# Study of US Craft Beer and Breweries

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```
library(ggplot2) # Data visualization
library(readr) # CSV file I/O, e.g. the read_csv function
library(dplyr) # Heavy use of this library
```

```
##
## 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
```

```
# Read in beer and breweries data set
Beers <- read.csv('Beers.csv')
Breweries <- read.csv('Breweries.csv')
```

```
# Renamed Brewery_id to Brew_ID to satisfy merging requirement
Beers <- rename(Beers, Brew_ID = Brewery_id)
```

```
# dplyr library used to make data easier to work with.
#dplyr::tbl_df(Beers)
#dplyr::tbl_df(Breweries)
```

```
# 2. Merge beer data with the breweries data.
BrewPub <- full_join(Beers, Breweries, by="Brew_ID")
#(dplyr::tbl_df(BrewPub))
```

```
# 1.How many breweries are present in each state?
States <- BrewPub %>%
  group_by(State) %>%
  summarise(count = n_distinct(Brew_ID))
States %>% tbl_df %>% print(n=51)
```

```
## # A tibble: 51 x 2
##    State count
##    <fct> <int>
##  1 " AK"     7
##  2 " AL"     3
##  3 " AR"     2
##  4 " AZ"    11
##  5 " CA"    39
##  6 " CO"    47
##  7 " CT"     8
##  8 " DC"     1
##  9 " DE"     2
## 10 " FL"    15
## 11 " GA"     7
```

```
## 12 " HI"     4
## 13 " IA"     5
## 14 " ID"     5
## 15 " IL"    18
## 16 " IN"    22
## 17 " KS"     3
## 18 " KY"     4
## 19 " LA"     5
## 20 " MA"    23
## 21 " MD"     7
## 22 " ME"     9
## 23 " MI"    32
## 24 " MN"    12
## 25 " MO"     9
## 26 " MS"     2
## 27 " MT"     9
## 28 " NC"    19
## 29 " ND"     1
## 30 " NE"     5
## 31 " NH"     3
## 32 " NJ"     3
## 33 " NM"     4
## 34 " NV"     2
## 35 " NY"    16
## 36 " OH"    15
## 37 " OK"     6
## 38 " OR"    29
## 39 " PA"    25
## 40 " RI"     5
## 41 " SC"     4
## 42 " SD"     1
## 43 " TN"     3
## 44 " TX"    28
## 45 " UT"     4
## 46 " VA"    16
## 47 " VT"    10
## 48 " WA"    23
## 49 " WI"    20
## 50 " WV"     1
## 51 " WY"     4
```

```r
# 2.a Print the first six observations
print(head(BrewPub))
```

```
##                Name.x Beer_ID   ABV IBU Brew_ID
## 1            Pub Beer    1436 0.050  NA     409
## 2         Devil's Cup    2265 0.066  NA     178
## 3 Rise of the Phoenix    2264 0.071  NA     178
## 4            Sinister    2263 0.090  NA     178
## 5       Sex and Candy    2262 0.075  NA     178
## 6        Black Exodus    2261 0.077  NA     178
##                            Style Ounces                    Name.y City
## 1            American Pale Lager     12 10 Barrel Brewing Company Bend
## 2        American Pale Ale (APA)     12       18th Street Brewery Gary
## 3                  American IPA      12       18th Street Brewery Gary
```

```
## 4 American Double / Imperial IPA     12       18th Street Brewery Gary
## 5                   American IPA     12       18th Street Brewery Gary
## 6                  Oatmeal Stout     12       18th Street Brewery Gary
##   State
## 1    OR
## 2    IN
## 3    IN
## 4    IN
## 5    IN
## 6    IN
```

```
# 2. b Print the last six observations
print (tail(BrewPub))
```

```
##                           Name.x Beer_ID   ABV IBU Brew_ID
## 2405 Rocky Mountain Oyster Stout    1035 0.075  NA     425
## 2406                   Belgorado     928 0.067  45     425
## 2407               Rail Yard Ale     807 0.052  NA     425
## 2408             B3K Black Lager     620 0.055  NA     425
## 2409         Silverback Pale Ale     145 0.055  40     425
## 2410        Rail Yard Ale (2009)      84 0.052  NA     425
##                         Style Ounces                  Name.y   City State
## 2405           American Stout     12 Wynkoop Brewing Company Denver    CO
## 2406              Belgian IPA     12 Wynkoop Brewing Company Denver    CO
## 2407 American Amber / Red Ale     12 Wynkoop Brewing Company Denver    CO
## 2408              Schwarzbier     12 Wynkoop Brewing Company Denver    CO
## 2409  American Pale Ale (APA)     12 Wynkoop Brewing Company Denver    CO
## 2410 American Amber / Red Ale     12 Wynkoop Brewing Company Denver    CO
```

