Prob

rhadoop

2019 3 13

1. ggplot2 midwest

```
library(ggplot2)
library(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
```

```
df_midwest <-as.data.frame(ggplot2::midwest)
head(df_midwest,10)
```

```
##    PID    county state  area poptotal popdensity popwhite popblack
## 1  561     ADAMS    IL 0.052    66090  1270.9615    63917     1702
## 2  562 ALEXANDER    IL 0.014    10626   759.0000     7054     3496
## 3  563      BOND    IL 0.022    14991   681.4091    14477      429
## 4  564     BOONE    IL 0.017    30806  1812.1176    29344      127
## 5  565     BROWN    IL 0.018     5836   324.2222     5264      547
## 6  566    BUREAU    IL 0.050    35688   713.7600    35157       50
## 7  567   CALHOUN    IL 0.017     5322   313.0588     5298        1
## 8  568   CARROLL    IL 0.027    16805   622.4074    16519      111
## 9  569      CASS    IL 0.024    13437   559.8750    13384       16
## 10 570 CHAMPAIGN    IL 0.058   173025  2983.1897   146506    16559
##    popamerindian popasian popother percwhite   percblack percamerindan
## 1             98      249      124  96.71206  2.57527614     0.1482826
## 2             19       48        9  66.38434 32.90043290     0.1788067
## 3             35       16       34  96.57128  2.86171703     0.2334734
## 4             46      150     1139  95.25417  0.41225735     0.1493216
## 5             14        5        6  90.19877  9.37285812     0.2398903
## 6             65      195      221  98.51210  0.14010312     0.1821340
## 7              8       15        0  99.54904  0.01878993     0.1503194
## 8             30       61       84  98.29813  0.66051770     0.1785183
## 9              8       23        6  99.60557  0.11907420     0.0595371
## 10           331     8033     1596  84.67331  9.57029331     0.1913018
##     percasian  percother popadults  perchsd percollege  percprof
## 1  0.37675897 0.18762294     43298 75.10740   19.63139  4.355859
## 2  0.45172219 0.08469791      6724 59.72635   11.24331  2.870315
```

```
## 3  0.10673071 0.22680275      9669 69.33499   17.03382  4.488572
## 4  0.48691813 3.69733169     19272 75.47219   17.27895  4.197800
## 5  0.08567512 0.10281014      3979 68.86152   14.47600  3.367680
## 6  0.54640215 0.61925577     23444 76.62941   18.90462  3.275891
## 7  0.28184893 0.00000000      3583 62.82445   11.91739  3.209601
## 8  0.36298721 0.49985123     11323 75.95160   16.19712  3.055727
## 9  0.17116916 0.04465282      8825 72.27195   14.10765  3.206799
## 10 4.64268169 0.92241006     95971 87.49935   41.29581 17.757448
##    poppovertyknown percpovertyknown percbelowpoverty percchildbelowpovert
## 1            63628         96.27478        13.151443              18.01172
## 2            10529         99.08714        32.244278              45.82651
## 3            14235         94.95697        12.068844              14.03606
## 4            30337         98.47757         7.209019              11.17954
## 5             4815         82.50514        13.520249              13.02289
## 6            35107         98.37200        10.399635              14.15882
## 7             5241         98.47802        15.149781              13.78776
## 8            16455         97.91729        11.710726              17.22546
## 9            13081         97.35060        13.875086              17.99478
## 10          154934         89.54429        15.572437              14.13223
##    percadultpoverty percelderlypoverty inmetro category
## 1         11.009776          12.443812       0      AAR
## 2         27.385647          25.228976       0      LHR
## 3         10.852090          12.697410       0      AAR
## 4          5.536013           6.217047       1      ALU
## 5         11.143211          19.200000       0      AAR
## 6          8.179287          11.008586       0      AAR
## 7         12.932331          21.085271       0      LAR
## 8         10.027037           9.525052       0      AAR
## 9         11.914343          13.660180       0      AAR
## 10        17.562728           8.105017       1      HAU
```

