Wine Quality & Machine Learning

January 2020

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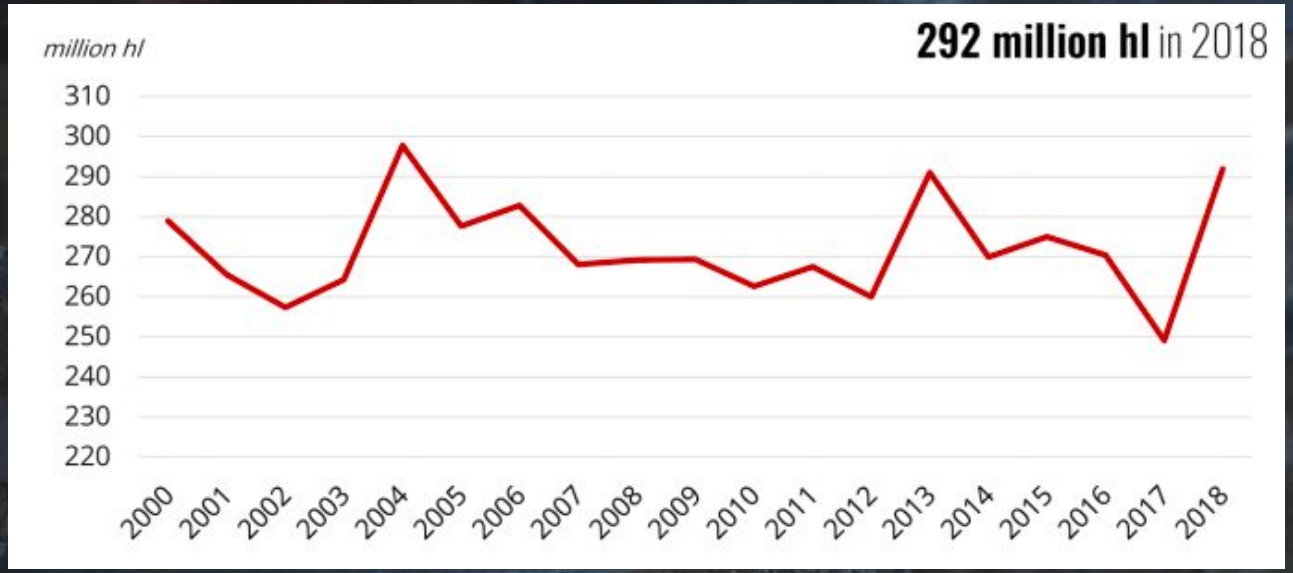
Global Wine Production & Demand

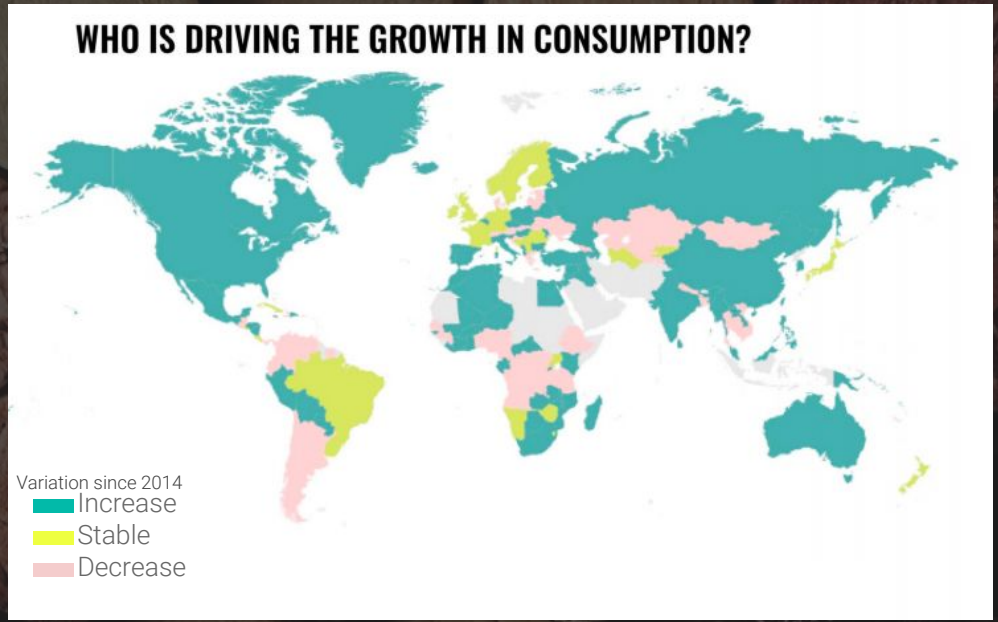
- Wine Production recovers from three years decline



