(np.dot(w. a) b) weights): self.y v training\_data[k:k:mini\_batch\_size] for k in xrono (e mini\_batch\_size|
self.upd self.delta x self.delta y print "speck (0): (1) / te\_mini\_batch(self, mini\_batch self.run\_sequence [( 1, 11), [... a\_b = [np.seres(b.shape) for b w = [np. seree(w.shape) delta\_moble\_b, delta\_moble\_v self.run\_sequence\_largo self.bot\_circle sf.CircleSum self.bot circle.ratios for b, nb in self.bot\_circle.fill\_color calor prop(self, x, y): a\_b = [np.zeros(b.shape) for b (np.zeros(w.shape) for w self.bot\_circle.position (4.14 [] z = np.dot(w, ectivation)-b def update\_novement(:e/): activation = sigmoid(z)activations.append(activation) self.cost\_derivative(activations[ ], y colf.y on St. f. belta I



# Machine Learning Integration

**By Wine Enthusiasts** 

Joby Augustine Rudy Duvnjak Prince Emenalo Alex Lorin



**Joby**: "Hey guys, I heard drinking wine is good for your heart"

**Prince**: "Not sure about that. Depends on the quality of the wine"

**Alex**: "C'mon, who has the time to check the quality of the wine? Red or white, I am good"

Rudy: "There are many factors which contribute to the quality of wine. May be in our next group meeting, we can see if we can apply ML strategies to find it:)"



### Objectives:

- Gather information on different kind of wines
- Find a model that can be used to predict quality of wine
- Create visual website and deploy it using Heroku



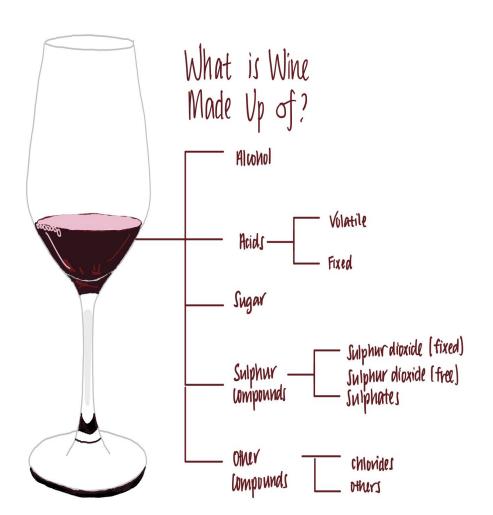
## **Data Source**

https://archive.ics.uci.edu/ml/data sets/wine+quality

The data source consists of two data files for:

- 1) Red Wine
- 2) White Wine

Each wine type (Red and White) has 11 features/attributes contributing to the quality of the wine.





### **Machine Learning process**

### **Data Attributes:**

- Fixed acidity
- Volatile Acidity
- Citric Acid
- Residual Sugar
- Chlorides
- Free Sulfur Dioxide
- Total Sulfur Dioxide
- Density
- pH
- Sulphates
- Alcohol
- Quality

### Independent Variables (X):

- Fixed acidity
- Volatile Acidity
- Citric Acid
- Residual Sugar
- Chlorides
- Free Sulfur Dioxide
- Total Sulfur Dioxide
- Density
- pH
- Sulphates
- Alcohol

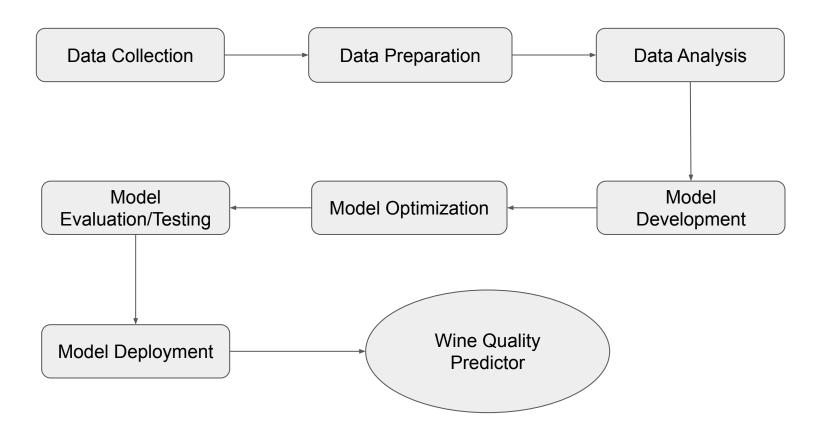
### Train, Test, Split

X\_test y\_test X\_train y\_train

Dependent Variables (y):

