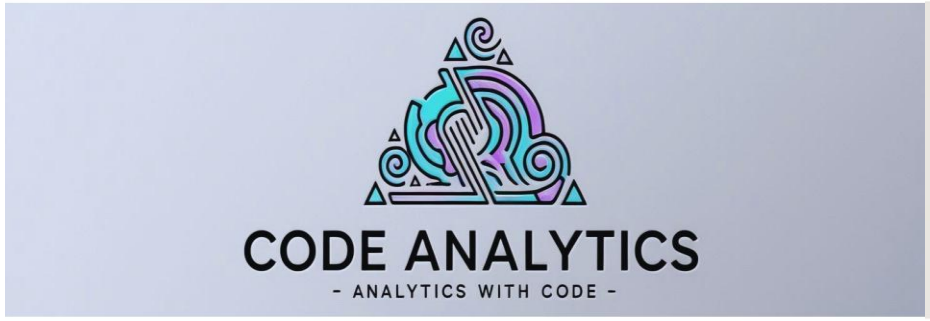
Presentation of the

Wine Quality Analytics System

Determining the quality of white vinho verde wines based on their physicochemical composition

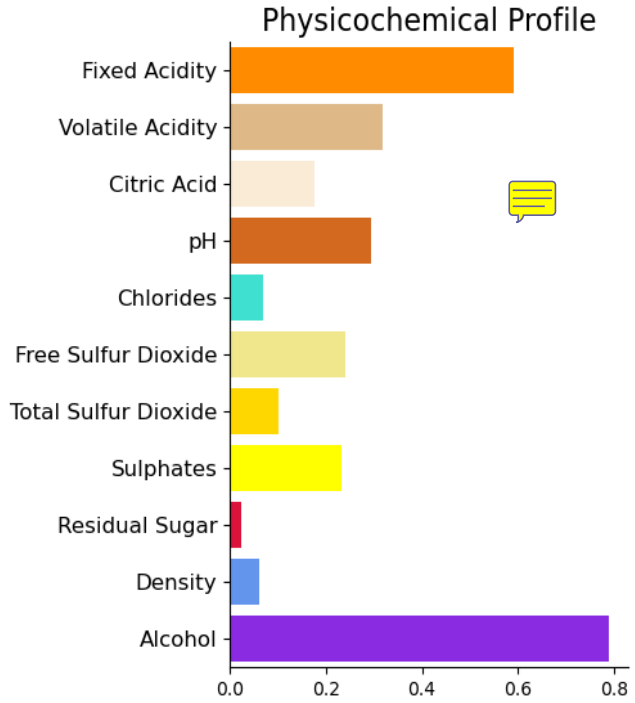
A cooperation of



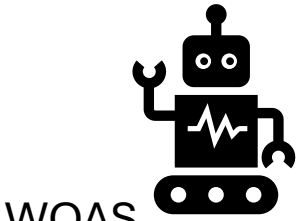
Agenda

- The Wine Quality System
- The Challenges
- Data Insights: Alcohol and Density
- The Machine Learning Model
- Results
- Conclusions