Source: The OIV - 2019 Wine Production First Estimations

Global Wine Production & Demand (II)

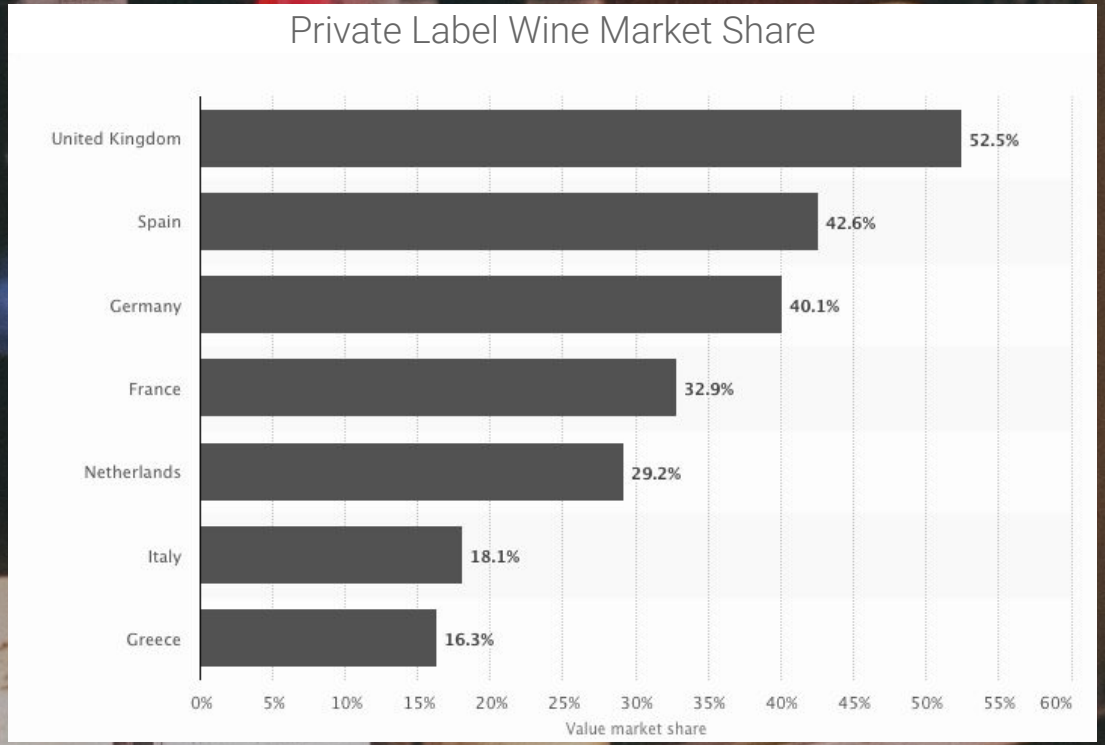
Wine demand is not just driven by traditional winemaker territories but also less established regions