```
# 3. Report the number of NA's in each column.
MissingValues <- sapply(BrewPub, function(x)sum(is.na(x)))
print(MissingValues)
```

```
##  Name.x Beer_ID     ABV     IBU Brew_ID   Style  Ounces  Name.y    City
##       0       0      62    1005       0       0       0       0       0
##   State
##       0
```

```
# 4. Compute the median alcohol content unit for each state.
Bitter <- BrewPub %>%
  na.omit() %>%
group_by(State) %>%
summarise(Median = median(ABV)) %>%
arrange(Median)
#dplyr::tbl_df(Bitter) ~ duplicated next line
Bitter %>% tbl_df %>% print(n=50)
```

```
## # A tibble: 50 x 2
##    State Median
##    <fct>  <dbl>
##  1 " AR" 0.0400
##  2 " UT" 0.0400
##  3 " NJ" 0.0460
##  4 " NH" 0.0465
##  5 " KS" 0.0500
##  6 " MO" 0.0500
```

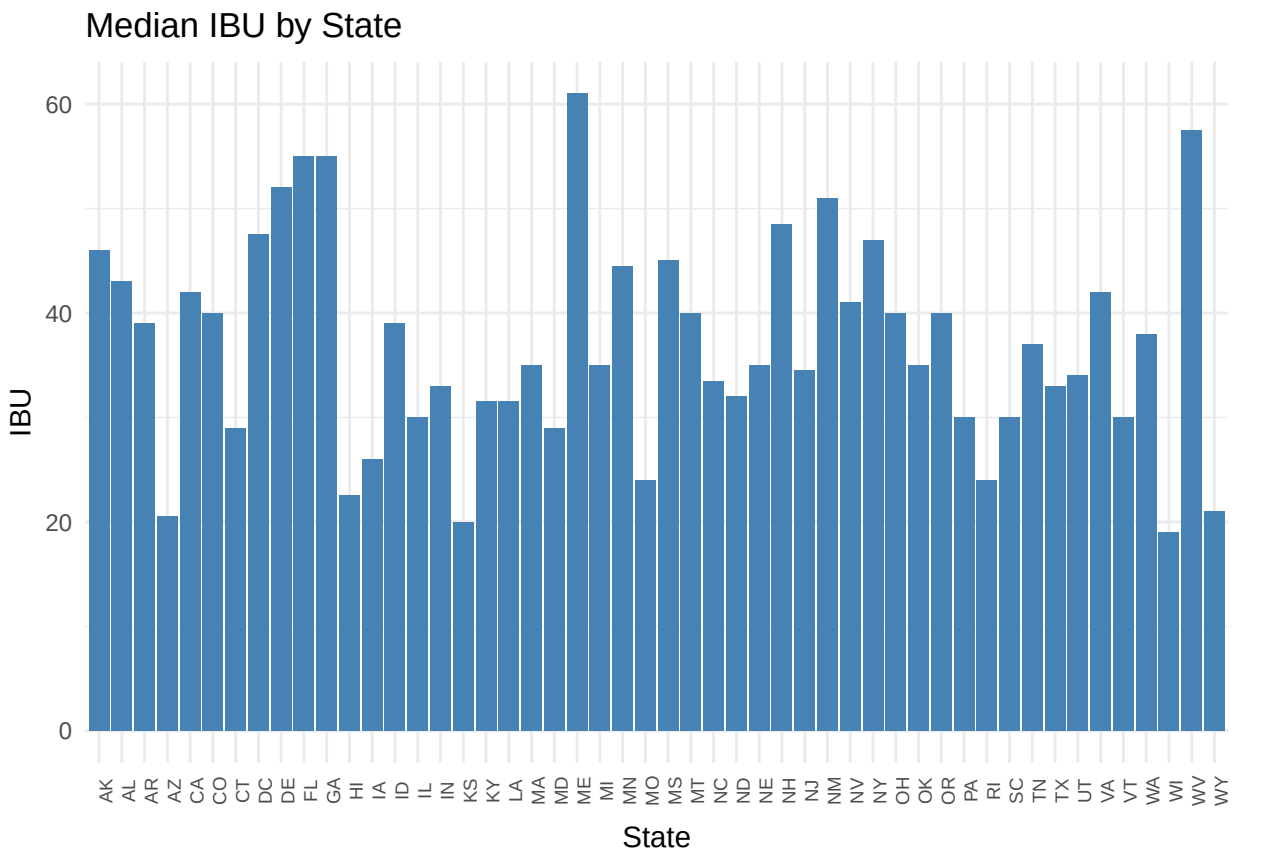
```
##  7 " ND" 0.0500
##  8 " SC" 0.0500
##  9 " WI" 0.0510
## 10 " LA" 0.0510
## 11 " WY" 0.0510
## 12 " HI" 0.0520
## 13 " RI" 0.0525
## 14 " MA" 0.0540
## 15 " DE" 0.0550
## 16 " NV" 0.0550
## 17 " TN" 0.0550
## 18 " TX" 0.0550
## 19 " VT" 0.0550
## 20 " MN" 0.0555
## 21 " IA" 0.0560
## 22 " MI" 0.0560
## 23 " NE" 0.0560
## 24 " OR" 0.0560
## 25 " WA" 0.0560
## 26 " MD" 0.0565
## 27 " AK" 0.0570
## 28 " IL" 0.0570
## 29 " IN" 0.0570
## 30 " MT" 0.0570
## 31 " PA" 0.0570
## 32 " VA" 0.0570
## 33 " AZ" 0.0575
## 34 " KY" 0.0575
## 35 " OH" 0.0575
## 36 " CA" 0.0580
## 37 " ID" 0.0580
## 38 " MS" 0.0580
## 39 " DC" 0.0590
## 40 " NY" 0.0595
## 41 " AL" 0.0600
## 42 " CT" 0.0610
## 43 " NC" 0.0610
## 44 " NM" 0.0610
## 45 " FL" 0.0620
## 46 " GA" 0.0620
## 47 " WV" 0.0620
## 48 " OK" 0.0630
## 49 " CO" 0.0650
## 50 " ME" 0.0670
```

