changed over time? Does genre popularity have a pattern in the course of a year? Do demographics such as age or gender tend to report reading the same types of books?

The Data

This data was collected via a public API from a popular book social network. All information is self reported, including demographic information, books read, and genre categorization. Unfortunately it is not necessary when reporting having read a book to categorize it by genre but fortunately many users do.

Two types of data were collected: User data, and information about books users self-reported to be "currently reading"

A note about github: The collected CSV files are too large to share on github. However, you can see exactly how I collected the data at my repo called 'goodreads-analyses' I'm also happy to share the data I collected if you would like to reproduce my analyses or work with the data yourself. A word of caution: I collected this data too quickly for their tastes and ended up getting IP banned for about a month. Consume at your own risk.

User Data

```
    user.cols <- c("userID", "name", "gender", "age", "location", "lastactive",
                   "readcount", "currentcount", "wantscount")
    users <- read.csv("data/users.csv", header=F, col.names=user.cols, stringsAsFactors=F)
    head(users)
```

```
##   userID          name gender age          location lastactive readcount
## 1      1 Otis Chandler   male  36 San Francisco, CA    02/2014       361
## 2      2 odawg Diggity   male  36 San Francisco, CA    11/2013        75
## 3      3        Adrian   male  38 San Francisco, CA    12/2013        52
## 4      4       Isadora female  NA San Francisco, CA    06/2013         4
## 5      5     Elizabeth female  NA  Santa Monica, CA    01/2014       937
## 6      6         kelly female  40       Oakland, CA    01/2014        28
##   currentcount wantscount
## 1            3        360
## 2            7         19
## 3            0          0
## 4            0          0
## 5            7        568
## 6            1         12
```

```
    dim(users)
```

```
## [1] 574919      9
```

Book Data

```
    book.cols <- c("userID", "bookID", "shelf", "dateadded", "datestarted", "datefinished", "title",
                   "isbn", "isbn13", "imageurl", "pages", "publisher", "publicationdate", "genres")
    books <- read.csv("data/currently-reading.csv", header=F, col.names=book.cols,
                      stringsAsFactors=F, na.strings="")
    head(books, 1)
```

```
##   userID bookID             shelf                       dateadded
## 1      1 123715 currently-reading Fri Nov 08 15:25:13 -0800 2013
##                       datestarted datefinished
## 1 Fri Dec 27 16:10:42 -0800 2013         <NA>
##                                                                  title
## 1 Slack: Getting Past Burnout, Busywork, and the Myth of Total Efficiency
##         isbn        isbn13
## 1 0767907698 9780767907699
##                                                          imageurl pages
## 1 https://d202m5krfqbpi5.cloudfront.net/books/1320419657m/123715.jpg   256
##        publisher publicationdate
## 1 Crown Business            2002
##
## 1 ["business", "management", "non-fiction", "work", "agile", "nonfiction", "software-development", "
```

```
    dim(books)
```

```
## [1] 130396     14
```

Genres

For each book title collected I also collected the names of the "shelves" it was added to. Many users sort their shelves by genre so this seems to be an adequate way to assign a single common genre to each title with a little processing.

