

Craft Beer and Brewery Analysis

Presented by: Samantha McNeilly and Thulasiram Ruppa Krishnan

1. Craft Beer

What Exactly is craft beer?

Craft Beer Defined

Small

Annual production of 6 million barrels of beer or less (approximately 3 percent of U.S. annual sales).

Independent

Less than 25 percent of the craft brewery is owned or controlled by a beverage alcohol industry member that is not itself a craft brewer.





7,000

U.S. Operating Breweries

\$26 Billion

Craft Retail Dollar Value Growth (2017)

135,072

Small Brewing Jobs (2017)

Main Ingredients in Craft Beer



Malt

Hops

Yeast

Important Beer Stats

Standard Reference Method

Refers to a beer's color. An American wheat typically has an SRM of 5, while a stout is usually in the range of 25-40 SRM.

Serving Size

Beer is often served in variously shaped glasses of different sizes. In the U.S., we often generalize the term "pint" of beer, or 16 ounces.

Alcohol by Volume (ABV)

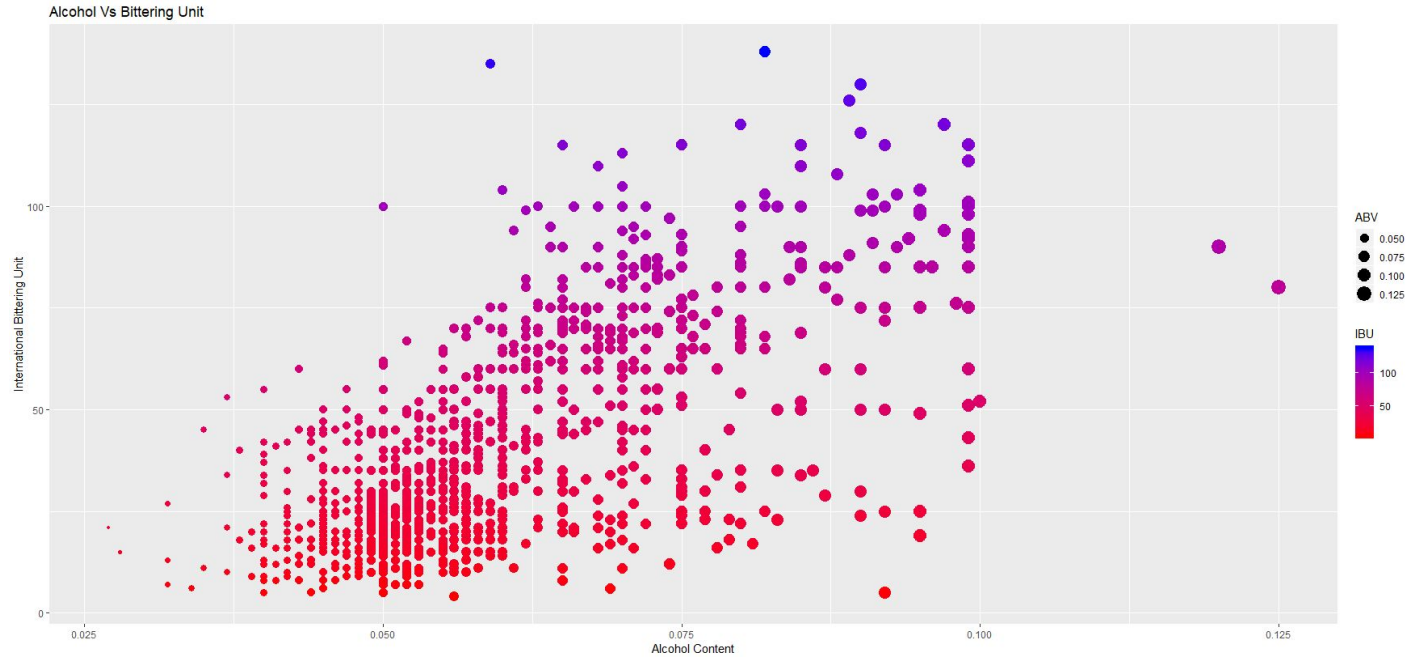
Varies by craft beer style from around 3% to more than 20%. U.S. average 5.9%.

Gravity

Amount of residual sugar in a beer, which often affects mouthfeel. It is expressed in points that are relative to water's gravity, 1.000 (no residual sugar).

International Bitterness Units (IBU)

Measure of hops' contribution to a beer's bitterness. It can range from zero to over 100.



Alcohol versus Bitterness Unit

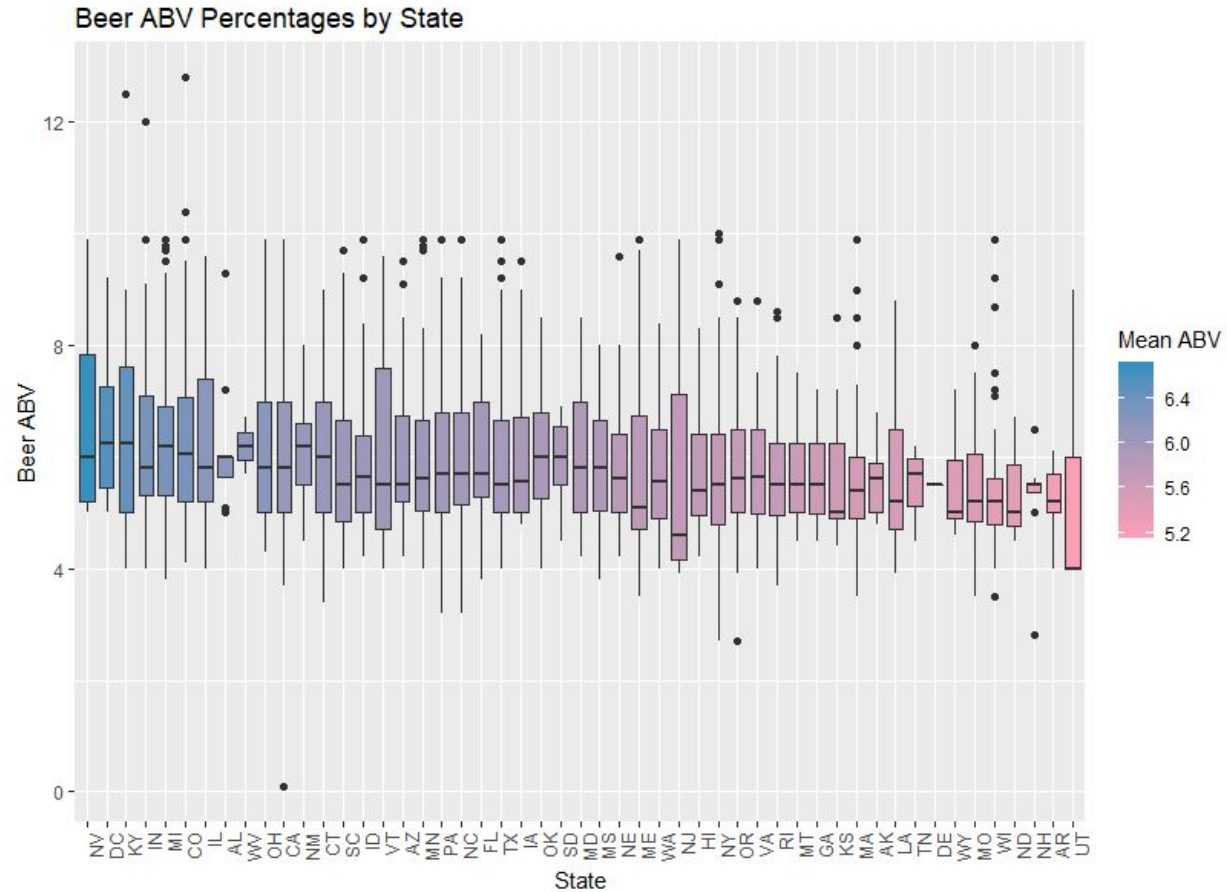


2.

