anova_wi_cardio

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Calculates the ratio statistics across all drugs

Note: While the metric of brand_name != generic_name is generally affective, there are some

outliers to consider, such as when a substring of the total name is used as "brand name"

```
library(data.table)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:data.table':
##
##     between, last
##
## The following objects are masked from 'package:stats':
##
##     filter, lag
##
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(agricolae)
setwd("~/projects/data")
b= c(rep("character", 6),rep("factor",4), "numeric", rep("factor",6), "character", "character", "charac
DT = fread("National_Downloadable_File.csv",colClasses = b)
```

```
##
Read 0.0% of 2150817 rows
Read 11.2% of 2150817 rows
Read 13.9% of 2150817 rows
Read 22.8% of 2150817 rows
Read 30.2% of 2150817 rows
Read 40.0% of 2150817 rows
Read 50.7% of 2150817 rows
Read 61.4% of 2150817 rows
Read 66.0% of 2150817 rows
```

```
Read 76.3% of 2150817 rows
Read 86.0% of 2150817 rows
Read 95.8% of 2150817 rows
Read 2150817 rows and 43 (of 43) columns from 0.617 GB file in 00:00:19
```

```
names(DT)[1] <- c("NPI")
setkey(DT, NPI)

phy_drugs = fread("wi_cardi2.tab", sep="\t", header=FALSE)
hospitals = unique(phy_drugs[, 20])
setkey(phy_drugs,V1)

#Change to focus on METOPROLOL SUCCINATE b/g ratio
if (FALSE) {
  phy_drugs = phy_drugs[`V9`=="METOPROLOL SUCCINATE"]
}
```

First aggregate ratios over physicians

```
grouped_by_physician = phy_drugs %>%
  group_by(V1) %>%
  select(drug_name = V8, generic_name = V9, total_claim_cnt = V11)
```

Calculates ratios based on number of brand name vs total claims, adds respective hospital to each row

```
phy_bg_ratios = summarise(grouped_by_physician,
      bg_ratio = (sum(as.vector(total_claim_cnt[as.vector(drug_name) != as.vector(generic_name)]))/sum(a
)

phy_bg_ratios$hospital <- phy_drugs[.(phy_bg_ratios$V1), mult = "first"]$V20
phy_bg_ratios$zip = DT[.(as.character(phy_bg_ratios$V1)), mult = "first"]$`Zip Code`
```

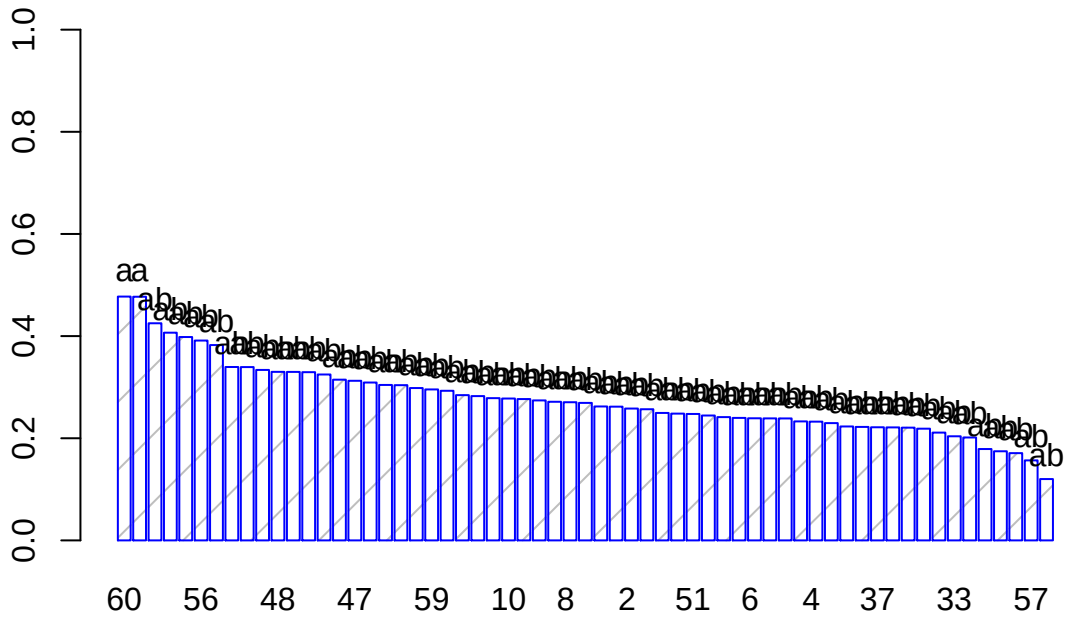
ANOVA analysis on Wisconsin on b/g ratio

