MohandasAthiraDataExploration1

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## R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

###############################################################################################################  
# #   
# CODE FOR FINDING TOTAL OPERATING REVENUE PER CARDHOLDER AND RELATED, INFERRED INSIGHTS BASED ON DATA #   
# #   
# #   
###############################################################################################################  
  
##CODE  
 #Reading CSV file into object  
 library\_data<-read.csv(file = "library\_data.csv",encoding = "latin")  
 library(dplyr)

## Warning: package 'dplyr' was built under R version 4.4.3

##   
## 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

library("rapportools")

## Warning: package 'rapportools' was built under R version 4.4.3

##   
## Attaching package: 'rapportools'

## The following object is masked from 'package:dplyr':  
##   
## n

## The following objects are masked from 'package:stats':  
##   
## IQR, median, sd, var

## The following objects are masked from 'package:base':  
##   
## max, mean, min, range, sum

library("plyr")

## Warning: package 'plyr' was built under R version 4.4.3

## ------------------------------------------------------------------------------

## You have loaded plyr after dplyr - this is likely to cause problems.  
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:  
## library(plyr); library(dplyr)

## ------------------------------------------------------------------------------

##   
## Attaching package: 'plyr'

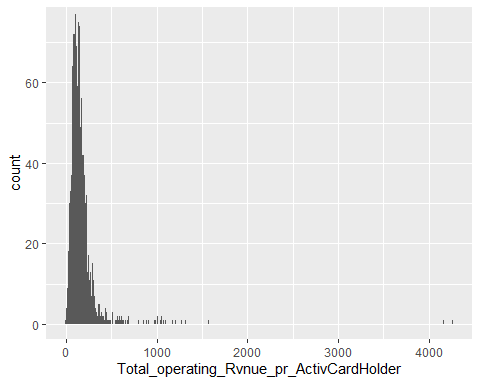
## The following objects are masked from 'package:dplyr':  
##   
## arrange, count, desc, failwith, id, mutate, rename, summarise,  
## summarize

#Using mutate, created new column Total\_operating\_Rvnue\_pr\_ActivCardHolder after cleaning the corresponding input columns  
 library\_data1 <- library\_data %>%  
 mutate(  
 B2.9..Total.Operating.Revenues = as.numeric(gsub("[^0-9.]", "",  
 B2.9..Total.Operating.Revenues)),  
 A1.14..No..of.Active.Library.Cardholders = as.numeric(gsub("[^0-9.]", "",  
 A1.14..No..of.Active.Library.Cardholders)),  
 Total\_operating\_Rvnue\_pr\_ActivCardHolder =ifelse(A1.14..No..of.Active.Library.Cardholders==0, NA,  
 B2.9..Total.Operating.Revenues / A1.14..No..of.Active.Library.Cardholders  
 ))  
 View(library\_data1)  
 #Plot the histogram with Total\_operating\_Rvnue\_pr\_ActivCardHolder and noticed deviations in   
 #each range[0-225,(225-500), above 500]   
 library(ggplot2)

## Warning: package 'ggplot2' was built under R version 4.4.3

ggplot(data = library\_data1) +  
 geom\_histogram(mapping = aes(x=Total\_operating\_Rvnue\_pr\_ActivCardHolder),binwidth = 10)+  
 coord\_cartesian(ylim=c(0,75))

## Warning: Removed 275 rows containing non-finite outside the scale range  
## (`stat\_bin()`).



##INSIGHT 1  
 #Create a data set with library data greater than 500 for analysis  
 outliner<-library\_data1 %>%   
 filter(Total\_operating\_Rvnue\_pr\_ActivCardHolder>500)  
 View(outliner)  
 Outliner\_data<-select(outliner,Library.Full.Name,A1.4.Type.of.Library.Service..English.,  
 A1.14..No..of.Active.Library.Cardholders,B2.9..Total.Operating.Revenues)  
 #Generating data in table format  
 #install.packages("pander")  
 library(pander)

## Warning: package 'pander' was built under R version 4.4.3

pander(Outliner\_data)