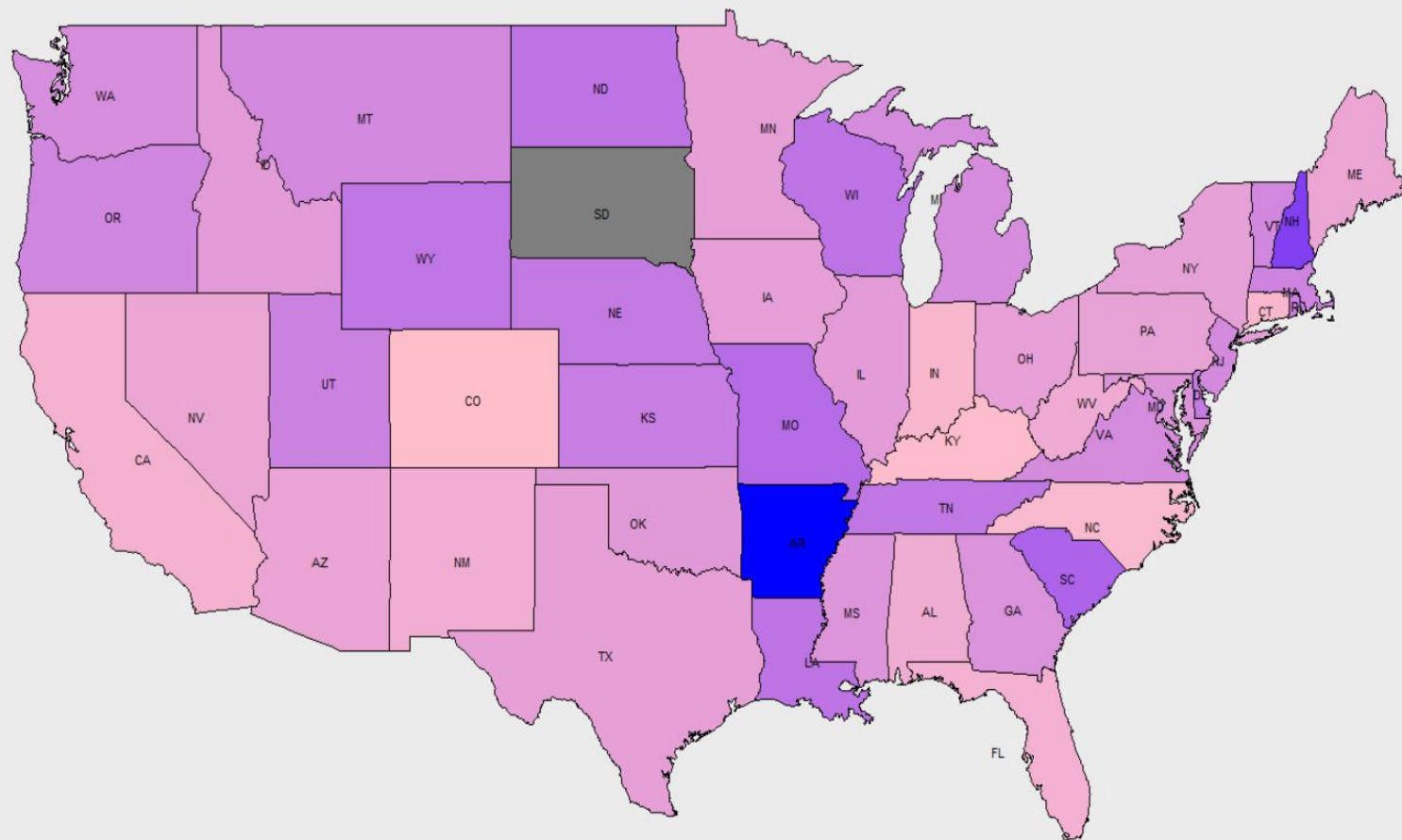
State Analysis

Which states have the highest / lowest ABV and IBU?
Number of breweries?