First I'll find the most common shelf names and decide upon a set of genres to sort all the titles into, if possible.

```
    require(stringr)
```

```
## Loading required package: stringr
```

```
    genre.counts <- list()
    for (genre.set in books$genres) {
        genres <- str_extract_all(genre.set, "[a-z/-]+")[[1]]
        for (genre in genres) {
            if (!genre %in% names(genre.counts)) {
                genre.counts[genre] <- 1
            } else {
                genre.counts[genre] <- genre.counts[[genre]] + 1
            }
        }
    }
```

```r
sorted.counts <- sort(unlist(genre.counts),decreasing = T)
```

```r
sorted.counts[1:100]
```

```
##            favorites              fiction          non-fiction
##                79091                61488                54406
##           nonfiction           literature              history
##                44533                21635                21470
##            book-club              classics   historical-fiction
##                21357                19401                17115
##              fantasy               novels            biography
##                15497                13007                12454
##               kindle         contemporary               memoir
##                11688                11564                10961
##           philosophy              science              classic
##                10696                 9611                 9468
##           historical              mystery             politics
##                 9137                 8578                 8489
##      science-fiction               series              romance
##                 7622                 7536                 7527
##           psychology          young-adult                humor
##                 7222                 6997                 6749
##             religion        short-stories               -books
##                 6481                 6349                 6307
##               sci-fi              memoirs              to-buy
##                 6066                 5773                 5597
##             business            self-help              library
##                 5436                 5133                 4935
##                   ya          spirituality              essays
##                 4763                 4163                 4061
##            reference        adult-fiction             thriller
##                 3923                 3819                 3781
##            sociology contemporary-fiction                crime
##                 3767                 3760                 3744
##               travel           favourites            chick-lit
##                 3718                 3585                 3511
##                food                poetry       sci-fi-fantasy
##                 3469                 3448                 3378
##            economics               horror            adventure
##                 3284                 3275                 3236
##     literary-fiction            christian              default
##                 3215                 3107                 3102
##                  war             bookclub                  art
##                 2925                 2918                 2875
##             american                adult            spiritual
##                 2824                 2797                 2764
##               health            abandoned      magical-realism
##                 2756                 2694                 2520
##         christianity     american-history             dystopia
##                 2515                 2436                 2378
##            audiobook                novel             theology
##                 2322                 2301                 2290
##           paranormal          biographies            childrens
```

```
##                 2127                 2113                 2105
##                music                scifi               africa
##                 2053                 2035                 1973
##                ebook             dystopian            wish-list
##                 1948                 1859                 1844
##             suspense             parenting               school
##                 1829                 1825                 1825
##                    -              russian            political
##                 1821                 1791                 1766
##            education               france              feminism
##                 1654                 1647                 1622
##                india               french        autobiography
##                 1621                 1614                 1613
##     self-improvement              cooking                magic
##                 1598                 1559                 1543
##             pulitzer               theory              writing
##                 1522                 1515                 1494
##          middle-east
##                 1494
```