Table continues below

| Library.Full.Name | A1.4.Type.of.Library.Service..English. |
| --- | --- |
| Alnwick/Haldimand Twp | Public or Union Library |
| Garden River FN | First Nations Library |
| Henvey Inlet FN | First Nations Library |
| Mattagami FN | First Nations Library |
| Nipissing FN | First Nations Library |
| Seine River FN | First Nations Library |
| Simcoe County Co-operative | County, County co-operative or Regional Municipality Library |
| Wabauskang FN | First Nations Library |
| Whitefish River FN | First Nations Library |
| Algonquins of Pikwakanagan FN | First Nations Library |
| Chippewas of the Thames FN | First Nations Library |
| Henvey Inlet FN | First Nations Library |
| Iskatewizaagegan No. 39 FN | First Nations Library |
| Mattagami FN | First Nations Library |
| Michipicoten FN | First Nations Library |
| Nipissing FN | First Nations Library |
| Seine River FN | First Nations Library |
| Simcoe County Co-operative | County, County co-operative or Regional Municipality Library |
| Wahta Mohawk FN | First Nations Library |
| Whitefish River FN | First Nations Library |
| Algonquins of Pikwakanagan FN | First Nations Library |
| Henvey Inlet FN | First Nations Library |
| Iskatewizaagegan No. 39 FN | First Nations Library |
| Magnetawan FN | First Nations Library |
| Mattagami FN | First Nations Library |
| Nipissing FN | First Nations Library |
| Sachigo Lake FN | First Nations Library |
| Seine River FN | First Nations Library |
| Simcoe County Co-operative | County, County co-operative or Regional Municipality Library |
| Wahta Mohawk FN | First Nations Library |
| Iskatewizaagegan No. 39 FN | First Nations Library |
| Magnetawan FN | First Nations Library |
| Mattagami FN | First Nations Library |
| Nipissing FN | First Nations Library |
| Saugeen FN | First Nations Library |
| Seine River FN | First Nations Library |
| Sheshegwaning FN | First Nations Library |
| Simcoe County Co-operative | County, County co-operative or Regional Municipality Library |
| Wahta Mohawk FN | First Nations Library |

| A1.14..No..of.Active.Library.Cardholders | B2.9..Total.Operating.Revenues |
| --- | --- |
| 431 | 257393 |
| 10 | 15741 |
| 65 | 33973 |
| 40 | 24546 |
| 74 | 74723 |
| 32 | 38840 |
| 732 | 804105 |
| 25 | 24480 |
| 50 | 28724 |
| 59 | 34431 |
| 50 | 25918 |
| 65 | 36973 |
| 40 | 26248 |
| 40 | 39516 |
| 80 | 55316 |
| 72 | 75250 |
| 41 | 32968 |
| 759 | 790462 |
| 30 | 16790 |
| 50 | 44689 |
| 56 | 32857 |
| 65 | 33973 |
| 35 | 24265 |
| 5 | 20788 |
| 40 | 34573 |
| 62 | 79390 |
| 75 | 44535 |
| 48 | 32505 |
| 757 | 796372 |
| 30 | 16607 |
| 60 | 38205 |
| 5 | 21288 |
| 40 | 47190 |
| 62 | 81984 |
| 103 | 63986 |
| 32 | 34606 |
| 20 | 20202 |
| 742 | 676826 |
| 35 | 21494 |

##EXPLANATION 1  
 #We are having 39 out-liner libraries  
 #In the above code we are looking for the Total\_operating\_Rvnue\_pr\_ActivCardHolder,  
 #whose value is greater than 500,which is considered as an out-liner.  
 #Higher value for Total\_operating\_Rvnue\_pr\_ActivCardHolder means,   
 #lower number of active card holders compared to the Operating revenue provided for them.  
 #When analyzing the data set we can see that most of the libraries are First Nation Libraries.  
 #Tried to identified the needs and generate programs for supporting First Nation Libraries and people.  
 #Can use surveys and social media for identifying their needs and plan accordingly.  
 #Tried to create facilities, resources, services and programs which increases user interactions,  
 #and in that way utilize the Total Operating Revenue to its maximum benefit.  
   