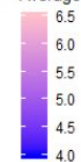
Beer ABV by State



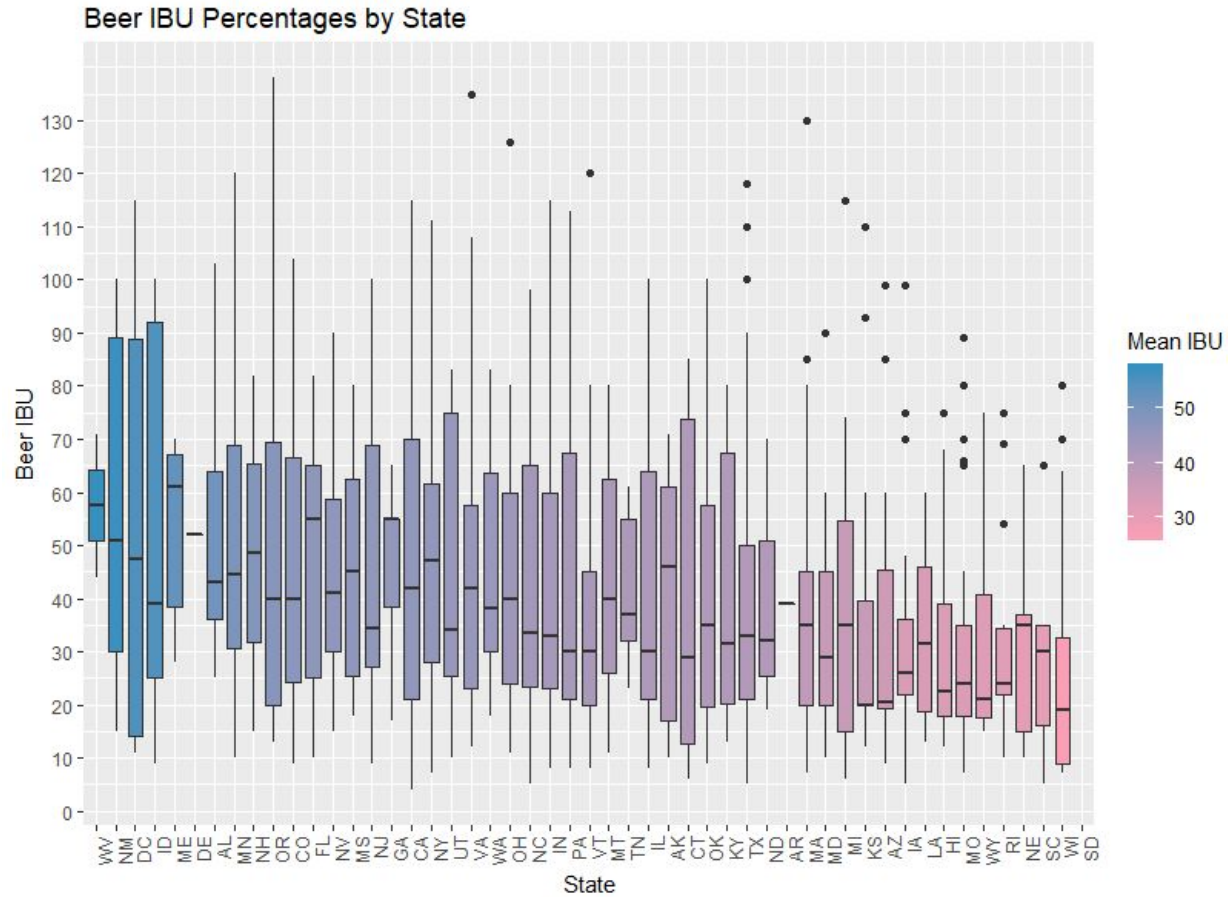
USA State Average Alcohol content



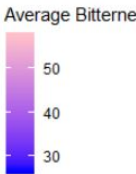
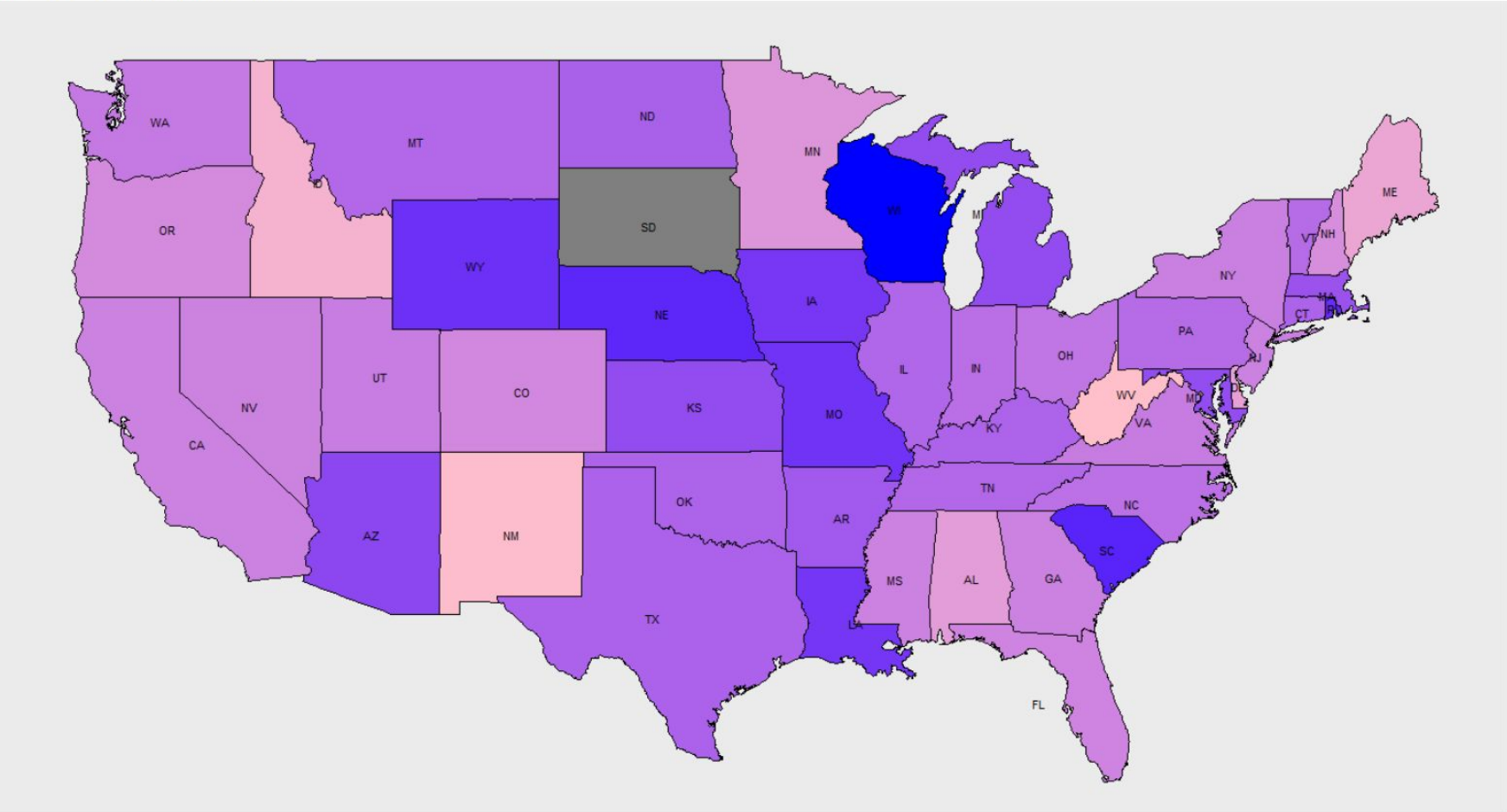
Average Alcohol content in percent