Now to pick a set of genres that most books will be able to be binned into.

```
genre.bins <- list("history"=c("history","american history","world history","european history","mil
                   "classics"=c("classics","classic"),
                   "historical fiction"=c("historical fiction"),
                   "fantasy"=c("fantasy"),
                   "biography"=c("biography","bio","biographies"),
                   "memoir"=c("memoir","autobiography","memoirs","biography memoir","biographies me
                   "philosophy"=c("philosophy"),
                   "math and science"=c("science","psychology","sociology","anthropology","economic
                   "mystery"=c("mystery","mysteries"),
                   "politics"=c("politics","political"),
                   "science fiction"=c("science fiction","sf","scifi","sci fi"),
                   "romance"=c("romance","romances"),
                   "young adult"=c("young adult","ya"),
                   "humor"=c("humor","comedy","humour"),
                   "religion"=c("religion","christianity","spirituality","religions","theology","is
                   "business"=c("business","management","marketing","business books"),
                   "self improvement"=c("self help","self improvement","professional development","
                   "reference"=c("reference","art reference","writing reference"),
                   "thriller"=c("thriller","thrillers"),
                   "poetry"=c("poetry","poet","poetics"),
                   "horror"=c("horror"),
                   "adventure"=c("adventure"),
                   "literary fiction"=c("literary fiction","literary","lit fic","lit fiction"),
                   "food"=c("nutrition","foodie","cooking","food","cookbook","cookbooks","recipes",
                   "childrens"=c("childrens","children","kid","kids","children s books"),
                   "technology"=c("technology","tech","programming","computer","computers","technic
                   "comics"=c("comics","comic","graphic novels","graphic novel"),
                   "the arts"=c("art","contemporary art","music related","art related","writing","m
```

```
require(stringr)
GetGenre <- function(shelf.set) {
```

```
        shelves <- str_extract_all(shelf.set, "[a-z/-]+")[[1]]
        for (s in shelves) {
            shelf <- str_trim(gsub("-"," ",tolower(s)))
            g <- names(grep(shelf,genre.bins,value=T))
            if (length(g)>0) return(g[1])
        }
        return(NA)
    }
```

```
    books$genre <- sapply(books[,"genres"], GetGenre)
```

```
    table(books$genre, useNA = "ifany")
```

```
##
##          adventure          biography           business
##                 43               2254               1728
##          childrens           classics             comics
##                322               7628               1843
##            fantasy               food historical fiction
##               6424               1310              35902
##            history             horror              humor
##               7143               1251               1267
##   literary fiction   math and science             memoir
##                 38               4911               1322
##            mystery         philosophy             poetry
##               2621               2936               2424
##           politics          reference           religion
##                910               1812              29574
##            romance    science fiction   self improvement
##                972               2556               2461
##         technology           the arts           thriller
##                882               2904                440
##        young adult               <NA>
##               2766               3752
```

```
    genre.nas <- subset(books,is.na(genre))
    head(genre.nas$genres)
```

```
## [1] "[\"skimmed-incomplete\"]"
## [2] "[\"adult-nonfic\", \"moneysmartweek\"]"
## [3] "[]"
## [4] "[\"haber\"]"
## [5] "[\"blinded-me-with-science\", \"nf-politics-history\"]"
## [6] "[\"ideas-of-the-self\", \"books-on-religon\"]"
```

```
    require(stringr)
    genre.leftovers <- list()
    for (shelf.set in genre.nas$genres) {
        shelves <- str_extract_all(shelf.set, "[a-z/-]+")[[1]]
        for (shelf in shelves) {
            if (!shelf %in% names(genre.leftovers)) {
```

```
            genre.leftovers[shelf] <- 1
        } else {
            genre.leftovers[shelf] <- genre.leftovers[[shelf]] + 1
        }
    }
}
```

Out of the 130396 books only 3752 were unable to be binned. The numbers look pretty reasonable, although 35902 historical fiction did surprise.

I'll create a new CSV so I don't have to re-run this.

```
write.csv(books, file="data/books_with_genre.csv",row.names=F)
```

Obviously most of the interesting analysis is going to come from demographics, so now I'll merge in the user information

```
merged <- merge(books, users)
dim(merged)
```

```
## [1] 130396     23
```

That all looks like it should, so I'll write another csv

```
write.csv(merged, file="data/books_with_users.csv", row.names=F)
```

Analysis

Genres added to currently reading shelf over time

When thinking about genre popularity and the book social network I think the most important date (out of date added to shelf, date started, and date finished) is the date the book was added to the shelf. This is the time when the user is interested in the book.

I'll also include gender, age, and location in this data set. I think these will provide interesting interactive features for the Shiny app.

```
books.users <- read.csv("data/books_with_users.csv")
gt <- subset(books.users, !is.na(genre))
dateadded <- as.Date(gt$dateadded, format="%a %b %d %H:%M:%S %z %Y")
genre.time <- data.frame(dateadded, genre=gt$genre, gender=gt$gender, age=gt$age, location=gt$locati
dim(genre.time)
```

```
## [1] 126644      5
```

```
head(genre.time)
```

```
##    dateadded            genre gender age          location
## 1 2013-11-08         business   male  36 San Francisco, CA
## 2 2012-02-22         religion   male  36 San Francisco, CA
## 3 2012-01-16         religion   male  36 San Francisco, CA
## 4 2010-07-31  science fiction   male  36 San Francisco, CA
## 5 2010-07-30         classics   male  36 San Francisco, CA
## 6 2010-07-15 math and science   male  36 San Francisco, CA
```

```
    write.csv(genre.time, file="data/processed_books.csv", row.names=F)
```