```
tail(df_midwest,10)
```

```
##      PID     county state  area poptotal popdensity popwhite popblack
## 428 3043     VERNON    WI 0.048    25617   533.6875    25509       12
## 429 3044      VILAS    WI 0.060    17707   295.1167    16116        9
## 430 3045   WALWORTH    WI 0.032    75000  2343.7500    72747      454
## 431 3046   WASHBURN    WI 0.050    13772   275.4400    13585       25
## 432 3047 WASHINGTON    WI 0.025    95328  3813.1200    94465      125
## 433 3048   WAUKESHA    WI 0.034   304715  8962.2059   298313     1096
## 434 3049    WAUPACA    WI 0.045    46104  1024.5333    45695       22
## 435 3050   WAUSHARA    WI 0.037    19385   523.9189    19094       29
## 436 3051  WINNEBAGO    WI 0.035   140320  4009.1429   136822      697
## 437 3052       WOOD    WI 0.048    73605  1533.4375    72157       90
##     popamerindian popasian popother percwhite  percblack percamerindan
## 428            36       42       18  99.57841 0.04684389     0.1405317
## 429          1534       38       10  91.01485 0.05082736     8.6632405
## 430           201      494     1104  96.99600 0.60533333     0.2680000
## 431           122       33        7  98.64217 0.18152774     0.8858554
## 432           208      337      193  99.09470 0.13112622     0.2181940
## 433           672     2699     1935  97.89902 0.35968036     0.2205339
## 434           125       92      170  99.11288 0.04771820     0.2711262
## 435            70       43      149  98.49884 0.14960021     0.3611040
## 436           685     1728      388  97.50713 0.49672178     0.4881699
```

```
## 437           481      722      155  98.03274 0.12227430     0.6534882
##     percasian  percother popadults  perchsd percollege percprof
## 428 0.1639536 0.07026584     16883 69.21163   18.94213 3.624948
## 429 0.2146044 0.05647484     12815 76.14514   19.21186 4.315256
## 430 0.6586667 1.47200000     46742 79.02101   23.15690 6.082324
## 431 0.2396166 0.05082777      9297 74.85210   19.01689 4.022803
## 432 0.3535163 0.20245888     59583 81.34032   23.39090 4.014568
## 433 0.8857457 0.63501961    195837 87.98899   35.39678 7.667090
## 434 0.1995488 0.36873156     30109 72.13790   16.54987 3.138596
## 435 0.2218210 0.76863554     13316 70.00601   15.06458 2.620907
## 436 1.2314709 0.27651083     88960 80.61938   24.99550 5.659847
## 437 0.9809116 0.21058352     46796 78.29515   21.66638 4.583725
##     poppovertyknown percpovertyknown percbelowpoverty percchildbelowpovert
## 428           25087         97.93106        15.824929            21.201105
## 429           17446         98.52601        14.736902            23.043367
## 430           71553         95.40400         9.641804             8.699613
## 431           13532         98.25733        15.866095            21.418598
## 432           94143         98.75692         3.237628             4.069854
## 433          299802         98.38767         3.121060             3.785820
## 434           44412         96.33004         8.488697            10.071411
## 435           19163         98.85478        13.786985            20.050708
## 436          133950         95.46038         8.804031            10.592031
## 437           72685         98.75008         8.525831            11.162997
##     percadultpoverty percelderlypoverty inmetro category
## 428        13.449643          14.571429       0      AAR
## 429        14.251978           9.173228       0      AAR
## 430        10.926610           6.894182       0      AAR
## 431        13.642483          14.329455       0      AAR
## 432         2.584500           4.280889       1      HLU
## 433         2.590061           4.085479       1      HLU
## 434         6.953799          10.338641       0      AAR
## 435        11.695784          11.804558       0      AAR
## 436         8.660587           6.661094       1      HAU
## 437         7.375656           7.882918       0      AAR
```

```
dim(df_midwest)
```

```
## [1] 437  28
```

```
str(df_midwest)
```