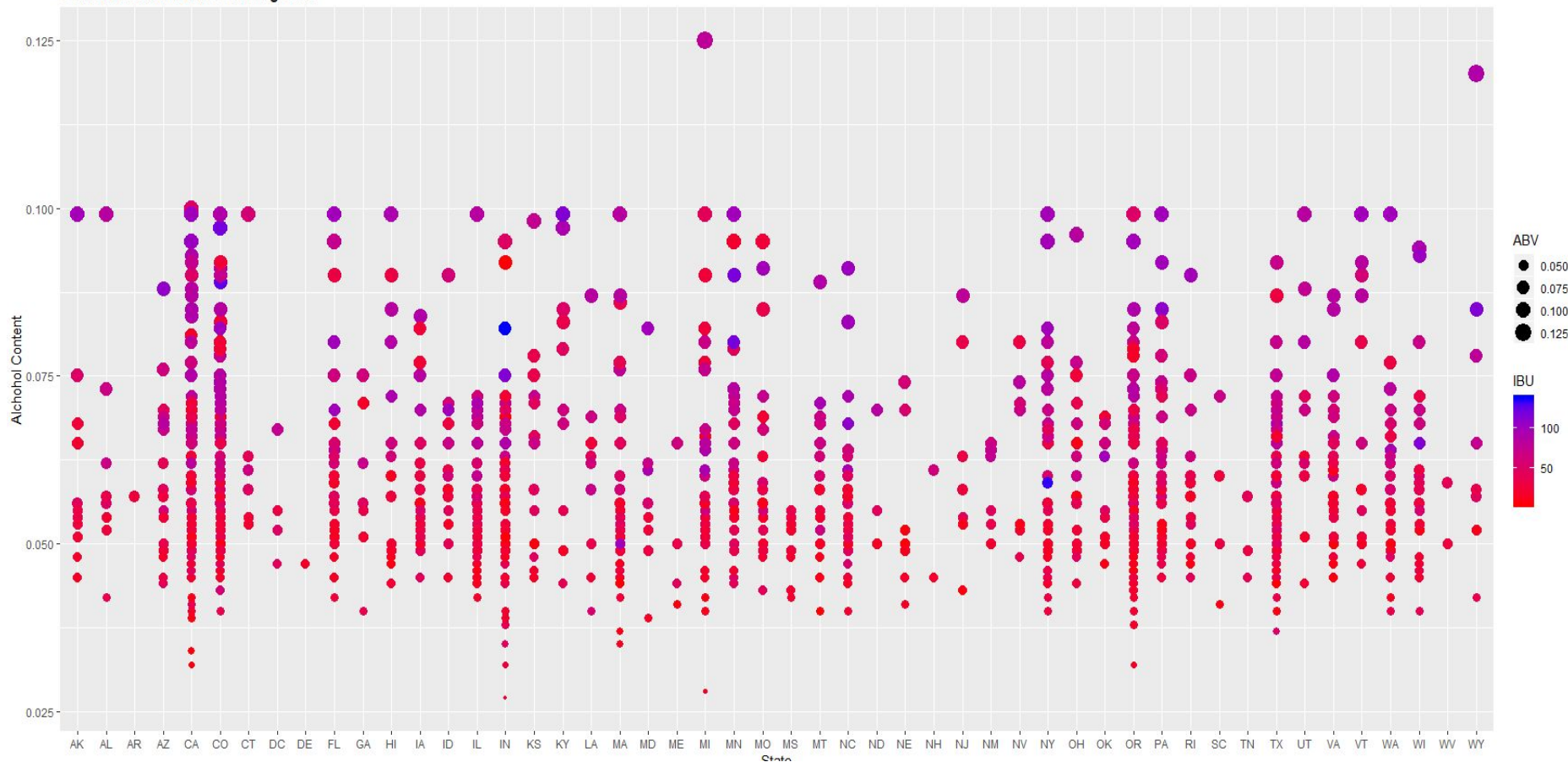
Beer IBU by State



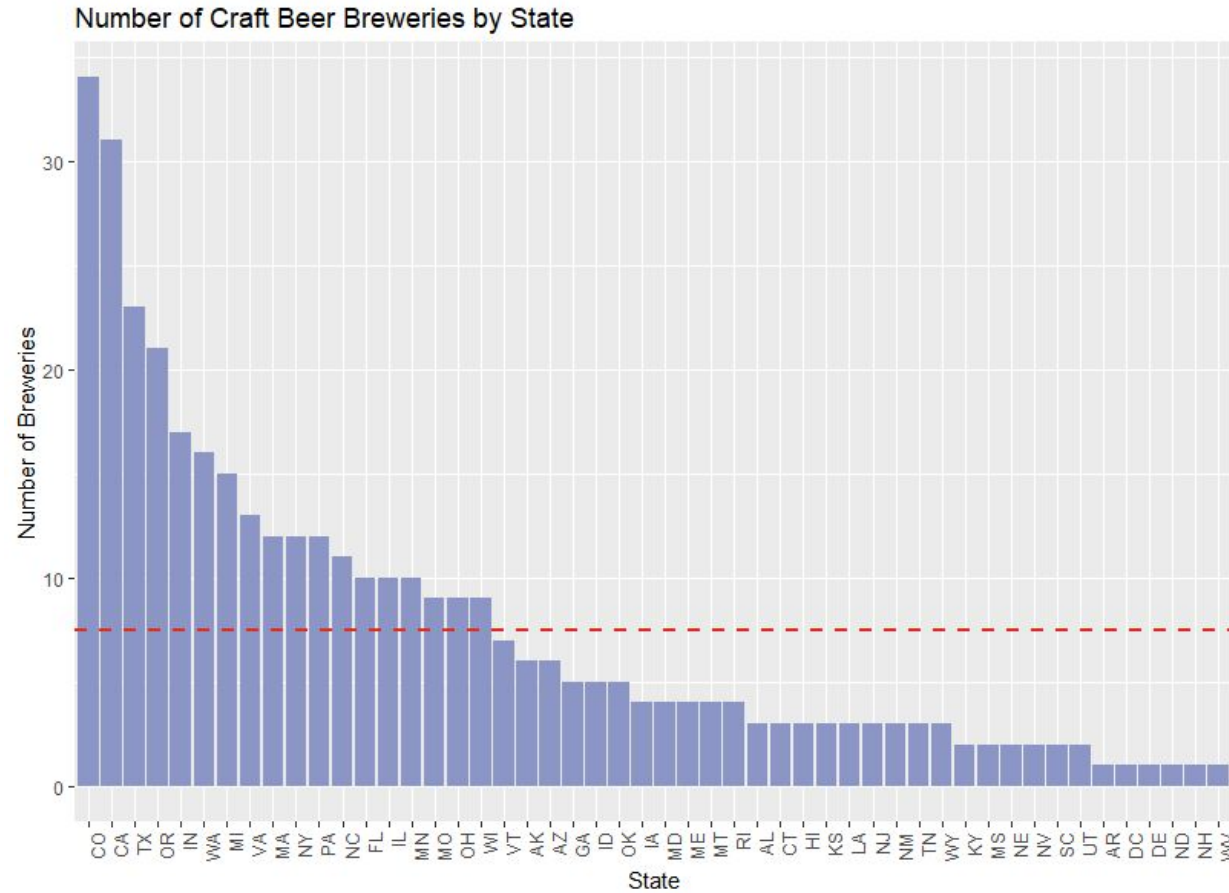
USA State Average Bitterness Unit



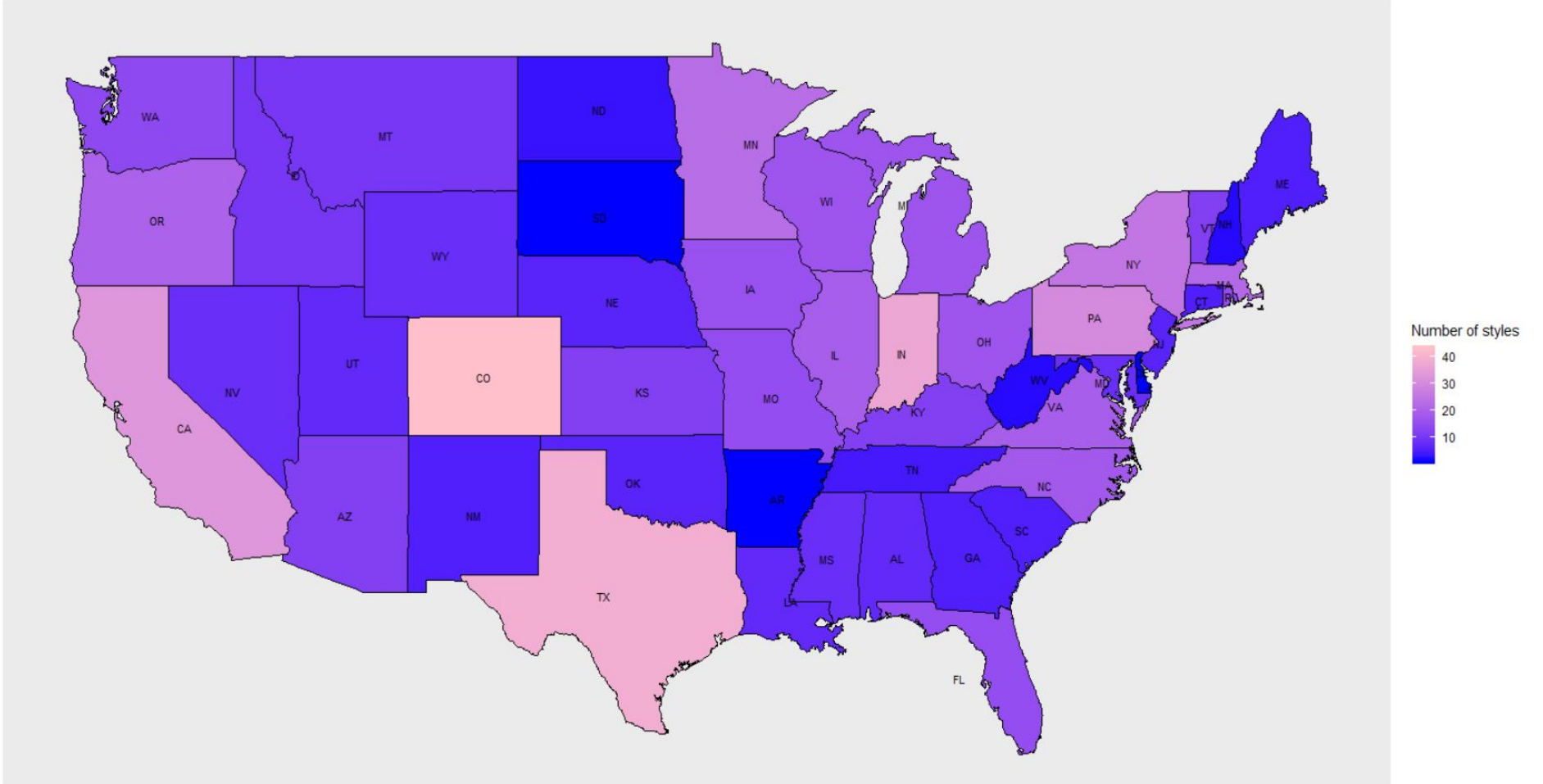
State wise Alcohol Vs Bittering Unit



