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## THE EFFECT OF PHYSICOCHEMICAL ON THE WINE QUALITY

## Why Wine?

the vino, the grape, plonk, vin du pays, port, burgundy, vin de table, vin ordinaire, walla walla, splishy splashy, slap the belly

when wine goes in wisdom comes out

- It's data science

the Data Dorks can help out the Cork Dorks

## PROJECT DATA

#### THE SOURCE

Paulo Cortez, University of Minho, Guimarães, Portugal

#### THE DATA

Our two datasets include:

- Sample set of approximately 1,600 red and 4,800 white wines
- 12 numerical attributes / features for each sample wine

#### **OBJECTIVE**

Develop a machine learning model using the chemical makeup of wine to predict its quality.



#### Data Attributes

#### Input variables (based on physicochemical tests):

- 1 fixed acidity
- 2 volatile acidity
- 3 citric acid
- 4 residual sugar
- 5 chlorides
- 6 free sulfur dioxide
- 7 total sulfur dioxide
- 8 density
- 9 pH
- 10 sulphates
- 11 alcohol

#### Output variable (based on sensory data):

12 - quality (score between 0 and 10)

### MACHINE LEARNING

#### Data Exploration

#### Pulled in data

Separate csv files for red and white wine

#### ■ Looked at the datatypes

- All floats except for quality
- Changed datatype to float for quality

#### Looked at data shape

- Quality not evenly distributed amongst classifications
- Skewed heavily to quality of 5 & 6
- Understand that this is heavily going to affect our model

quality	
3	20
4	163
5	1457
6	2198
7	880
8	175
9	5

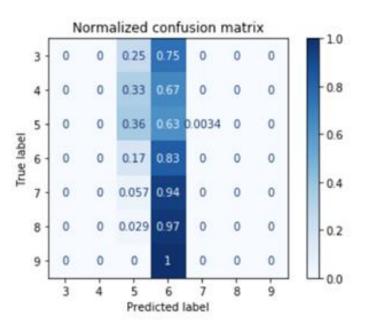
#### The Models

Model	Accuracy
RandomForestClassifier	0.707142857
XGBoost	0.66122449
DecisionTreeClassifier	0.582653061
KNeighborsClassifier	0.558035714
LogisticRegression	0.481632653
NaivesBayes	0.448341837

- Created x and y variables
  - output (y) = quality
  - x = other features
- Train test split from x and y variables
- Ran multiple models to test and compare accuracies
  - linear regression r2
     score = 0.281361

#### The Models Continued

Confusion matrix to see
 where there were
 inaccuracies - shows that
 model chose 6 far too often



- Tried two different types of data scaling – feature scaling and PCA. Neither helped the shape of our data enough to impact our model.
- Tried two different types of hypertuning to improve our accuracy. RandomizedSearch & GridSearch. When the optimal params from those searches were added to the model – accuracy decreased.
- Used pickle to save our model down into a callable (.sav) file

## LIVE DEMONSTRATION

## Project Final Materials & Demonstration

Project Link

bc633.pythonanywhere.com

- Route to different html files using render\_template.
- Includes the home page, imbedded tableau visualization, and site for users to submit data and receive a prediction on wine quality.

## ADDITIONAL VISUALIZATIONS

## Tableau Interactive Dashboards and Visualizations

https://public.tableau.com/views/WineProject

https://public.tableau.com/views/RandomForestClassifi er-WineAttributeImportance

# DATA SCIENCE HAPPENS... WINE HELPS

**ANY QUESTIONS?**