  
   
##INSIGHT 2  
 #Create a data set with Total\_operating\_Rvnue\_pr\_ActivCardHolder is NA for analysis  
 library(dplyr)  
 zero\_card\_hlders<-library\_data1 %>% filter(is.na(Total\_operating\_Rvnue\_pr\_ActivCardHolder) &   
 A1.14..No..of.Active.Library.Cardholders == 0)  
 count1<-nrow(zero\_card\_hlders)  
 print(count1)

## [1] 274

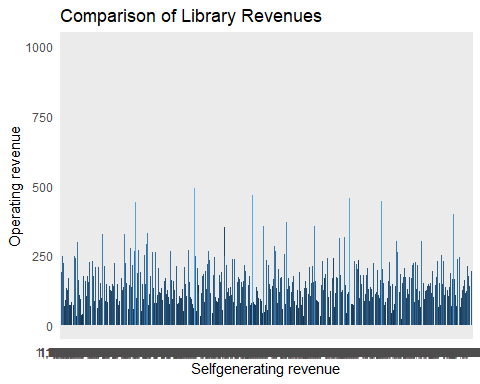
Library\_details\_zero\_cardholder<-select(zero\_card\_hlders,  
 Library.Full.Name,A1.4.Type.of.Library.Service..English.,  
 A1.14..No..of.Active.Library.Cardholders,  
 B2.9..Total.Operating.Revenues)  
 #Generating data in table format  
 library(pander)  
 pander(Library\_details\_zero\_cardholder)