Breweries by State



Number of styles by state





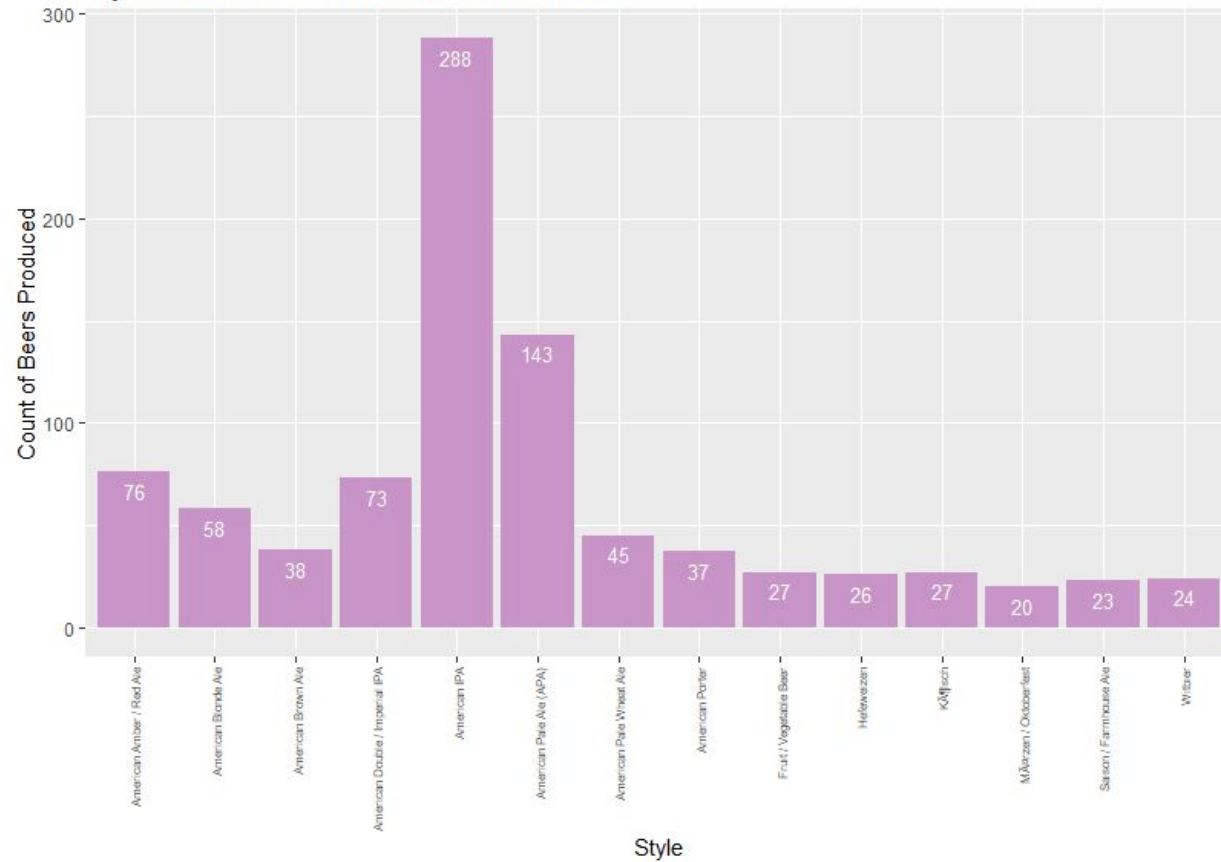
3.

Style Analysis

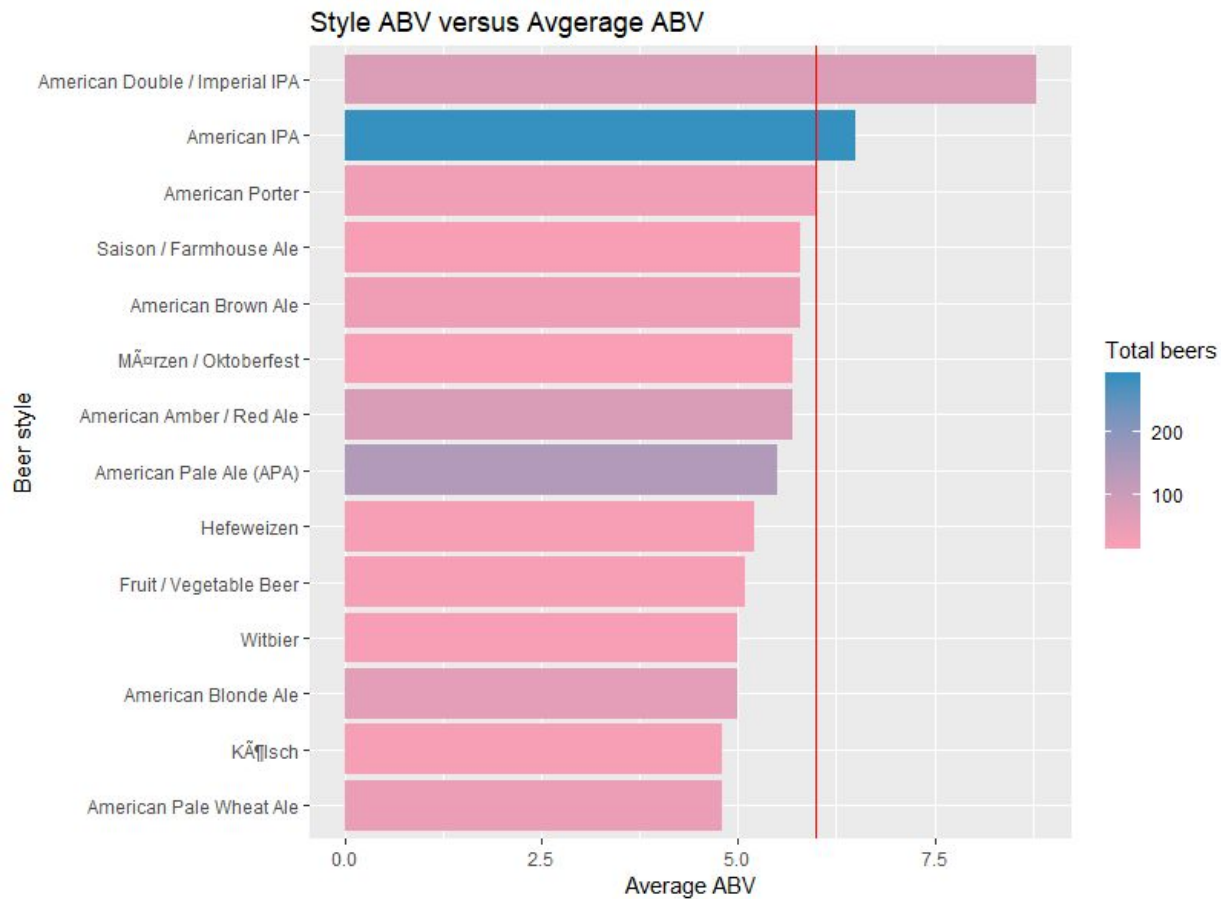
Which are most popular? What is the ABV and IBU for each style?