ANOVA analysis by hospital on b/g ratio

```
data <-phy_bg_ratios
data <- cbind(data,trt=factor(data$hospital,labels=1:length(unique(data$hospital))))
model <- aov(bg_ratio ~ trt, data = data)

lsd.out <- LSD.test(model, "trt", p.adj = "bonferroni")
hsd.out <- HSD.test(model,"trt", group = T)
```

```
bar.group(lsd.out$groups,ylim=c(0,1),density=4,border="blue")
bar.group(hsd.out$groups,ylim=c(0,1),density=4,border="blue")
```




```
#lsd.out$groups
#hsd.out$groups

id.group <- data %>%
  select(hospital, trt) %>%
  unique()
hsd.out$groups.id <- merge(id.group, hsd.out$groups, by = "trt")
hsd.out$groups.id
```

```
##     trt
##  1:  10
##  2:  11
##  3:  12
##  4:  13
##  5:  14
##  6:  15
##  7:  16
##  8:  17
##  9:  18
## 10:  19
## 11:  20
## 12:  21
```

```
## 13:  22
## 14:  23
## 15:  24
## 16:  25
## 17:  26
## 18:  27
## 19:  28
## 20:  29
## 21:  30
## 22:  31
## 23:  32
## 24:  33
## 25:  34
## 26:  35
## 27:  36
## 28:  37
## 29:  38
## 30:  39
## 31:  40
## 32:  41
## 33:  42
## 34:  43
## 35:  44
## 36:  45
## 37:  46
## 38:  47
## 39:  48
## 40:  49
## 41:  50
## 42:  51
## 43:  52
## 44:  53
## 45:  54
## 46:  55
## 47:  56
## 48:  57
## 49:  58
## 50:  59
## 51:  60
## 52:  61
##     trt
##                                                                hospital
##  1:                                                    BAYCARE AURORA, LLC
##  2:                                          BELLIN MEMORIAL HOSPITAL, INC
##  3:                                               BELOIT HEALTH SYSTEM INC
##  4:                                  CARDIOLOGY ASSOCIATES OF WAUKESHA, S.C.
##  5:                                COLUMBIA ST MARY'S HOSPITAL OZAUKEE, INC.
##  6:                             COLUMBIA ST. MARY'S HOSPITAL MILWAUKEE, INC
##  7:                                CULLINANE CARDIOVASCULAR CONSULTANTS, SC
##  8:                                           DEAN HEALTH SYSTEMS, INC
##  9:                                     EAU CLAIRE HEART INSTITUTE, SC
## 10:                                       EAU CLAIRE MEDICAL CLINIC SC
## 11:                                                EDDY D. CO, MD, SC
## 12:                                              FARZAD KAMRANI,MD.SC.
```

```
## 13: FROEDTERT AND THE MEDICAL COLLEGE OF WISCONSIN COMMUNITY PHYSICIANS IN
## 14:                                                 GUNDERSEN CLINIC  LTD
## 15:                                GUNDERSEN LUTHERAN MEDICAL CENTER, INC.
## 16:                                              HOLY FAMILY MEMORIAL INC
## 17:                                                  HUDSON PHYSICIANS SC
## 18:                                           JOAN T. HARNEY GNADT, MD, SC
## 19:                             LAKE COUNTRY CARDIOVASCULAR ASSOCIATES LTD
## 20:                                           LAKESHORE MEDICAL CLINIC LTD
## 21:                                                    LOUIE COULIS MD SC
## 22:                                                 MARSHFIELD CLINIC INC
## 23:                               MAYO CLINIC HEALTH SYSTEM-RED CEDAR, INC
## 24:                     MAYO CLINIC HEALTH SYSTEM - EAU CLAIRE CLINIC, INC
## 25:            MAYO CLINIC HEALTH SYSTEM - FRANCISCAN MEDICAL CENTER, INC.
## 26:                                        MERCY HEALTH SYSTEM CORPORATION
## 27:                                                MERITER HOSPITAL, INC.
## 28:                                             MERITER MEDICAL GROUP  INC
## 29:                                           MILE BLUFF MEDICAL CENTER INC
## 30:                                      MILWAUKEE CARDIOVASCULAR CNTR S.C.
## 31:                                             NETWORK HEALTH SYSTEM, INC.
## 32:                                                   OAKLEAF CLINICS SC
## 33:                                           PRACTICE MANAGEMENT GROUP INC
## 34:                                    PROHEALTH CARE MEDICAL ASSOCIATES INC
## 35:                             SIXTEENTH STREET COMMUNITY HEALTH CENTERS INC
## 36:         ST VINCENT HOSPITAL-HOSPITAL SISTERS-THIRD ORDER OF ST FRANCIS
## 37:                               ST. JOSEPH'S ELECTROCARDIOGRAPHIC ASSOCIATES
## 38:        ST. NICHOLAS HOSPITAL-SISTERS OF THE THIRD ORDER OF ST. FRANCIS
## 39:                                                SUHAS K SHELGIKAR MD SC
## 40:                                     THE MEDICAL COLLEGE OF WISCONSIN INC
## 41:                                                 THE MONROE CLINIC, INC.
## 42:                                                 THEDACARE, INCORPORATED
## 43:                                               UNITED HOSPITAL SYSTEM INC
## 44:                             UNIVERSITY OF WISCONSIN MEDICAL FOUNDATION INC
## 45:                                           WATERTOWN HEART INSTITUTE SC
## 46:                                  WATERTOWN REGIONAL MEDICAL CENTER, INC
## 47:                                                WAUKESHA HEART INSTITUTE
## 48:                                              WESTFIELDS HOSPITAL, INC.
## 49:                                         WHEATON FRANCISCAN MEDICAL GROUP
## 50:                                                    WISCONSIN HEALTH FUND
## 51:                                           WISCONSIN HEART CENTER S C
## 52:                                                 ZENITH HEALTHCARE SC
##                                                                    hospital
##        means  M
##  1: 0.2777667 ab
##  2: 0.2207583 ab
##  3: 0.2714276 ab
##  4: 0.2983064 ab
##  5: 0.3147188 ab
##  6: 0.2784896 ab
##  7: 0.4251262 ab
##  8: 0.2618529 ab
##  9: 0.2445100 ab
## 10: 0.2230500 ab
## 11: 0.2929120 ab
## 12: 0.3091187 ab
```

```
## 13: 0.1745037 ab
## 14: 0.2212075 ab
## 15: 0.2622252 ab
## 16: 0.3039344 ab
## 17: 0.1200686 ab
## 18: 0.2387944 ab
## 19: 0.3293824 ab
## 20: 0.2296248 ab
## 21: 0.2329979 ab
## 22: 0.3298661 ab
## 23: 0.2740851 ab
## 24: 0.2038654 ab
## 25: 0.2567954 ab
## 26: 0.2413616 ab
## 27: 0.2398291 ab
## 28: 0.2215102 ab
## 29: 0.2767385 ab
## 30: 0.3248027 ab
## 31: 0.2110743 ab
## 32: 0.2825382 ab
## 33: 0.3393418 ab
## 34: 0.4770871  a
## 35: 0.3981913 ab
## 36: 0.2843912 ab
## 37: 0.3337723 ab
## 38: 0.3125156 ab
## 39: 0.3299663 ab
## 40: 0.1708218 ab
## 41: 0.2187086 ab
## 42: 0.2475537 ab
## 43: 0.3394982 ab
## 44: 0.1788730 ab
## 45: 0.4066732 ab
## 46: 0.2014802 ab
## 47: 0.3912818 ab
## 48: 0.1566502 ab
## 49: 0.2692160 ab
## 50: 0.2955656 ab
## 51: 0.4773980  a
## 52: 0.2495088 ab
##         means  M
```

