Becoming a Sommelier with Data Science

Colin McKew

Data Science Final Project

Final Presentation

The Problem and the Goal

- For novice wine drinkers, it can often to be difficult to determine what type of wine is associated with different reviews
- Novice wine drinkers are often unable to determine where the best rated wine is coming from, and also what words may be associated with better quality wine.
- How can novice wine drinker determine the quality and proper price point of a bottle of wine?
  - How do the experts describe highly rated wine?
  - Where is the best wine coming from?
- Goal
  - Properly identify the wine varieties based on expert reviews, without going tasting the wine or becoming a sommelier

Data Set

- Kaggle
  - Data scraped from WineEnthusiast magazine
    - Wine are rated on a scale of 1-100 by expert wine drinkers
    - The following field are available in the data set:
      - *Rating*
      - *Variety*
      - *Description*
      - *Country*
      - *Province*
      - *Region 1*
      - *Region 2*
      - *Winery*
      - *Designation*
      - *Price*
  - Our main field when predicting wine variety will be the description field, containing reviews sommeliers
  - Will also use other field to do exploratory analysis on where and what types of wine are rated the highest

Cleaning the Data

- In exploring the data, there were several duplicates that needed to be removed from the data set
  - Code
    - *data[data.duplicated('description', keep=False)].sort_values('description').head(15)*
    - *df = data.drop_duplicates('description')* – removing the duplicated data based on description
- Also chose to remove fields where there were 'NaN' values
  - Dropped the field 'Region 2' due to missing values
- Using this parsed data, it was now possible to explore the different characteristics of the wine varieties

Exploratory Analysis

- You can see a clear correlation between the price of a certain wine and its assigned rating
- This OLS Regression shows that for every increase in rating, there is a subsequent increase in price of $0.03

OLS Regression Results

Dep. Variable:	points	**R-squared:**	0.200
Model:	OLS	**Adj. R-squared:**	0.200
Method:	Least Squares	**F-statistic:**	2.229e+04
Date:	Tue, 03 Oct 2017	**Prob (F-statistic):**	0.00
Time:	22:26:25	**Log-Likelihood:**	-2.2074e+05
No. Observations:	89105	**AIC:**	4.415e+05
Df Residuals:	89103	**BIC:**	4.415e+05
Df Model:	1		
Covariance Type:	nonrobust		