```
# 4. a Compute the median alcohol content unit for each state.
FireWater <- BrewPub %>%
  na.omit() %>%
group_by(State) %>%
summarise(Median = median(IBU)) %>%
arrange(Median)
# dplyr::tbl_df(FireWater) duplicated next line
FireWater %>% tbl_df %>% print(n=50)
```

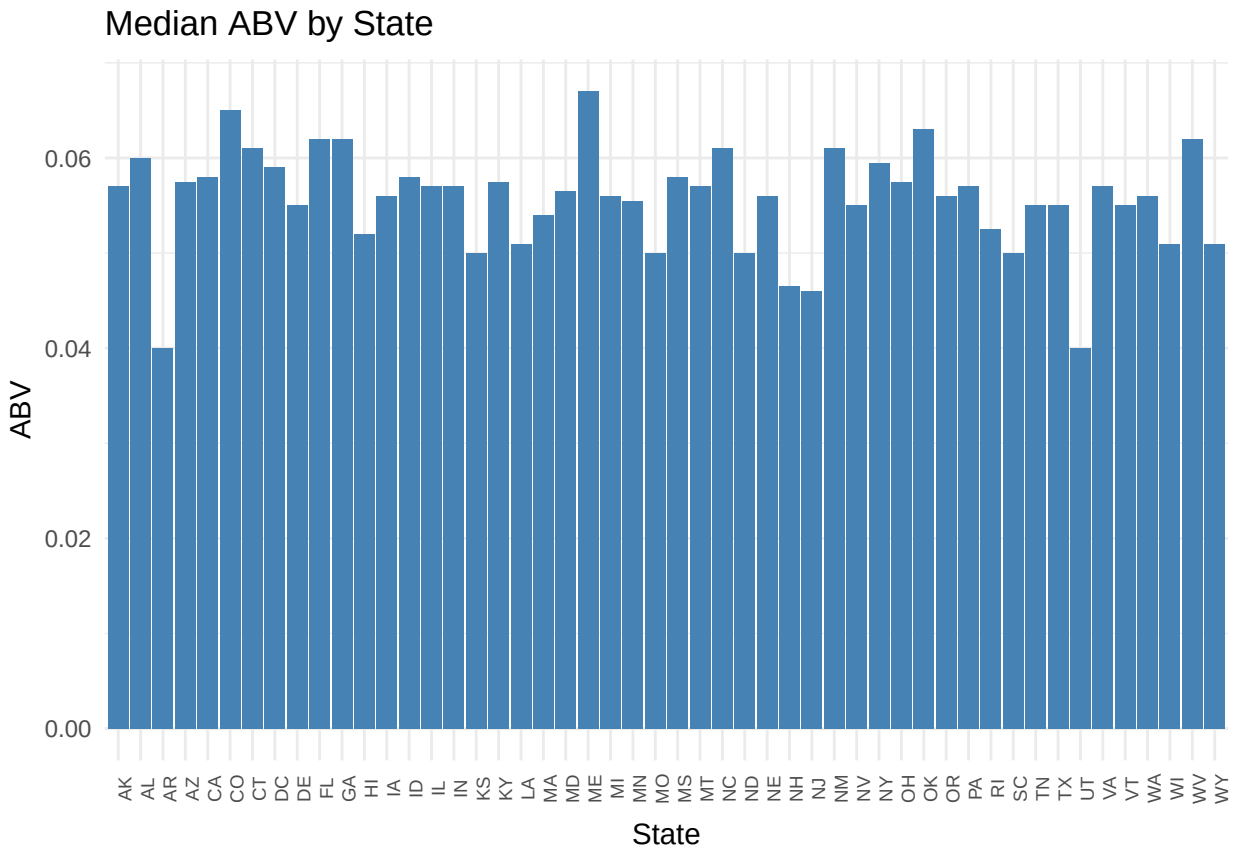
```
## # A tibble: 50 x 2
```