Table continues below

| Library.Full.Name | A1.4.Type.of.Library.Service..English. |
| --- | --- |
| Adjala-TosorontioTwp | Contracting Municipality |
| Alberton Twp | Contracting Municipality |
| Amaranth Twp | Contracting Municipality |
| Archipelago Twp | Contracting Municipality |
| Aweres LSB | Contracting LSB |
| Baldwin Twp | Contracting Municipality |
| Beckwith Twp | Contracting Municipality |
| Brudenell, Lyndoch & Raglan Twp | Contracting Municipality |
| Calvin, Municipality of | Contracting Municipality |
| Carling Twp | Contracting Municipality |
| Casey Twp | Contracting Municipality |
| Chamberlain Twp | Contracting Municipality |
| Chapple Twp | Contracting Municipality |
| Charlton and Dack, Municipality of | Contracting Municipality |
| Coleman Twp | Contracting Municipality |
| Dawson LSB | Contracting LSB |
| Dawson Twp | Contracting Municipality |
| East Garafraxa Twp | Contracting Municipality |
| East Hawkesbury Twp | Contracting Municipality |
| Evanturel Twp | Contracting Municipality |
| Faraday Twp | Contracting Municipality |
| Gillies Twp | Contracting Municipality |
| Goulais & District LSB | Contracting LSB |
| Hallebourg LSB | Contracting LSB |
| Hamilton Twp | Contracting Municipality |
| Harley Twp | Contracting Municipality |
| Hawk Junction LSB | Contracting LSB |
| Hudson Twp | Contracting Municipality |
| Hurkett LSB | Contracting LSB |
| Jocelyn Twp | Contracting Municipality |
| Jogues LSB | Contracting LSB |
| Johnson Twp | Contracting Municipality |
| Joly Twp | Contracting Municipality |
| Kerns Twp | Contracting Municipality |
| Killarney | Contracting Municipality |
| La Vallee Twp | Contracting Municipality |
| Lac Seul FN | Contracting First Nations Band Council |
| Lac Ste. Therese LSB | Contracting LSB |
| Laird Twp | Contracting Municipality |
| Lake of The Woods Twp | Contracting Municipality |
| Lappe Local Services Board | Contracting LSB |
| Laurentian Valley Twp | Contracting Municipality |
| Laurier LSB | Contracting LSB |
| Limerick Twp | Contracting Municipality |
| Local Services Board of Rainbow Country | Contracting LSB |
| MacDonald, Meredith & Aberdeen Add’l Twp | Contracting Municipality |
| Madoc Twp | Contracting Municipality |
| Mattawan Twp | Contracting Municipality |
| McDougall, Municipality of | Contracting Municipality |
| McMurrich-Monteith, the Corporation of the Township of | Contracting Municipality |
| McNab-Braeside Twp | Contracting Municipality |
| Melancthon Twp | Contracting Municipality |
| Mono | Contracting Municipality |
| Montague Twp | Contracting Municipality |
| Morley Twp | Contracting Municipality |
| Mulmur Twp | Contracting Municipality |
| Nairn & Hyman Twp | Contracting Municipality |
| Neebing, Municipality of | Contracting Municipality |
| North Shore Twp | Contracting Municipality |
| O’Connor Twp | Contracting Municipality |
| Oro-Medonte Twp | Contracting Municipality |
| Papineau-Cameron Twp | Contracting Municipality |
| Perth South Twp | Contracting Municipality |
| Restoule LSB | Contracting LSB |
| Robinson LSB | Contracting LSB |
| Rossport LSB | Contracting LSB |
| Tarbutt & Tarbutt Additional Twp | Contracting Municipality |
| Thornloe, Village of | Contracting Municipality |
| Tiny Twp | Contracting Municipality |
| Adjala-TosorontioTwp | Contracting Municipality |
| Alberton Twp | Contracting Municipality |
| Amaranth Twp | Contracting Municipality |
| Archipelago Twp | Contracting Municipality |
| Aweres LSB | Contracting LSB |
| Baldwin Twp | Contracting Municipality |
| Beckwith Twp | Contracting Municipality |
| Brudenell, Lyndoch & Raglan Twp | Contracting Municipality |
| Calvin, Municipality of | Contracting Municipality |
| Carling Twp | Contracting Municipality |
| Casey Twp | Contracting Municipality |
| Chamberlain Twp | Contracting Municipality |
| Chapple Twp | Contracting Municipality |
| Charlton and Dack, Municipality of | Contracting Municipality |
| Coleman Twp | Contracting Municipality |
| Conmee Twp | Contracting Municipality |
| Dawson LSB | Contracting LSB |
| Dawson Twp | Contracting Municipality |
| East Garafraxa Twp | Contracting Municipality |
| East Hawkesbury Twp | Contracting Municipality |
| Evanturel Twp | Contracting Municipality |
| Faraday Twp | Contracting Municipality |
| Gillies Twp | Contracting Municipality |
| Goulais & District LSB | Contracting LSB |
| Hallebourg LSB | Contracting LSB |
| Hamilton Twp | Contracting Municipality |