Popular Styles

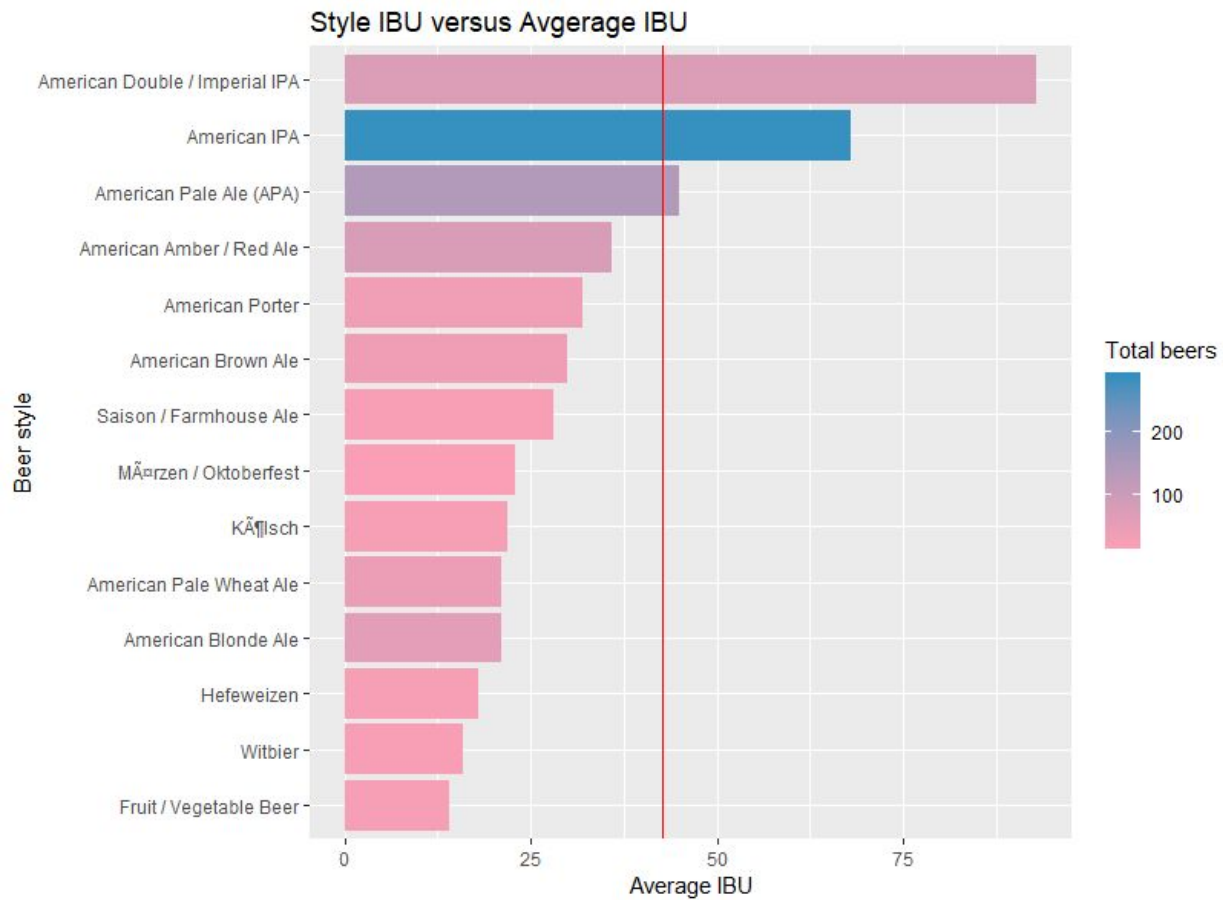
Styles of Craft Beer Produced if Count ≥ 20



Style ABV



Style IBU



**High (6.0 +)
ABV Style
Word Cloud**

A word cloud of beer styles. The largest and most prominent term is 'American IPA', oriented vertically in the center. Other terms are arranged around it, including 'American Double / Imperial Stout' at the top and bottom, 'American White IPA', 'English Barleywine', 'Russian Imperial Stout', 'English India Pale Ale (IPA)', 'Baltic Porter', 'Belgian IPA', 'American Porter', 'Foreign / Export Stout', 'American India Pale Lager', 'Winter Warmer', 'Rye Beer', 'Pumpkin Ale', 'Scotch Ale / Wee Heavy', 'American Strong Ale', 'American Black Ale', 'Scottish Ale', 'American Stout', 'Belgian Dark Ale', and 'English Strong Ale'. The background is a light blue and green gradient.

American Double / Imperial Stout

English Barleywine

American White IPA

Tripel

Russian Imperial Stout

English India Pale Ale (IPA)

Baltic Porter

Belgian IPA

American Porter

Foreign / Export Stout

American India Pale Lager

Winter Warmer

Rye Beer

Pumpkin Ale

Scotch Ale / Wee Heavy

American Strong Ale

American Black Ale

Scottish Ale

American Stout

Belgian Dark Ale

English Strong Ale

American Double / Imperial IPA

**Medium (4.0 -
5.9) ABV Style
Word Cloud**



**Low (< 4.0)
ABV Style
Word Cloud**

Light Lager
Berliner Weissbier

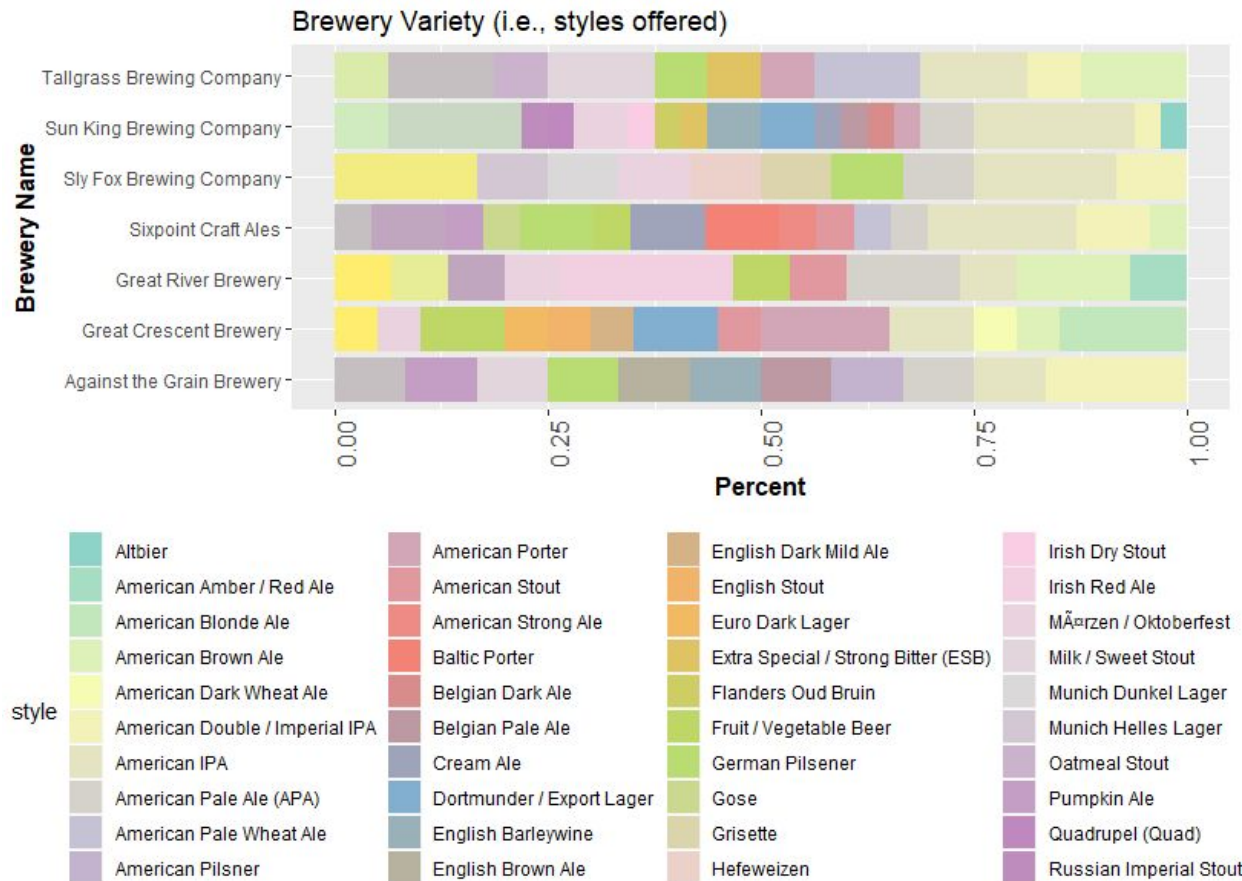
4.

Brewery Analysis

Which breweries have the largest selection?