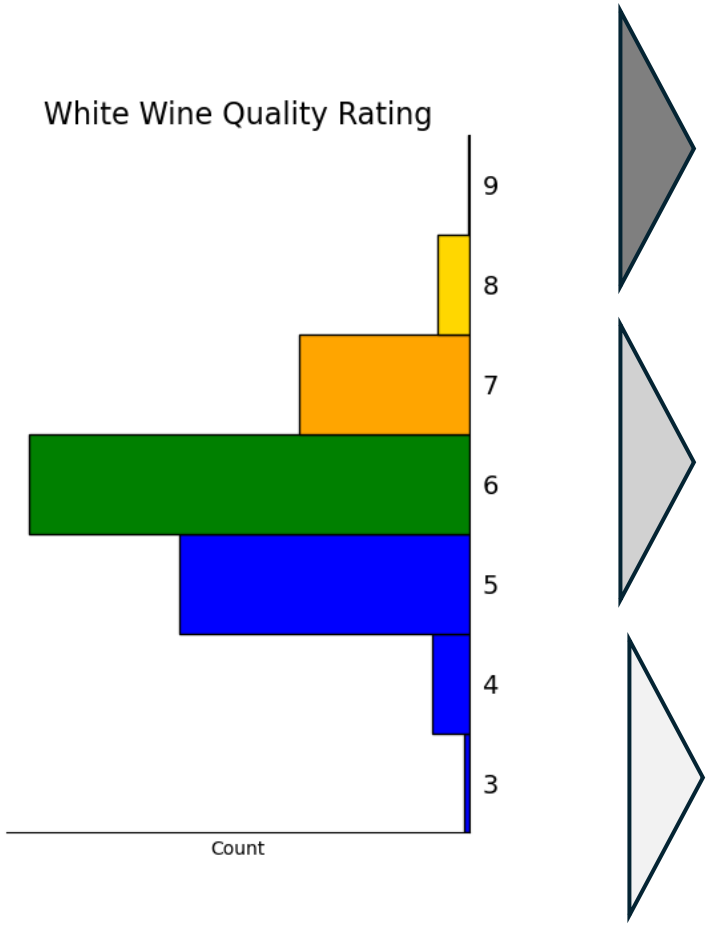
The Wine Quality System



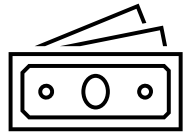
Tasters

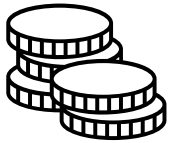


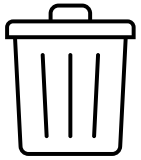
WQAS



Marketing

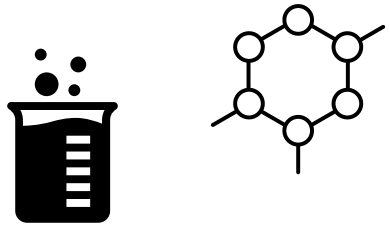






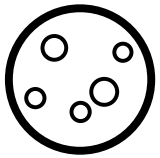
- Wine Quality Analytics System supports the tasters with finding high quality wines
- The system can be continuosly improved.

Challenges



complex mixture of >1000 substances resulting from a complicated process

- The taste is the least understood human sense and highly individual
- Each chemical composition has it‘s own appeal