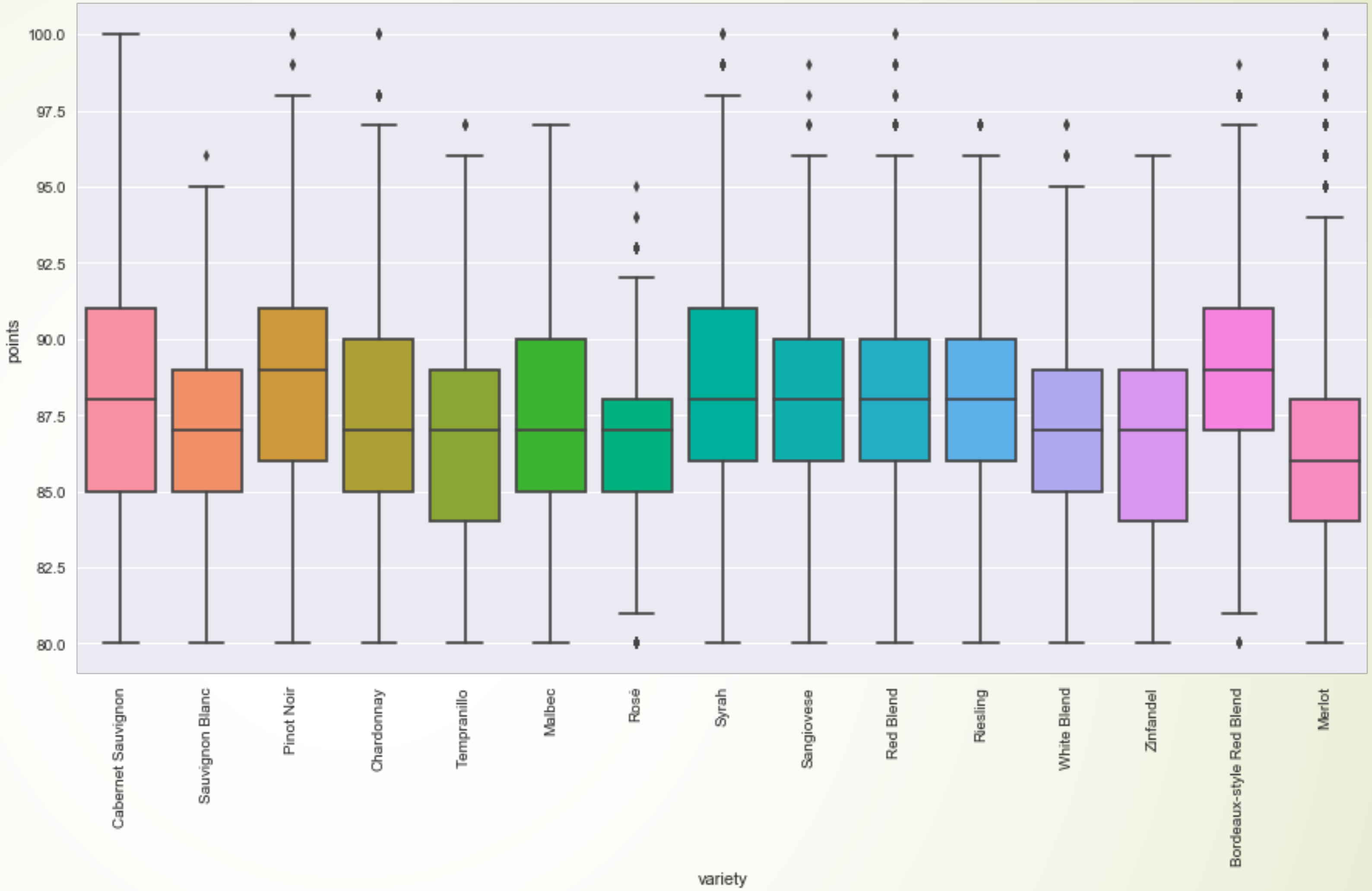
	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	86.5807	0.013	6687.550	0.000	86.555	86.606
price	0.0383	0.000	149.282	0.000	0.038	0.039

Omnibus:	26783.717	**Durbin-Watson:**	0.411
Prob(Omnibus):	0.000	**Jarque-Bera (JB):**	759914.709
Skew:	-0.851	**Prob(JB):**	0.00
Kurtosis:	17.205	**Cond. No.**	67.8

Exploratory Analysis (cont.)

country	price
US-France	50.000000
England	47.500000
Hungary	47.166667
France	44.910644
Germany	42.537787

- Top 5 average wine prices in the data set



- Top wine varieties – looks as if Pinot Noir has the highest average point score

Further Manipulating Data for Model

- Noticing that there were a great deal of wine varieties with limited data points, chose to use the top 15 varieties for the model:
  - *toplist = ['Pinot Noir', 'Chardonnay', 'Cabernet Sauvignon', 'Red Blend', 'Sauvignon Blanc', 'Syrah', 'Riesling', 'Bordeaux-style Red Blend', 'Merlot', 'Zinfandel']*
- Remove the varieties from description in order to solely use the descriptive words for prediction
  - Set the top 15 varieties to a unique list, then remove from the data set for clean descriptions
    - Left with a data set of 51,352 line items

Label Encoder

- Utilized a LabelEncoder to assign a numeric value to the top 15 wine varieties
- Now, able to use this assigned value to predict the variety of wine based on its assigned numeric value

Variety	Label Encoder
Cabernet Sauvignon	1
Sauvignon Blanc	7
Pinot Noir	4
Pinot Noir	4
Pinot Noir	4