Brewery Variety

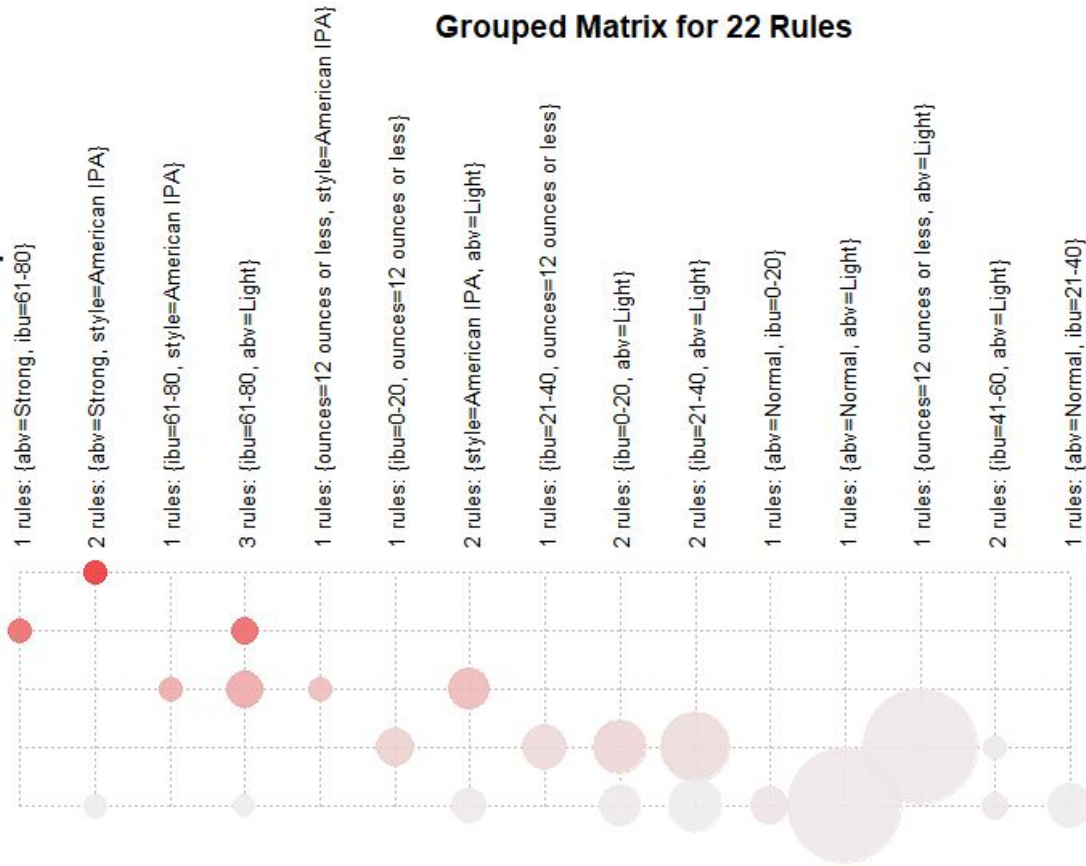


5.