| Harley Twp | Contracting Municipality |
| Hawk Junction LSB | Contracting LSB |
| Hudson Twp | Contracting Municipality |
| Hurkett LSB | Contracting LSB |
| Jocelyn Twp | Contracting Municipality |
| Jogues LSB | Contracting LSB |
| Johnson Twp | Contracting Municipality |
| Joly Twp | Contracting Municipality |
| Kerns Twp | Contracting Municipality |
| Killarney | Contracting Municipality |
| La Vallee Twp | Contracting Municipality |
| Lac Ste. Therese LSB | Contracting LSB |
| Laird Twp | Contracting Municipality |
| Lake of The Woods Twp | Contracting Municipality |
| Lappe Local Services Board | Contracting LSB |
| Laurentian Valley Twp | Contracting Municipality |
| Local Services Board of Rainbow Country | Contracting LSB |
| MacDonald, Meredith & Aberdeen Add’l Twp | Contracting Municipality |
| Madoc Twp | Contracting Municipality |
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| McMurrich-Monteith, the Corporation of the Township of | Contracting Municipality |
| McNab-Braeside Twp | Contracting Municipality |
| Melancthon Twp | Contracting Municipality |
| Mono | Contracting Municipality |
| Montague Twp | Contracting Municipality |
| Morley Twp | Contracting Municipality |
| Mulmur Twp | Contracting Municipality |
| Nairn & Hyman Twp | Contracting Municipality |
| Neebing, Municipality of | Contracting Municipality |
| North Shore Twp | Contracting Municipality |
| O’Connor Twp | Contracting Municipality |
| Oro-Medonte Twp | Contracting Municipality |
| Papineau-Cameron Twp | Contracting Municipality |
| Perth South Twp | Contracting Municipality |
| Restoule LSB | Contracting LSB |
| Robinson LSB | Contracting LSB |
| Rossport LSB | Contracting LSB |
| Tarbutt & Tarbutt Additional Twp | Contracting Municipality |
| Thornloe, Village of | Contracting Municipality |
| Tiny Twp | Contracting Municipality |
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| Beckwith Twp | Contracting Municipality |
| Brudenell, Lyndoch & Raglan Twp | Contracting Municipality |
| Calvin, Municipality of | Contracting Municipality |
| Carling Twp | Contracting Municipality |
| Casey Twp | Contracting Municipality |
| Chamberlain Twp | Contracting Municipality |
| Chapple Twp | Contracting Municipality |
| Charlton and Dack, Municipality of | Contracting Municipality |
| Coleman Twp | Contracting Municipality |
| Conmee Twp | Contracting Municipality |
| Dawson LSB | Contracting LSB |
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| Hallebourg LSB | Contracting LSB |
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| Hilliard Twp | Contracting Municipality |
| Hudson Twp | Contracting Municipality |
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| Jogues LSB | Contracting LSB |
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| Kerns Twp | Contracting Municipality |
| Killarney | Contracting Municipality |
| La Vallee Twp | Contracting Municipality |
| Lac Ste. Therese LSB | Contracting LSB |
| Laird Twp | Contracting Municipality |
| Lake of The Woods Twp | Contracting Municipality |
| Lappe Local Services Board | Contracting LSB |
| Laurentian Valley Twp | Contracting Municipality |
| Laurier LSB | Contracting LSB |
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| Mulmur Twp | Contracting Municipality |
| Nairn & Hyman Twp | Contracting Municipality |
| Neebing, Municipality of | Contracting Municipality |
| North Shore Twp | Contracting Municipality |
| O’Connor Twp | Contracting Municipality |
| Oro-Medonte Twp | Contracting Municipality |
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| Robinson LSB | Contracting LSB |
| Rossport LSB | Contracting LSB |
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| Hallebourg LSB | Contracting LSB |
| Hamilton Twp | Contracting Municipality |
| Harley Twp | Contracting Municipality |
| Harris Twp | Contracting Municipality |
| Hawk Junction LSB | Contracting LSB |
| Hilliard Twp | Contracting Municipality |
| Hudson Twp | Contracting Municipality |
| Hurkett LSB | Contracting LSB |
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| Jogues LSB | Contracting LSB |
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| Laurier LSB | Contracting LSB |
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| Rossport LSB | Contracting LSB |
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| Thornloe, Village of | Contracting Municipality |
| Tiny Twp | Contracting Municipality |