Example Plots

Here are some quick plots to see some examples of what we'll be able to do with this data. These are quick and dirty, we'll save the fancy stuff for the shiny app.

```
    require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
    require(dplyr)
```

```
## Loading required package: dplyr
##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:stats':
##
##     filter, lag
##
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

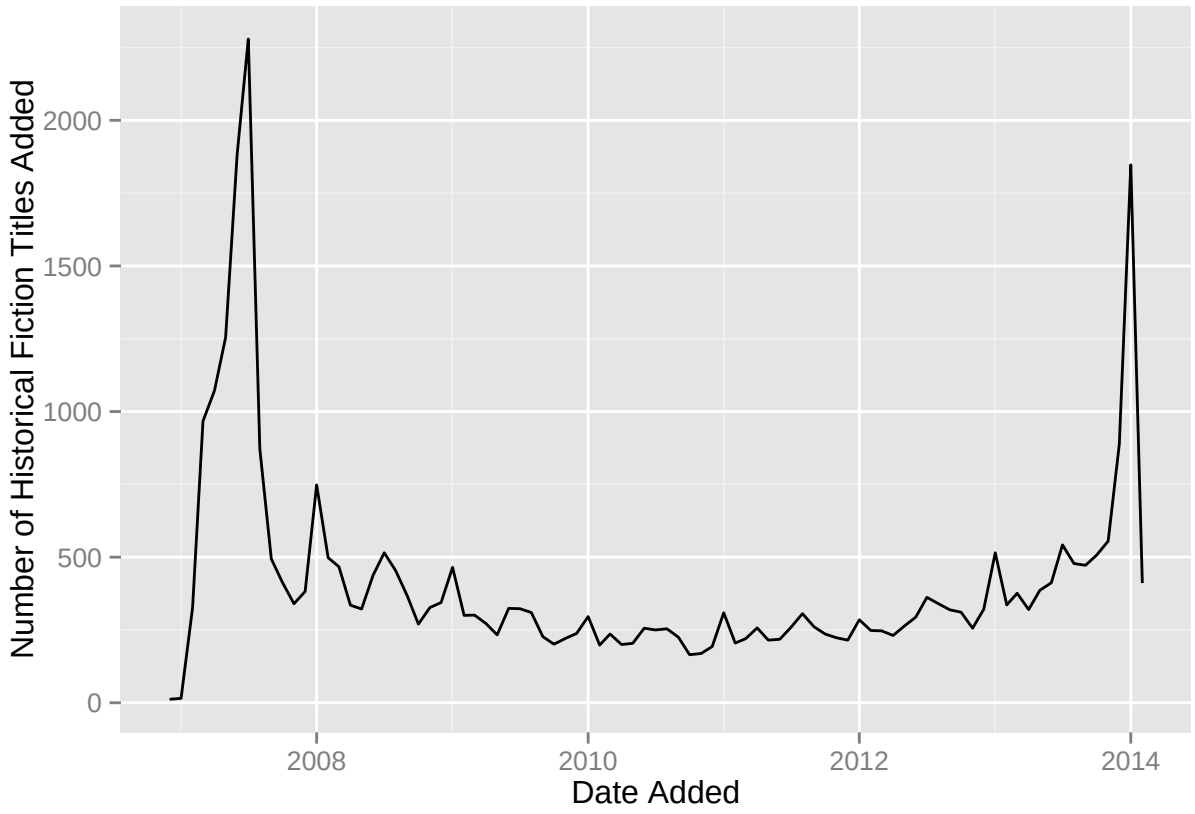
```
    require(lubridate)
```