Predicting Style

Models that predict style using a ABV, IBU and ounces

Items in LHS Group



Size: support
Color: lift

RHS

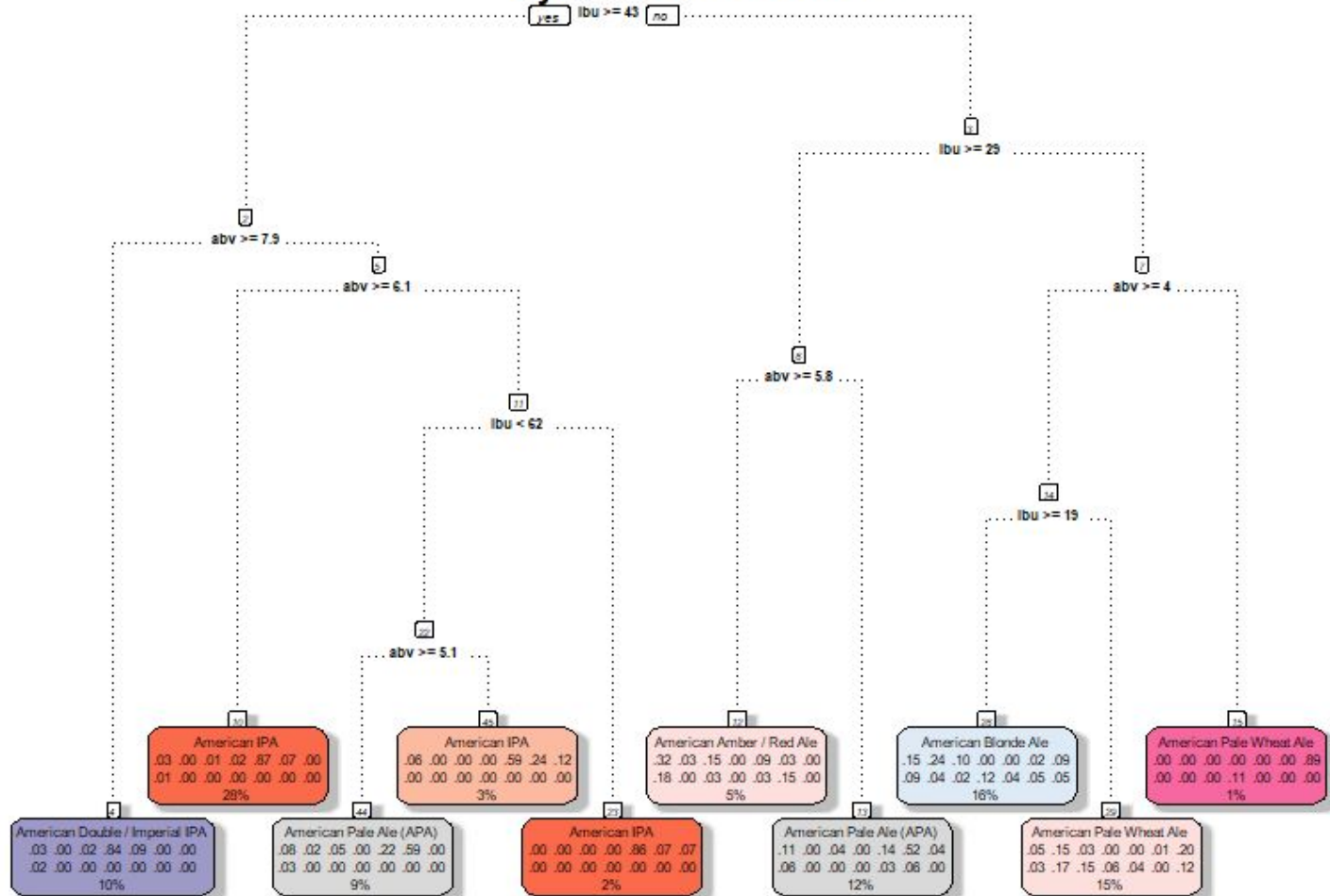
{ibu=61-80}

{style=American IPA}

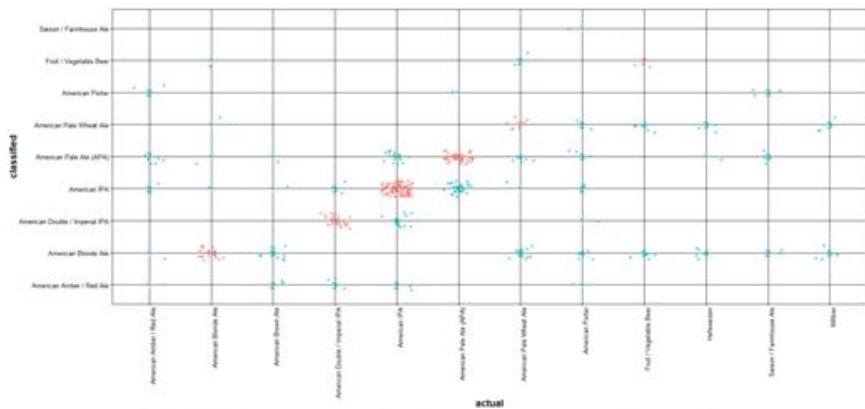
{abv=Strong}

{abv=Normal}

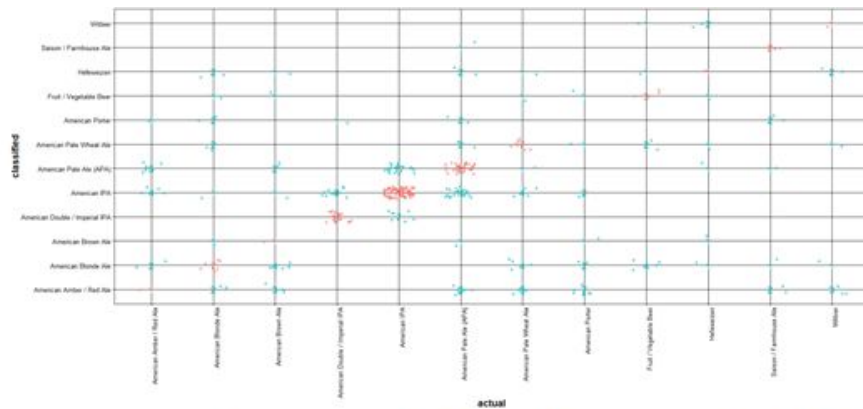
{ounces=12 ounces or less}



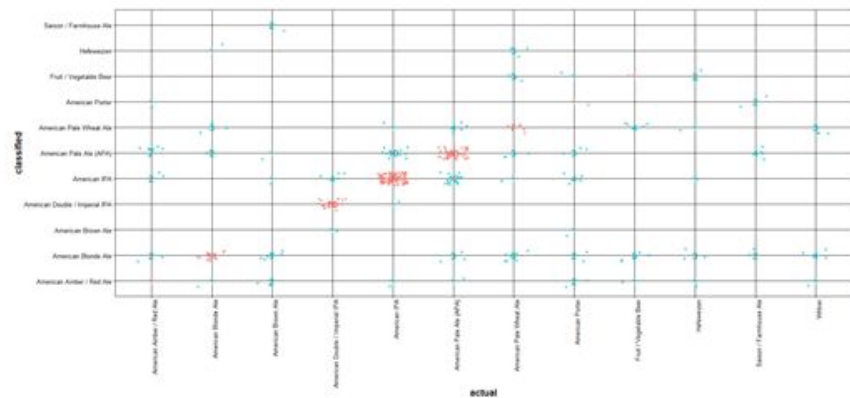
```
minsplit = 20, maxdepth = 13, cp = 0.01
```



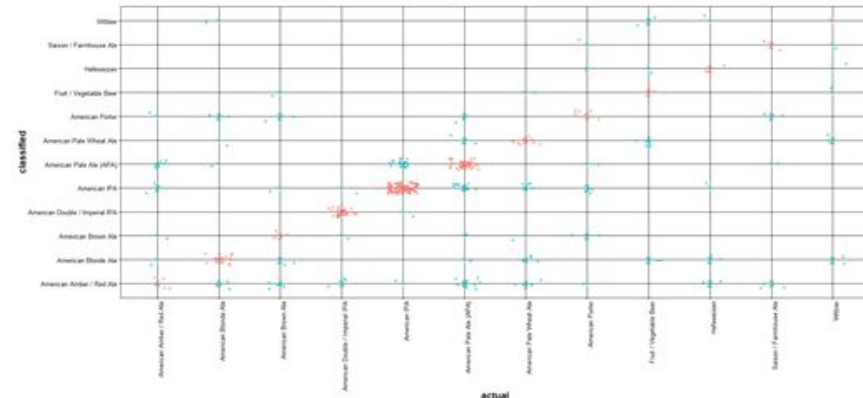
SVM Polynomial (Accuracy : 0.5347)



Knn 5 nearest neighbor (Accuracy : 0.4983)



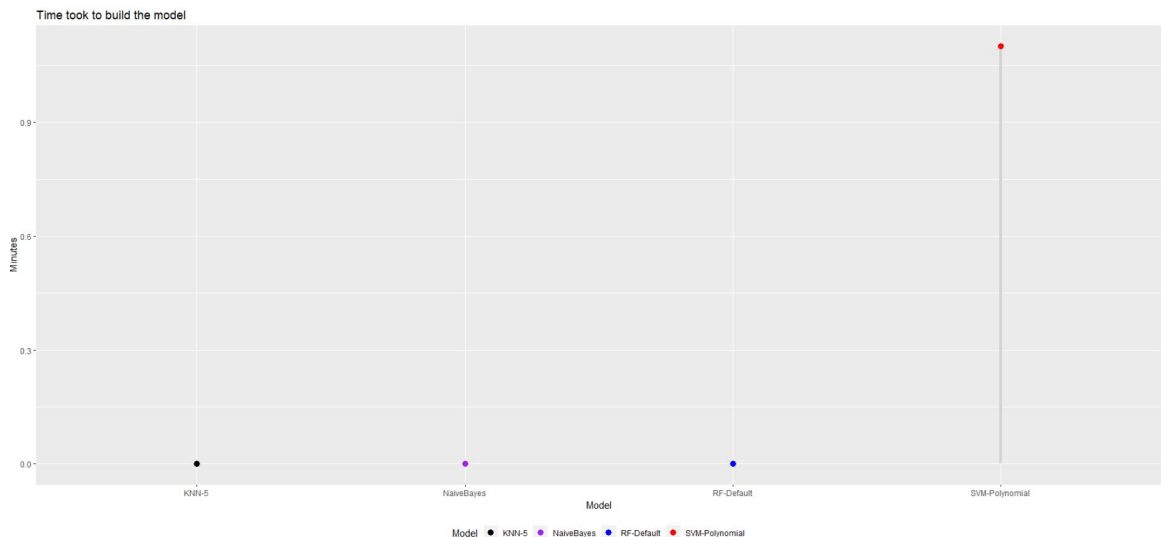
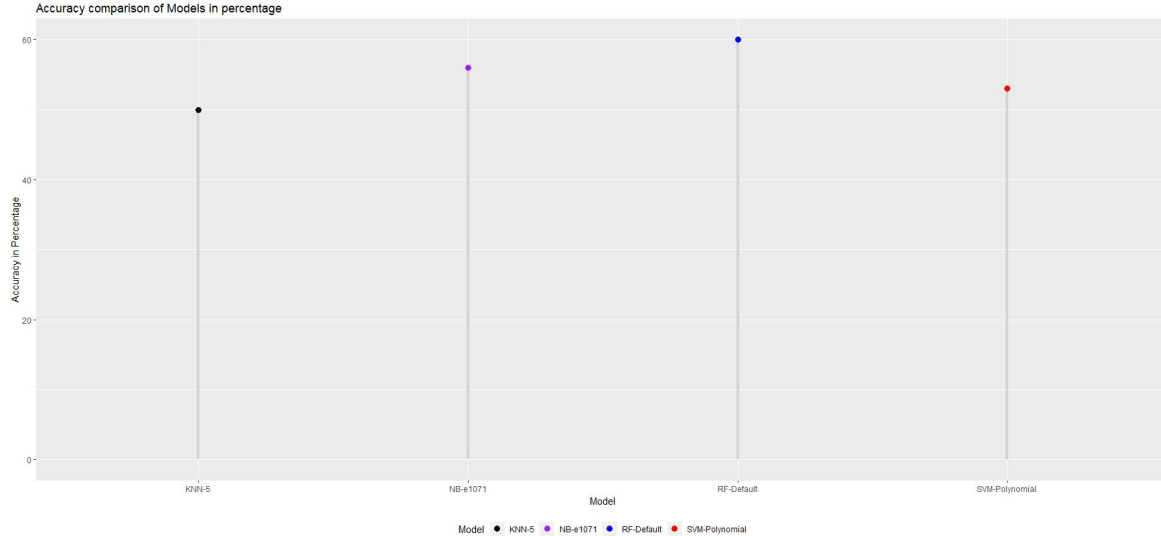
Naïve Bayes (Accuracy : 0.5611)



Random Forest (Accuracy : 0.6106)

Accuracy and time to build
the Models compared
against each other

Model	Accuracy in Percentage
SVM-Polynomial	53
KNN-5	50
NB-e1071	56
Random Forest	61





Conclusion

ABV, IBU and serving size alone are not good predictors of style.

Why?

Craft brewers are:

- Taking new twists on traditional styles
- Using non-traditional ingredients

How to improve model?

Incorporate additional beers stats, such as:

- Standard Reference Method (color)
- Gravity
- pH of water used
- Type of hops used
- Type of malt used
- Yeast strain used
- Brewing/Fermentation process

Thanks!

Any questions?

You can find us at
smmcneil@syr.edu &
truppakr@syr.edu