| A1.14..No..of.Active.Library.Cardholders | B2.9..Total.Operating.Revenues |
| --- | --- |
| 0 | 23128 |
| 0 | 4000 |
| 0 | 97175 |
| 0 | 30726 |
| 0 | 3264 |
| 0 | 1694 |
| 0 | 114625 |
| 0 | 6584 |
| 0 | 1177 |
| 0 | 45765 |
| 0 | 1762 |
| 0 | 7361 |
| 0 | 3778 |
| 0 | 1446 |
| 0 | 1498 |
| 0 | 274 |
| 0 | 5880 |
| 0 | 33679 |
| 0 | 16413 |
| 0 | 8572 |
| 0 | 30095 |
| 0 | 984 |
| 0 | 9653 |
| 0 | 428 |
| 0 | 305412 |
| 0 | 2486 |
| 0 | 547 |
| 0 | 5489 |
| 0 | 497 |
| 0 | 1503 |
| 0 | 448 |
| 0 | 2405 |
| 0 | 851 |
| 0 | 1822 |
| 0 | 1066 |
| 0 | 4487 |
| 0 | 1155 |
| 0 | 695 |
| 0 | 2429 |
| 0 | 4600 |
| 0 | 11400 |
| 0 | 125261 |
| 0 | 552 |
| 0 | 2331 |
| 0 | 497 |
| 0 | 3581 |
| 0 | 35687 |
| 0 | 403 |
| 0 | 45864 |
| 0 | 2589 |
| 0 | 115438 |
| 0 | 61291 |
| 0 | 105953 |
| 0 | 22760 |
| 0 | 1400 |
| 0 | 38534 |
| 0 | 1382 |
| 0 | 4992 |
| 0 | 2007 |
| 0 | 1220 |
| 0 | 264002 |
| 0 | 1878 |
| 0 | 110182 |
| 0 | 4313 |
| 0 | 397 |
| 0 | 289 |
| 0 | 1901 |
| 0 | 248 |
| 0 | 182183 |
| 0 | 33456 |
| 0 | 3587 |
| 0 | 89877 |
| 0 | 23726 |
| 0 | 3264 |
| 0 | 1694 |
| 0 | 110713 |
| 0 | 6584 |
| 0 | 1177 |
| 0 | 44878 |
| 0 | 1762 |
| 0 | 7361 |
| 0 | 3740 |
| 0 | 1446 |
| 0 | 1498 |
| 0 | 1250 |
| 0 | 274 |
| 0 | 5600 |
| 0 | 41663 |
| 0 | 16125 |
| 0 | 9557 |
| 0 | 23595 |
| 0 | 984 |
| 0 | 9653 |
| 0 | 428 |
| 0 | 299428 |
| 0 | 2486 |
| 0 | 547 |
| 0 | 5449 |
| 0 | 497 |
| 0 | 1503 |
| 0 | 448 |
| 0 | 2405 |
| 0 | 851 |
| 0 | 1822 |
| 0 | 1066 |
| 0 | 4436 |
| 0 | 695 |
| 0 | 2429 |
| 0 | 4400 |
| 0 | 11600 |
| 0 | 176364 |
| 0 | 497 |
| 0 | 3581 |
| 0 | 34278 |
| 0 | 403 |
| 0 | 58006 |
| 0 | 2589 |
| 0 | 109637 |
| 0 | 58293 |
| 0 | 93711 |
| 0 | 22100 |
| 0 | 1400 |
| 0 | 37166 |
| 0 | 1382 |
| 0 | 4992 |
| 0 | 2007 |
| 0 | 1220 |
| 0 | 250070 |
| 0 | 1878 |
| 0 | 107070 |
| 0 | 4273 |
| 0 | 397 |
| 0 | 289 |
| 0 | 1901 |
| 0 | 248 |
| 0 | 181434 |
| 0 | 30695 |
| 0 | 3500 |
| 0 | 101916 |
| 0 | 22278 |
| 0 | 3264 |
| 0 | 1694 |
| 0 | 105615 |
| 0 | 6584 |
| 0 | 1177 |
| 0 | 42139 |
| 0 | 1762 |
| 0 | 7281 |
| 0 | 3703 |
| 0 | 12686 |
| 0 | 1498 |
| 0 | 1225 |
| 0 | 274 |
| 0 | 4650 |
| 0 | 42450 |
| 0 | 15835 |
| 0 | 9557 |
| 0 | 22595 |
| 0 | 984 |
| 0 | 9653 |
| 0 | 428 |
| 0 | 289400 |
| 0 | 2486 |
| 0 | 547 |
| 0 | 1226 |
| 0 | 4458 |
| 0 | 497 |
| 0 | 1503 |
| 0 | 448 |
| 0 | 2405 |
| 0 | 851 |
| 0 | 1822 |
| 0 | 1066 |
| 0 | 4386 |
| 0 | 695 |
| 0 | 2429 |
| 0 | 4200 |
| 0 | 13091 |
| 0 | 164318 |
| 0 | 552 |
| 0 | 497 |
| 0 | 3581 |
| 0 | 32794 |
| 0 | 403 |
| 0 | 42129 |
| 0 | 2589 |
| 0 | 105635 |
| 0 | 54943 |
| 0 | 80989 |
| 0 | 21755 |
| 0 | 1400 |
| 0 | 32330 |
| 0 | 1382 |
| 0 | 4992 |
| 0 | 2007 |
| 0 | 1220 |
| 0 | 241456 |
| 0 | 1878 |
| 0 | 104616 |
| 0 | 4243 |
| 0 | 397 |
| 0 | 289 |
| 0 | 1901 |
| 0 | 248 |
| 0 | 183103 |
| 0 | 30167 |
| 0 | 1667 |
| 0 | 101790 |
| 0 | 15072 |
| 0 | 3264 |
| 0 | 1694 |
| 0 | 102224 |
| 0 | 6584 |
| 0 | 1177 |
| 0 | 40912 |
| 0 | 1762 |
| 0 | 7281 |
| 0 | 2828 |
| 0 | 12686 |
| 0 | 1498 |
| 0 | 1225 |
| 0 | 274 |
| 0 | 4000 |
| 0 | 42162 |
| 0 | 15556 |
| 0 | 9517 |
| 0 | 21595 |
| 0 | 984 |
| 0 | 9653 |
| 0 | 428 |
| 0 | 269796 |
| 0 | 2486 |
| 0 | 1103 |
| 0 | 547 |
| 0 | 613 |
| 0 | 4458 |
| 0 | 497 |
| 0 | 1503 |
| 0 | 448 |
| 0 | 2405 |
| 0 | 851 |
| 0 | 1822 |
| 0 | 1066 |
| 0 | 3387 |
| 0 | 695 |
| 0 | 2429 |
| 0 | 4000 |
| 0 | 160765 |
| 0 | 552 |
| 0 | 497 |
| 0 | 3581 |
| 0 | 31628 |
| 0 | 403 |
| 0 | 40902 |
| 0 | 2589 |
| 0 | 91130 |
| 0 | 53371 |
| 0 | 64524 |
| 0 | 21080 |
| 0 | 1400 |
| 0 | 32103 |
| 0 | 1382 |
| 0 | 4992 |
| 0 | 2007 |
| 0 | 1220 |
| 0 | 190930 |
| 0 | 1878 |
| 0 | 101181 |
| 0 | 4243 |
| 0 | 397 |
| 0 | 289 |
| 0 | 1901 |
| 0 | 248 |
| 0 | 186932 |