```
## 'data.frame':    437 obs. of  28 variables:
##  $ PID                : int  561 562 563 564 565 566 567 568 569 570 ...
##  $ county             : chr  "ADAMS" "ALEXANDER" "BOND" "BOONE" ...
##  $ state              : chr  "IL" "IL" "IL" "IL" ...
##  $ area               : num  0.052 0.014 0.022 0.017 0.018 0.05 0.017 0.027 0.024 0.058 ...
##  $ poptotal           : int  66090 10626 14991 30806 5836 35688 5322 16805 13437 173025 ...
##  $ popdensity         : num  1271 759 681 1812 324 ...
##  $ popwhite           : int  63917 7054 14477 29344 5264 35157 5298 16519 13384 146506 ...
##  $ popblack           : int  1702 3496 429 127 547 50 1 111 16 16559 ...
##  $ popamerindian      : int  98 19 35 46 14 65 8 30 8 331 ...
##  $ popasian           : int  249 48 16 150 5 195 15 61 23 8033 ...
##  $ popother           : int  124 9 34 1139 6 221 0 84 6 1596 ...
```

```
##  $ percwhite           : num  96.7 66.4 96.6 95.3 90.2 ...
##  $ percblack           : num  2.575 32.9 2.862 0.412 9.373 ...
##  $ percamerindan       : num  0.148 0.179 0.233 0.149 0.24 ...
##  $ percasian           : num  0.3768 0.4517 0.1067 0.4869 0.0857 ...
##  $ percother           : num  0.1876 0.0847 0.2268 3.6973 0.1028 ...
##  $ popadults           : int  43298 6724 9669 19272 3979 23444 3583 11323 8825 95971 ...
##  $ perchsd             : num  75.1 59.7 69.3 75.5 68.9 ...
##  $ percollege          : num  19.6 11.2 17 17.3 14.5 ...
##  $ percprof            : num  4.36 2.87 4.49 4.2 3.37 ...
##  $ poppovertyknown     : int  63628 10529 14235 30337 4815 35107 5241 16455 13081 154934 ...
##  $ percpovertyknown    : num  96.3 99.1 95 98.5 82.5 ...
##  $ percbelowpoverty    : num  13.15 32.24 12.07 7.21 13.52 ...
##  $ percchildbelowpovert: num  18 45.8 14 11.2 13 ...
##  $ percadultpoverty    : num  11.01 27.39 10.85 5.54 11.14 ...
##  $ percelderlypoverty  : num  12.44 25.23 12.7 6.22 19.2 ...
##  $ inmetro             : int  0 0 0 1 0 0 0 0 0 1 ...
##  $ category            : chr  "AAR" "LHR" "AAR" "ALU" ...
```

```
View(df_midwest)
summary(df_midwest)
```

```
##       PID          county             state               area        
##  Min.   : 561   Length:437         Length:437         Min.   :0.00500  
##  1st Qu.: 670   Class :character   Class :character   1st Qu.:0.02400  
##  Median :1221   Mode  :character   Mode  :character   Median :0.03000  
##  Mean   :1437                                         Mean   :0.03317  
##  3rd Qu.:2059                                         3rd Qu.:0.03800  
##  Max.   :3052                                         Max.   :0.11000  
##     poptotal         popdensity          popwhite          popblack      
##  Min.   :   1701   Min.   :   85.05   Min.   :    416   Min.   :      0  
##  1st Qu.:  18840   1st Qu.:  622.41   1st Qu.:  18630   1st Qu.:     29  
##  Median :  35324   Median : 1156.21   Median :  34471   Median :    201  
##  Mean   :  96130   Mean   : 3097.74   Mean   :  81840   Mean   :  11024  
##  3rd Qu.:  75651   3rd Qu.: 2330.00   3rd Qu.:  72968   3rd Qu.:   1291  
##  Max.   :5105067   Max.   :88018.40   Max.   :3204947   Max.   :1317147  
##  popamerindian        popasian         popother        percwhite     
##  Min.   :    4.0   Min.   :     0   Min.   :     0   Min.   :10.69  
##  1st Qu.:   44.0   1st Qu.:    35   1st Qu.:    20   1st Qu.:94.89  
##  Median :   94.0   Median :   102   Median :    66   Median :98.03  
##  Mean   :  343.1   Mean   :  1310   Mean   :  1613   Mean   :95.56  
##  3rd Qu.:  288.0   3rd Qu.:   401   3rd Qu.:   345   3rd Qu.:99.07  
##  Max.   :10289.0   Max.   :188565   Max.   :384119   Max.   :99.82  
##    percblack       percamerindan        percasian        percother      
##  Min.   : 0.0000   Min.   : 0.05623   Min.   :0.0000   Min.   :0.00000  
##  1st Qu.: 0.1157   1st Qu.: 0.15793   1st Qu.:0.1737   1st Qu.:0.09102  
##  Median : 0.5390   Median : 0.21502   Median :0.2972   Median :0.17844  
##  Mean   : 2.6763   Mean   : 0.79894   Mean   :0.4872   Mean   :0.47906  
##  3rd Qu.: 2.6014   3rd Qu.: 0.38362   3rd Qu.:0.5212   3rd Qu.:0.48050  
##  Max.   :40.2100   Max.   :89.17738   Max.   :5.0705   Max.   :7.52427  
##    popadults          perchsd        percollege        percprof     
##  Min.   :   1287   Min.   :46.91   Min.   : 7.336   Min.   : 0.5203  
##  1st Qu.:  12271   1st Qu.:71.33   1st Qu.:14.114   1st Qu.: 2.9980  
##  Median :  22188   Median :74.25   Median :16.798   Median : 3.8142  
##  Mean   :  60973   Mean   :73.97   Mean   :18.273   Mean   : 4.4473  
```

```
##  3rd Qu.:  47541   3rd Qu.:77.20   3rd Qu.:20.550   3rd Qu.: 4.9493
##  Max.   :3291995   Max.   :88.90   Max.   :48.079   Max.   :20.7913
##  poppovertyknown   percpovertyknown percbelowpoverty percchildbelowpovert
##  Min.   :   1696   Min.   :80.90    Min.   : 2.180   Min.   : 1.919
##  1st Qu.:  18364   1st Qu.:96.89    1st Qu.: 9.199   1st Qu.:11.624
##  Median :  33788   Median :98.17    Median :11.822   Median :15.270
##  Mean   :  93642   Mean   :97.11    Mean   :12.511   Mean   :16.447
##  3rd Qu.:  72840   3rd Qu.:98.60    3rd Qu.:15.133   3rd Qu.:20.352
##  Max.   :5023523   Max.   :99.86    Max.   :48.691   Max.   :64.308
##  percadultpoverty percelderlypoverty    inmetro         category
##  Min.   : 1.938   Min.   : 3.547     Min.   :0.0000   Length:437
##  1st Qu.: 7.668   1st Qu.: 8.912     1st Qu.:0.0000   Class :character
##  Median :10.008   Median :10.869     Median :0.0000   Mode  :character
##  Mean   :10.919   Mean   :11.389     Mean   :0.3432
##  3rd Qu.:13.182   3rd Qu.:13.412     3rd Qu.:1.0000
##  Max.   :43.312   Max.   :31.162     Max.   :1.0000
```

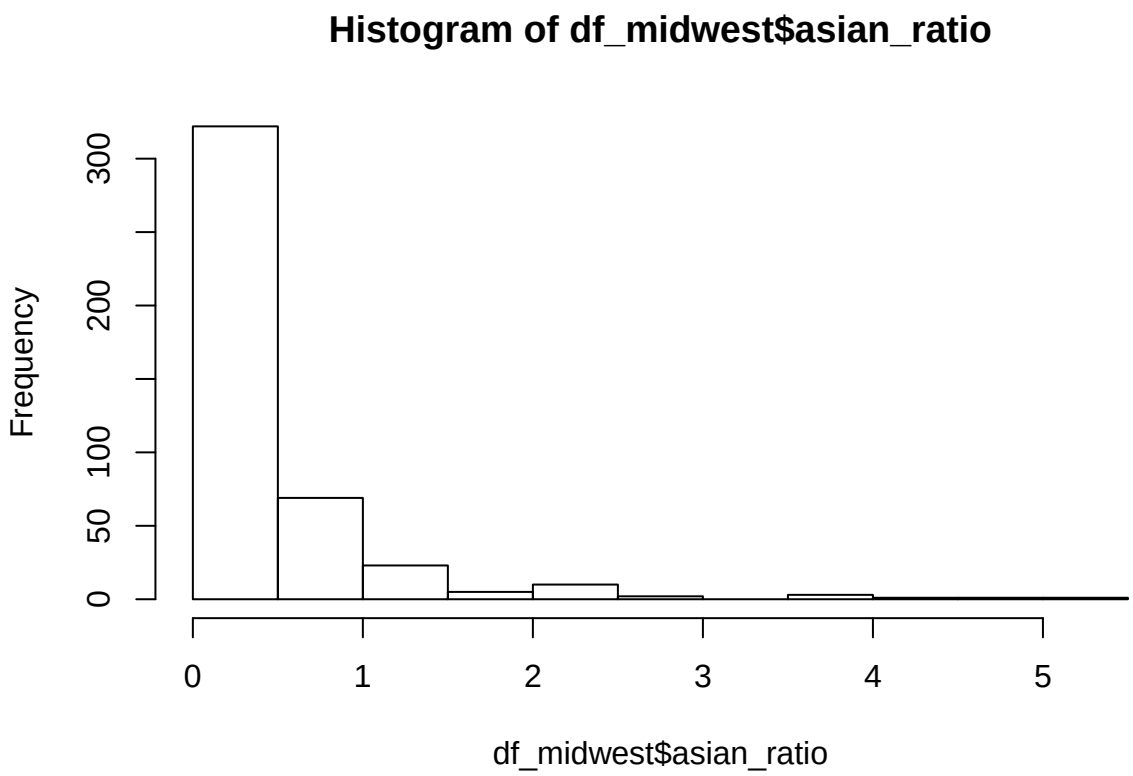
2. poptotal -> total, popasian -> asian

```
rename(df_midwest, total=poptotal, asian=popasian) -> df_midwest
names(df_midwest)
```

```
##  [1] "PID"                 "county"              "state"
##  [4] "area"                "total"               "popdensity"
##  [7] "popwhite"            "popblack"            "popamerindian"
## [10] "asian"               "popother"            "percwhite"
## [13] "percblack"           "percamerindan"       "percasian"
## [16] "percother"           "popadults"           "perchsd"
## [19] "percollege"          "percprof"            "poppovertyknown"
## [22] "percpovertyknown"    "percbelowpoverty"    "percchildbelowpovert"
## [25] "percadultpoverty"    "percelderlypoverty"  "inmetro"
## [28] "category"
```

3.

```
df_midwest$asian_ratio <- (df_midwest$asian/df_midwest$total)*100
hist(df_midwest$asian_ratio)
```



4. large, small

```
df_midwest$asian_pop <- ifelse(df_midwest$asian_ratio > mean(df_midwest$asian_ratio), "large",'small')
head(df_midwest[,c(1,2,29,30)],20)
```

```
##    PID     county asian_ratio asian_pop
## 1  561      ADAMS  0.37675897     small
## 2  562  ALEXANDER  0.45172219     small
## 3  563       BOND  0.10673071     small
## 4  564      BOONE  0.48691813     small
## 5  565      BROWN  0.08567512     small
## 6  566     BUREAU  0.54640215     large
## 7  567    CALHOUN  0.28184893     small
## 8  568    CARROLL  0.36298721     small
## 9  569       CASS  0.17116916     small
## 10 570  CHAMPAIGN  4.64268169     large
## 11 571  CHRISTIAN  0.25858562     small
## 12 572      CLARK  0.22611645     small
## 13 573       CLAY  0.20055325     small
## 14 574    CLINTON  0.30638699     small
## 15 575      COLES  0.66028968     large
## 16 576       COOK  3.69368316     large
## 17 577   CRAWFORD  0.24660912     small
```

```
## 18 578 CUMBERLAND  0.24367385     small
## 19 579    DE KALB  2.24683057     large
## 20 580    DE WITT  0.26035360     small
```

5. large, small

```
table(df_midwest$asian_pop)
```

```
##
## large small
##   119   318
```

```
qplot(df_midwest$asian_pop)
```