```
##    State Median
##    <fct>  <dbl>
##  1 " WI"   19.0
##  2 " KS"   20.0
##  3 " AZ"   20.5
##  4 " WY"   21.0
##  5 " HI"   22.5
##  6 " MO"   24.0
##  7 " RI"   24.0
##  8 " IA"   26.0
##  9 " CT"   29.0
## 10 " MD"   29.0
## 11 " IL"   30.0
## 12 " PA"   30.0
## 13 " SC"   30.0
## 14 " VT"   30.0
## 15 " KY"   31.5
## 16 " LA"   31.5
## 17 " ND"   32.0
## 18 " IN"   33.0
## 19 " TX"   33.0
## 20 " NC"   33.5
## 21 " UT"   34.0
## 22 " NJ"   34.5
## 23 " MA"   35.0
## 24 " MI"   35.0
## 25 " NE"   35.0
## 26 " OK"   35.0
## 27 " TN"   37.0
## 28 " WA"   38.0
## 29 " AR"   39.0
## 30 " ID"   39.0
## 31 " CO"   40.0
## 32 " MT"   40.0
## 33 " OH"   40.0
## 34 " OR"   40.0
## 35 " NV"   41.0
## 36 " CA"   42.0
## 37 " VA"   42.0
## 38 " AL"   43.0
## 39 " MN"   44.5
## 40 " MS"   45.0
## 41 " AK"   46.0
## 42 " NY"   47.0
## 43 " DC"   47.5
## 44 " NH"   48.5
## 45 " NM"   51.0
## 46 " DE"   52.0
## 47 " FL"   55.0
## 48 " GA"   55.0
## 49 " WV"   57.5
## 50 " ME"   61.0
```

```r
# 4. b Plot a bar chart to compare IBU by state
ggplot(data=FireWater, aes(x=State, y=Median)) +
  geom_bar(stat="identity", fill="steelblue")+
  theme_minimal() +
  theme(axis.text.x=element_text(size=rel(0.8), angle=90)) +
  ggtitle("Median IBU by State") +
  labs(x="State",y="IBU")
```




```r
# 4. c Plot a bar chart to compare ABV by state
ggplot(data=Bitter, aes(x=State, y=Median)) +
  geom_bar(stat="identity", fill="steelblue")+
  theme_minimal() +
  theme(axis.text.x=element_text(size=rel(0.8), angle=90))+
  ggtitle("Median ABV by State") +
  labs(x="State",y="ABV")
```




```
# 5. Which state has the maximum alcoholic (ABV) beer?
print(BrewPub[which.max(BrewPub$ABV),])
```

```
##                                                Name.x Beer_ID   ABV
## 2279 Lee Hill Series Vol. 5 - Belgian Style Quadrupel Ale    2565 0.128
##      IBU Brew_ID            Style Ounces                  Name.y    City
## 2279  NA      52 Quadrupel (Quad)   19.2 Upslope Brewing Company Boulder
##      State
## 2279    CO
```

```
# 5. a Which state has the most bitter (IBU) beer?
print(BrewPub[which.max(BrewPub$IBU),])
```

```
##                         Name.x Beer_ID   ABV IBU Brew_ID
## 148 Bitter Bitch Imperial IPA     980 0.082 138     375
##                              Style Ounces                  Name.y    City
## 148 American Double / Imperial IPA     12 Astoria Brewing Company Astoria
##     State
## 148    OR
```

```
# Summary for ABV variable
summary(BrewPub$ABV)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
## 0.00100 0.05000 0.05600 0.05977 0.06700 0.12800      62
```

```
# Combine Bitterness of Beer and Alcohol Content df for ease of analysis
BitterFire <- full_join(FireWater, Bitter, by="State")
# dplyr::tbl_df(BitterFire)
```

```
# Change column names to reflect meaningful variable name
BitterFire$Median.x <- (BitterFire$Median.x)
#dplyr::tbl_df(BitterFire)
```

```
# 7. Draw a scatter plot to compare relationship between beer
# bitterness and alcohol content
ggplot(BrewPub, aes(x=IBU, y= ABV)) +
  geom_point(shape=1) +
   geom_smooth(method=lm) + # add linear regression line
  theme(axis.text.x=element_text(size=rel(1.0)))+
ggtitle("Correlation between IBU and ABV ") +
  labs(x="IBU",y="ABV")
```

```
## Warning: Removed 1005 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 1005 rows containing missing values (geom_point).
```