# Getting the count and listing the libraries with number of active card holders is 0  
 count<-sum(library\_data1$A1.14..No..of.Active.Library.Cardholders == 0, na.rm = TRUE)  
##EXPLANATION 2  
 #Wherever Total\_operating\_Rvnue\_pr\_ActivCardHolder is NA,   
 #the corresponding library's number of active card holders is also 0.  
 #That indicates for the corresponding libraries, number of library users is 0,  
 #but total operating revenue is generated.  
 #Most of the library type is contacting municipality or contracting LSB type.   
 #So need to check the efficiently of contracting firms and their terms working.  
 #Initially we need to check weather those libraries are existing.  
 #There will be less possibility that libraries with 0 active card holders exist.   
 #If existing generate programs, resources , services which improves user interactions with public and   
 #Also social media advertisements can also be helpful.  
 #This helps in increasing number of active card holders, and optimizing the Total operating revenue.  
  
  
   
##INSIGHT 3  
 # Creating a data set where majority of Total\_operating\_Rvnue\_pr\_ActivCardHolder resides, which is less than 500  
 majority=library\_data1 %>%   
 filter(Total\_operating\_Rvnue\_pr\_ActivCardHolder<500)  
 View(majority)  
 #trying to find relation between above 2 variables using bar chart  
 ggplot(majority, aes(x =B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc..,  
 y =Total\_operating\_Rvnue\_pr\_ActivCardHolder,   
 fill = Total\_operating\_Rvnue\_pr\_ActivCardHolder)) +  
 geom\_bar(stat = "identity") +coord\_cartesian(ylim=c(0,1000))+  
 theme\_minimal() +  
 labs(title = "Comparison of Library Revenues",  
 x = "Selfgenerating revenue",  
 y = "Operating revenue") +  
 theme(legend.position = "none")