ANOVA analysis by zipcode on b/g ratio

```
data <-phy_bg_ratios
data <- cbind(data,trt=factor(data$zip,labels=1:length(unique(data$zip))))
model <- aov(bg_ratio ~ trt, data = data)

lsd.out <- LSD.test(model, "trt", p.adj = "bonferroni")
hsd.out <- HSD.test(model,"trt", group = T)
```

```
bar.group(lsd.out$groups,ylim=c(0,1),density=4,border="blue")
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```

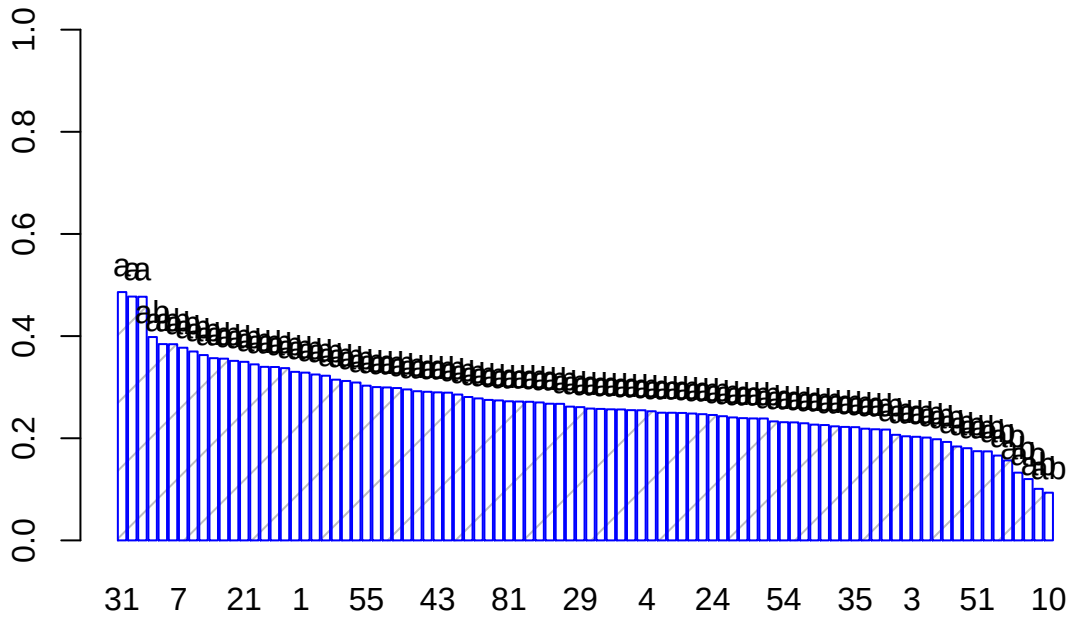