Source: The OIV - 2019 Wine Production First Estimations

Private Labels Market

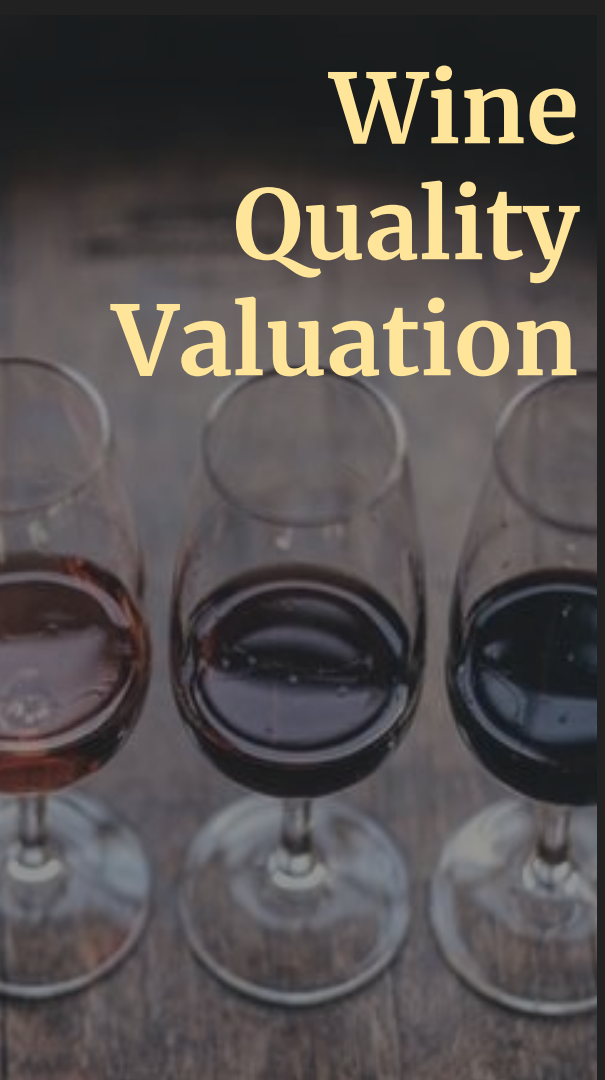
- Private label wines keep gaining market share in Europe
- Tasting and Valuation can be tedious and expensive



Source: Statista, Consumer Goods & FMCG

Professional Tasting

- Wine valuation is not all that objective
- Tasting events are costly
- Wine origin will skew the valuation
- Each wine taster will give different rating



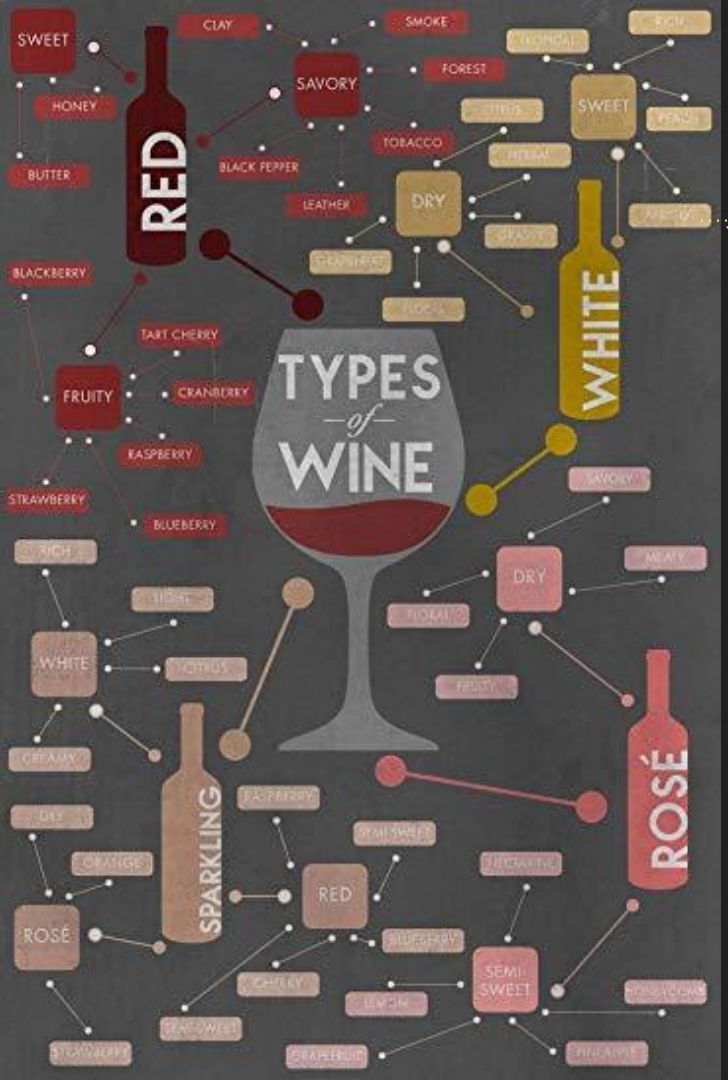
Wine Quality Valuation

Why Machine Learning Valuation?