#From the bar chart we find that Total\_operating\_Rvnue\_pr\_ActivCardHolder above 250, is the greatest functioning libraries.  
 # get that data into an object for further analysis.   
 core\_analysis<-majority %>% filter(Total\_operating\_Rvnue\_pr\_ActivCardHolder>250)  
 #Sorting data based on self generated revenue,Total\_operating\_Rvnue\_pr\_ActivCardHolder and Net balance brought from previous year   
 #after cleaning the corresponding columns.  
 core\_analysis$B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc.. <- as.numeric(  
 gsub("[^0-9.]", "",   
 core\_analysis$B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc..))  
 model\_data<-arrange(core\_analysis,  
 B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc..,  
 Total\_operating\_Rvnue\_pr\_ActivCardHolder,B1.1..Net.Balance.brought.forward.from.previous.year)  
 #print(model\_data)  
 #Select the last 5 observations from bottom of data set, which can be model to other libraries  
 options(max.print = 10000) # Set a higher limit  
 Model\_Libraries <- arrange(tail(model\_data),  
 desc(B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc..))  
 Model\_Libraries1<-select(Model\_Libraries,Library.Number,Library.Full.Name,  
 Survey.Year.From,A1.3.Ontario.Library.Service..OLS..Region..English.,  
 A1.10.City.Town,A1.14..No..of.Active.Library.Cardholders,  
 B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc..,  
 B2.9..Total.Operating.Revenues,Total\_operating\_Rvnue\_pr\_ActivCardHolder)  
 head(Model\_Libraries1)

## Library.Number Library.Full.Name Survey.Year.From  
## 1 L0269 Stratford 2018  
## 2 L0269 Stratford 2016  
## 3 L0269 Stratford 2017  
## 4 L0269 Stratford 2015  
## 5 L0074 Orangeville 2018  
## 6 L0074 Orangeville 2017  
## A1.3.Ontario.Library.Service..OLS..Region..English. A1.10.City.Town  
## 1 Southern Ontario Library Service Stratford  
## 2 Southern Ontario Library Service Stratford  
## 3 Southern Ontario Library Service Stratford  
## 4 Southern Ontario Library Service Stratford  
## 5 Southern Ontario Library Service Orangeville  
## 6 Southern Ontario Library Service Orangeville  
## A1.14..No..of.Active.Library.Cardholders  
## 1 8522  
## 2 8761  
## 3 8615  
## 4 8727  
## 5 7743  
## 6 7552  
## B2.6..Self.Generated.Revenue..e.g..fines..fees..sales.fundraising..room.rentals..cafe.revenue..etc..  
## 1 300219  
## 2 283168  
## 3 281696  
## 4 265438  
## 5 208563  
## 6 183085  
## B2.9..Total.Operating.Revenues Total\_operating\_Rvnue\_pr\_ActivCardHolder  
## 1 2686589 315.2533  
## 2 2541771 290.1234  
## 3 2587836 300.3872  
## 4 2505283 287.0726  
## 5 2060807 266.1510  
## 6 2030981 268.9329

##EXPLANATION 3  
 #Using the above code we are trying to find first 6 libraries and their details, where there interactions,  
 #programs and services that can be model to other libraries  
 # Library names specified above can be analyzed to identify programs that can be model to other libraries.  
 # Libraries with medium values on Total\_operating\_Rvnue\_pr\_ActivCardHolder will be doing excellent as,  
 #those have optimized value.  
 # they have great number of active card holders and total operating revenue utilization.  
 #Here we are trying to list libraries based on highest self generated revenue,   
 #with respect to Total\_operating\_Rvnue\_pr\_ActivCardHolder and revenue get back from previous year.  
 # Those libraries also have lots of interesting programs and services created for public.  
 # I had selected top5 model libraries based on their data.  
 #They will gives us an idea on how we can implement same on other libraries.