```
## Loading required package: lubridate
```

```
   genre.data <- read.csv("data/processed_books.csv")
```

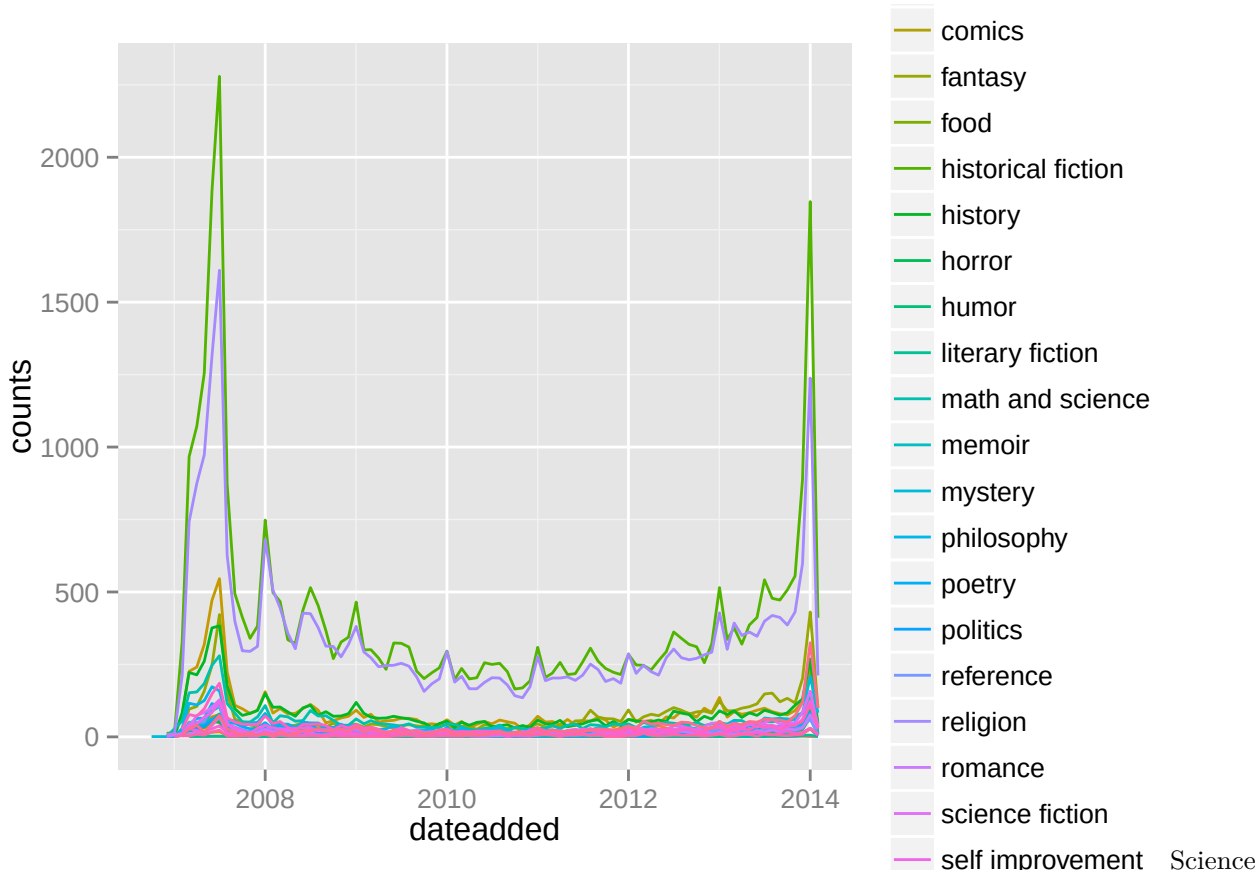
One genre, historical fiction, by date