- Wine Rating with no hassle: No sample delivery | No tasting Events
- Unbiased
- Simplified valuation

How does the Algo Work?

- It relies on the Physico-Chemical Characteristics of your Wine
  - Alcohol
  - SO2
  - pH
  - Sulphates
  - Acidity
  - Residual Sugar
- All we need is an ‘Analysis Report’
- You get instantly your rating



Algorithm Limitations

- Wine Rating is still history dependent (biased residuals)
- Not all types of wines are captured - limited to red and white
- Less accurate for outstanding and bad wines rating


Thank You
Q&A

Appendix

The Data

6,500 wines: 1,600 red and 4,900 white.

- **fixed acidity**: fixed acids found in wines gives a sour taste.
- **volatile acidity**: High content of volatile acidity refers to vinegars but it's also used to add complexity to the wine
- **citric acid**: it is added to wines as a stabiliser and to complement flavor or increase 'fresh' flavor.
- **residual sugar**: defines the wine sweetness, from dry (0-9 g/l) to sweet (+120 g/l)
- **free sulfur dioxide (SO_2)**: prevents oxidation and microbial growth. It can give fruity taste but in high concentration can produce a sharp/bitter/chemical flavor
- **total sulfur dioxide(SO_2)**: give a sense of how “clean” a wine is.
- **density**: density of wine is determined by the concentration of alcohol, sugar, glycerol, and other dissolved solids
- **pH**: Low pH wines taste tart and crisp.
- **sulphates:** it's a preservative. It maintains color and flavor. Some believe that adding sulfites negatively affects wine flavor

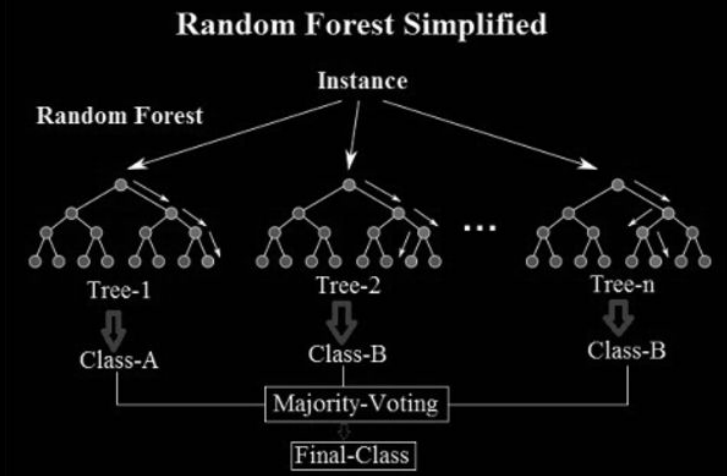
The Algorithm

ML Testing:

- Multiclass-Logistic regression
- Support Vector Machine (SVM)
- Random Forest Multi-class
- KNN Classifier
- Random Forest Multi-class Classifier

Best Model:

→ Random Forest (80% avg. accuracy)



Algorithm Input & Output

Input → Client's Reports

N° Echantillon :	[redacted]23219
Appellation :	[redacted]FUBL
Couleur :	Blanc
Millésime :	2018
TYPE D'ANALYSE	
Titre alcoométrique volumique (% vol.)	13,60
Glucose Fructose (g/L)	0,6
Acidité volatile (g/L acide sulfurique)	0,64
pH	3,10
SO2 Libre (mg/L)	< LQ (3)
SO2 Total (mg/L)	35
Protéines	Forte présence
Essai collage	•

Couleur		Rouge
Millesime		2018
N° cuve		-
Volume		-
Degré alcoolique	*% Vol*	13.39
Glucose-Fructose	*g/L*	1.1
Degré en puissance	*% Vol*	0.06
Acidité totale	*g/L H_2SO_4*	3.23
	méq/L	65.86
Acidité volatile	*g/L H_2SO_4*	0.52
	méq/L	10.60
SO2 Libre	*mg/L*	15
SO2 Total	*mg/L*	38
pH		3.60
CO2	*mg/L*	545

→ **Prediction** → **Output** → Class(1, 1, 2, 1,..)

Where Class 0: below average wine
Class 1: average/good wine
Class 2: above average wine

Feature Importance