Transforming Final Data for Model

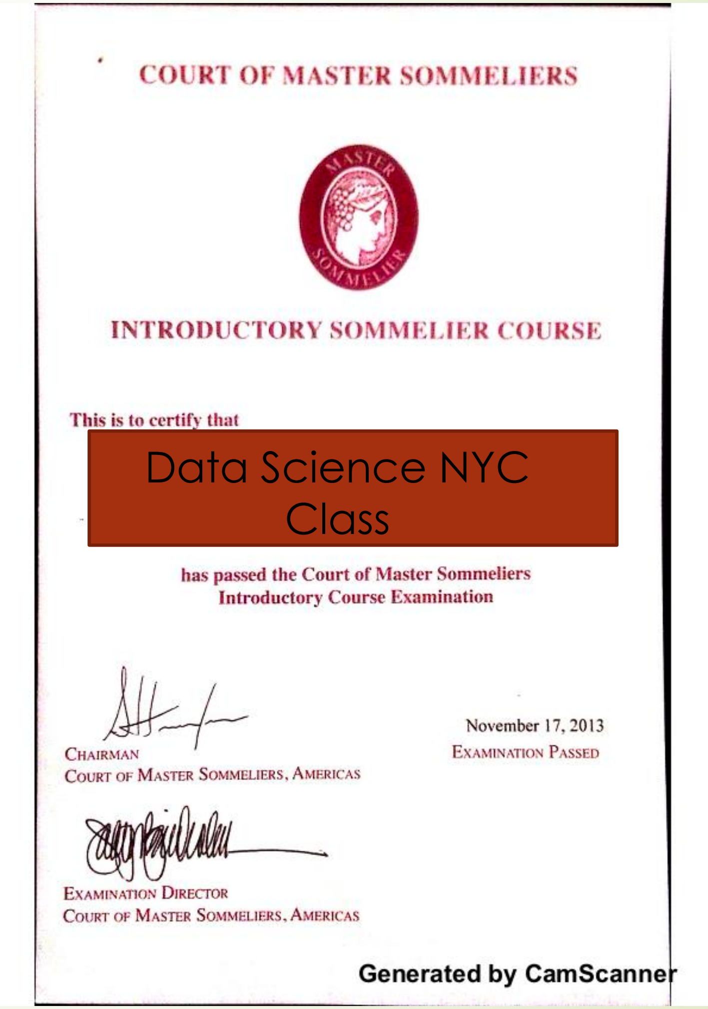
- First, needed to remove the "stop words" and transform the 'Description' field into a list of features
  - *from sklearn.feature_extraction.text import TfidfVectorizertfidf = TfidfVectorizer(min_df=5, max_features=100, strip_accents='unicode',lowercase =True, analyzer='word', token_pattern=r'\w+', use_idf=True, smooth_idf=True, sublinear_tf=True, stop_words = 'english').fit(subdata["description"])*
- Have a list of 'features' from the description to use in predicting wine variety
  - *u'red', u'rich', u'ripe', u's', u'shows', u'smoky', u'smooth', u'soft', u'spice', u'spicy', u'structure', u'style', u'sweet', u'syrah', u't', u'tannic', u'tannins', u'tart', u'texture', u'toast', u'tobacco', u'touch', u'vanilla', u'vineyard', u'white', u'wine', u'wood', u'years']*

Using Cross Validation (train and test split)

- Splitting the data set to train the model
  - y value will be the 'encoded variety' value assigned to the top 15 wine varieties
  - x value till be the vector of descriptive words created with the previous vectorizer
- Split the 20% of the data using cross validation into our train and testing variables; then imported and utilized 'xgboost' to assign learning rate for model
  - *test_size = 0.2y = subdata_2['encoded_winevariety']X = subdata_2.drop(['encoded_winevariety','variety'], axis=1)X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=test_size, random_state=seed)import xgboost as xgbclf = xgb.XGBClassifier(max_depth=3, n_estimators=300, learning_rate=0.05)*
- *Quick note on xgboost*
  - *Basically a function that uses 'boosted trees' to use additive training to optimize tree splits*

Model Results

- Running the cross validation and fitting the model
  - Checking the accuracy between the two train and test splits
  - *print('Accuracy Score:',accuracy_score(y_pred, y_test)*100,"%")*
- The accuracy score shows that the cross validation model predicted the correct encoded variety at a rate of 65%
  - Not perfect, but better than going through the process of actually becoming a true sommelier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INTRODUCTORY SOMMELIER COURSE

This is to certify that

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Conclusion and Next Steps

- In conclusion, the model did not display a particularly high accuracy rates in terms of predicting the proper variety
  - Difficult to use a multitude of similar words to predict the proper value
  - Ability to utlize a variety of natural language processing techniques, outside of xgboost and decision trees, to explore if the hit rate would be higher
- Further steps
  - Could take this model further, and add variety of pricing data, to begin to predict what words are associated with the highest priced wines
  - Also, could utilize a Word2Vec to explore which words have the most similarity to one another
    - Similar to our exercise with StumbleUpon data to see which words are most similar across a number of reviews