```
    hist.fic <- subset(genre.data, genre=="historical fiction")
    hist.fic$dateadded <- floor_date(as.Date(hist.fic$dateadded), "month")
    by_date <- hist.fic %.%
                group_by(dateadded) %.%
                summarise(counts=n())
    print(ggplot(by_date, aes(x=dateadded, y=counts)) + geom_line() + xlab("Date Added") + ylab("Number
```



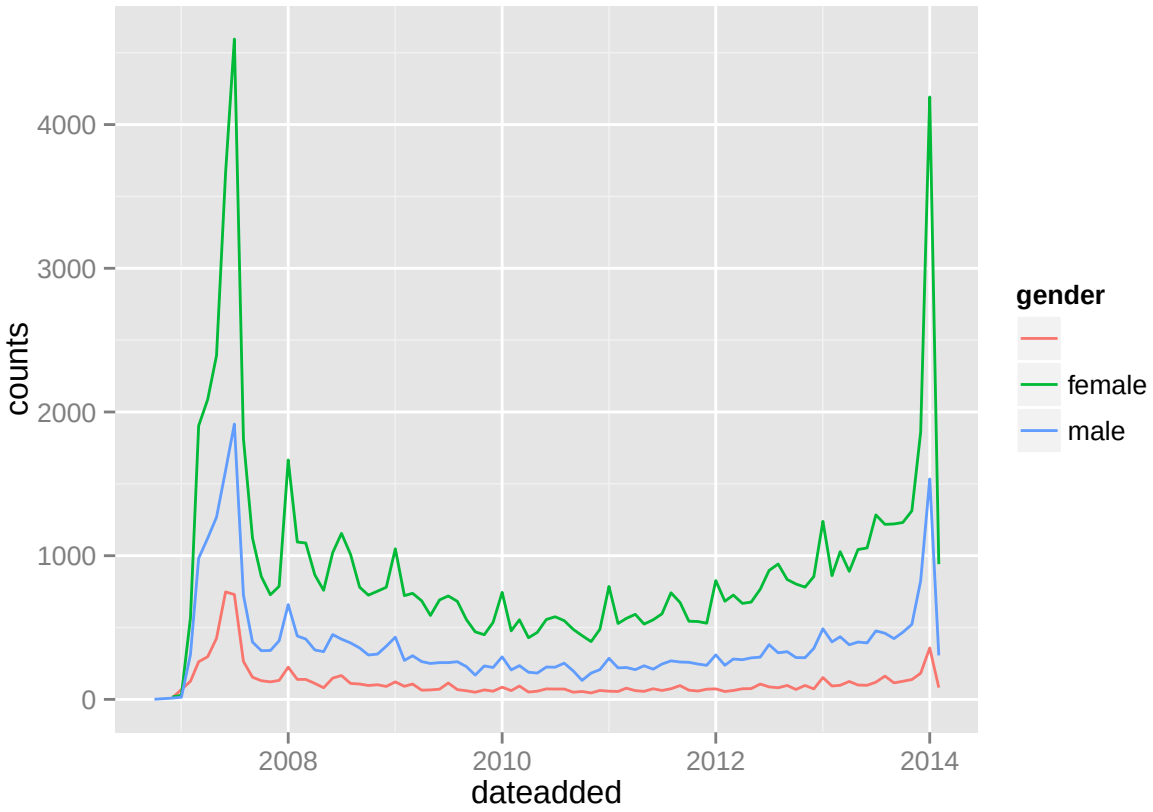
All genres by date

```
genre.data$dateadded <- floor_date(as.Date(genre.data$dateadded), "month")
by_genre_and_date <- genre.data %.%
                        group_by(genre, dateadded) %.%
                        summarise(counts=n())
ggplot(by_genre_and_date, aes(x=dateadded, y=counts, color=genre, group=genre)) + geom_line()
```



Science Fiction by date and gender

```
sf <- subset(genre.data, genre=="science fiction")
sf_date_gender <- genre.data %.%
                    group_by(gender, dateadded) %.%
                    summarise(counts=n())
ggplot(sf_date_gender, aes(x=dateadded, y=counts, color=gender, group=gender)) + geom_line()
```



Rdata

we'll store the data frame in an Rdata file for easy loading in the shiny app

```
genre.data <- read.csv("data/processed_books.csv")
genre.data$monthadded <- floor_date(as.Date(genre.data$dateadded), "month")
save(genre.data, file="shiny_books/genre_data.Rdata")
```

Interactive Shiny App

Now to make it shiny! Visit the code in the ui.R and server.R files in the github repo and visit the shiny app at https://shanfu.shinyapps.io/shiny_books/