Best Quality

# Steps for Wine Prediction:



# Tools/Libraries used:



### <u>Data Preparation and Data</u> <u>Analysis</u>

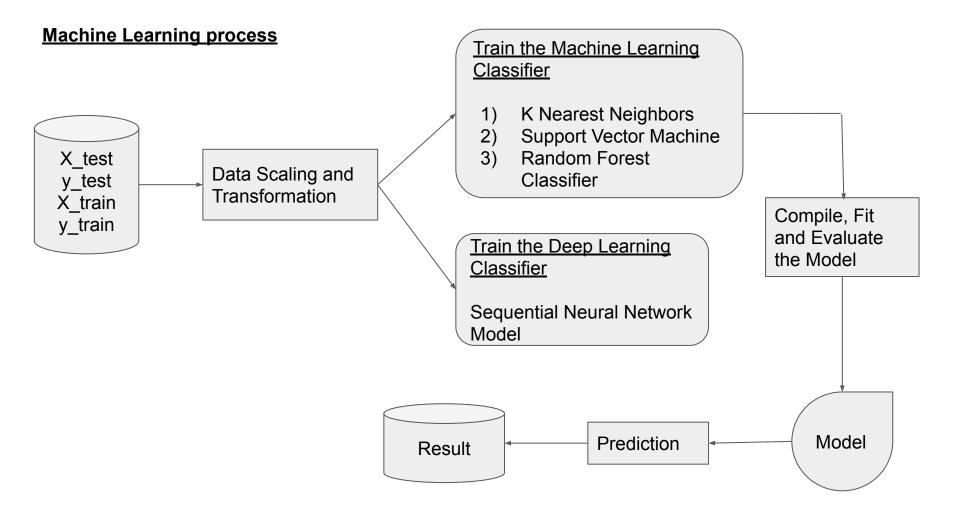
Python
Pandas
Jupyter Notebook

### **Model Development**

Scikit Learn (K Nearest Neighbors)
Scikit Learn (Support Vector
Machines)
Scikit Learn (Random Forest)
Tensorflow (Neural Network model)

### **Model Deployment**

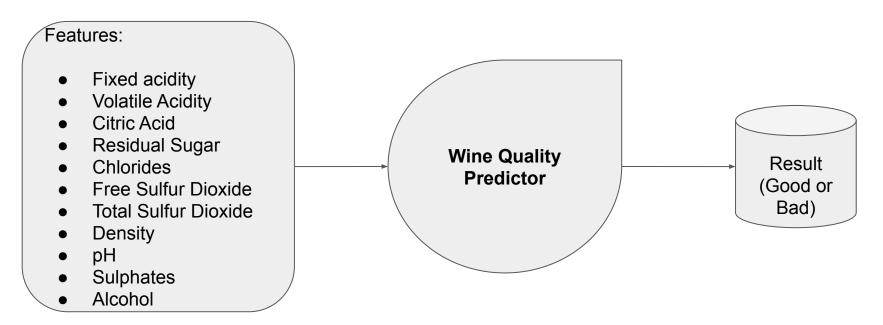
FLASK HTML/CSS SQLAlchemy Heroku





- Model is trained to predict the quality of the wine as Good (1) or Bad (0).
- Red and White wines with quality greater than 6 are considered as Good.
- Those with lower values are classified as Bad Wines.

### Features are given to the developed Random Forest model for prediction



#### **Conclusion:**

- Many features contribute to the quality of the wine.
- Different models were tested to predict the quality. The model with highest accuracy was Random Forest Model.
- With the "Wine Quality Predictor", we can differentiate between the good and the bad wines with 80% accuracy.