```
#lsd.out$groups
#hsd.out$groups

id.group <- data %>%
  select(hospital, trt) %>%
  unique()
hsd.out$groups.id <- merge(id.group, hsd.out$groups, by = "trt")
hsd.out$groups.id
```

```
##      trt
##   1:  10
##   2:  10
##   3:  11
##   4:  12
##   5:  13
##  ---
## 111:  88
## 112:  89
## 113:  90
## 114:  91
## 115:  92
##                                                                hospital
```

```
##   1:                                  THE MEDICAL COLLEGE OF WISCONSIN INC
##   2: FROEDTERT AND THE MEDICAL COLLEGE OF WISCONSIN COMMUNITY PHYSICIANS IN
##   3:         ST VINCENT HOSPITAL-HOSPITAL SISTERS-THIRD ORDER OF ST FRANCIS
##   4:                                                        LOUIE COULIS MD SC
##   5:                                                AURORA MEDICAL GROUP INC
##  ---
## 111:                                            NETWORK HEALTH SYSTEM, INC.
## 112:                                                THEDACARE, INCORPORATED
## 113:                                                   HUDSON PHYSICIANS SC
## 114:                                                BELOIT HEALTH SYSTEM INC
## 115:                                                    BAYCARE AURORA, LLC
##           means  M
##   1: 0.09340252 ab
##   2: 0.09340252 ab
##   3: 0.25664230 ab
##   4: 0.23299787 ab
##   5: 0.23933122 ab
##  ---
## 111: 0.24987154 ab
## 112: 0.25482803 ab
## 113: 0.12006861 ab
## 114: 0.29947690 ab
## 115: 0.28074246 ab
```

Miscelaneous codes

```
#grouped_by_hospital = phy_bg_ratios %>%
#  group_by(hospital) %>%
#  select(ratio = bg_ratio)

#Calculates ratios based on number of brand name vs total claims
# hosp_bg_ratios = summarise(grouped_by_hospital,
#       average_ratio = mean(ratio),
#       ratio_std = sd(ratio)
#       )
#
#hist(hosp_bg_ratios$average_ratio)
#hist(hosp_bg_ratios$ratio_std/hosp_bg_ratios$average_ratio)
```