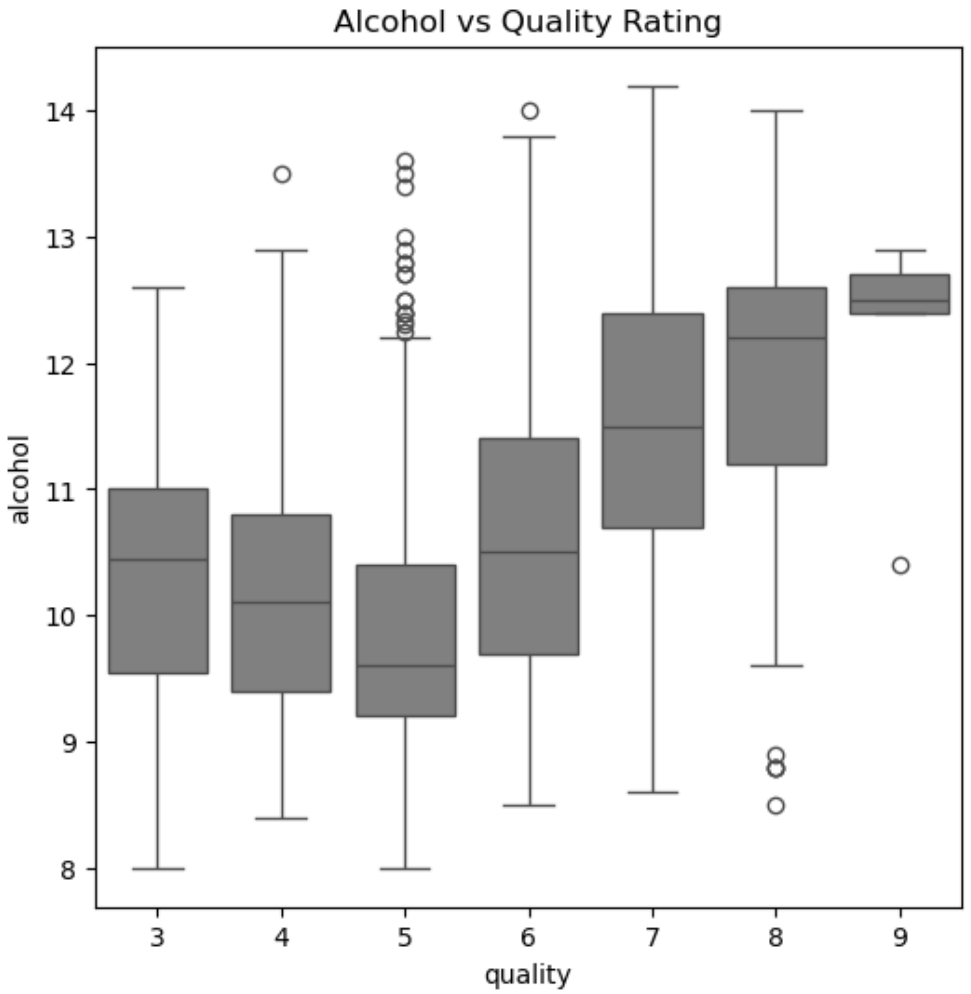


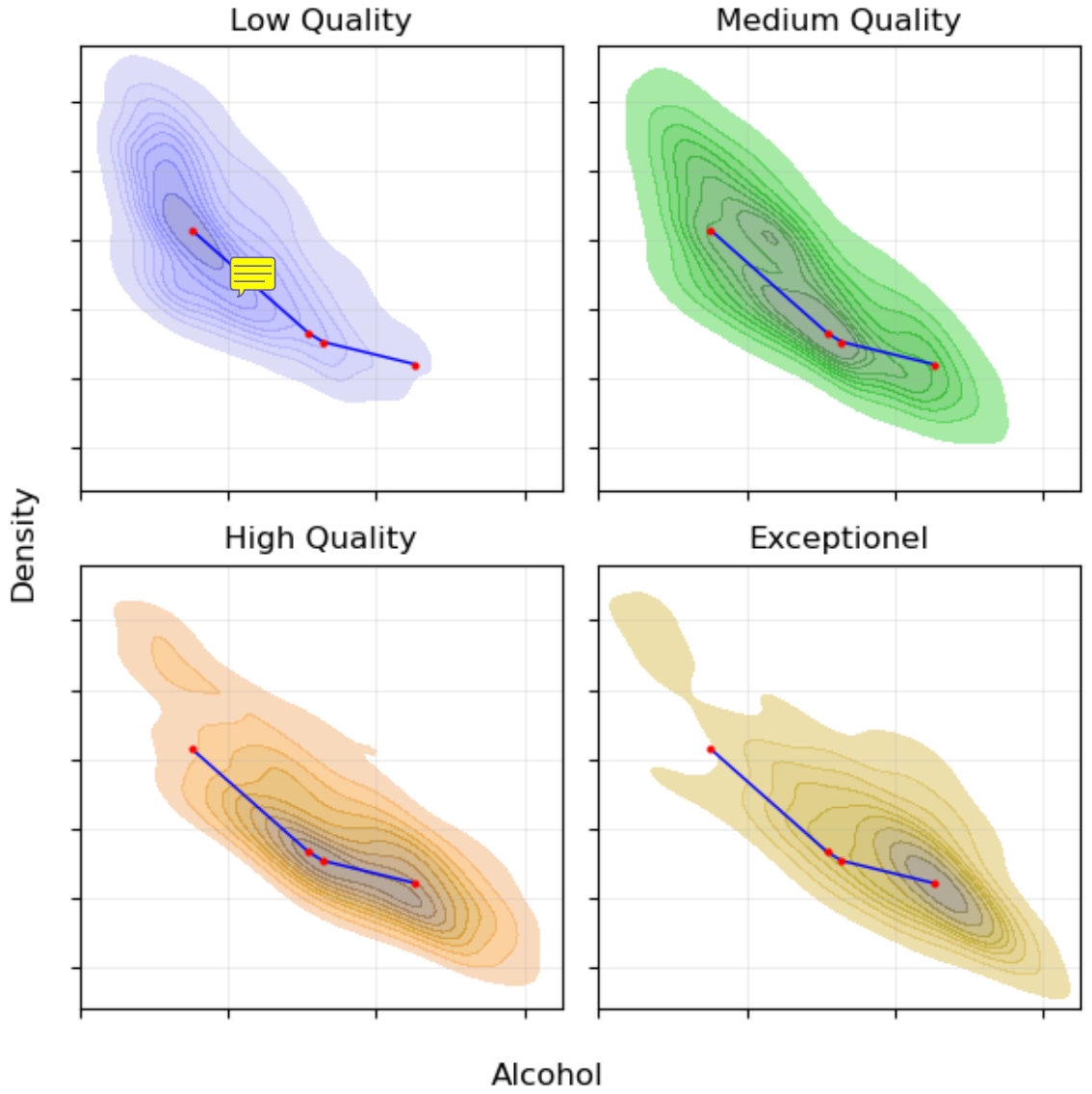
- Low data coverage
- 11 components
- 3500 samples
- 1 quality rating
- Only a few high quality wines

Noisy, high-dimensional, non-linear, interdependent relation between Quality and Features

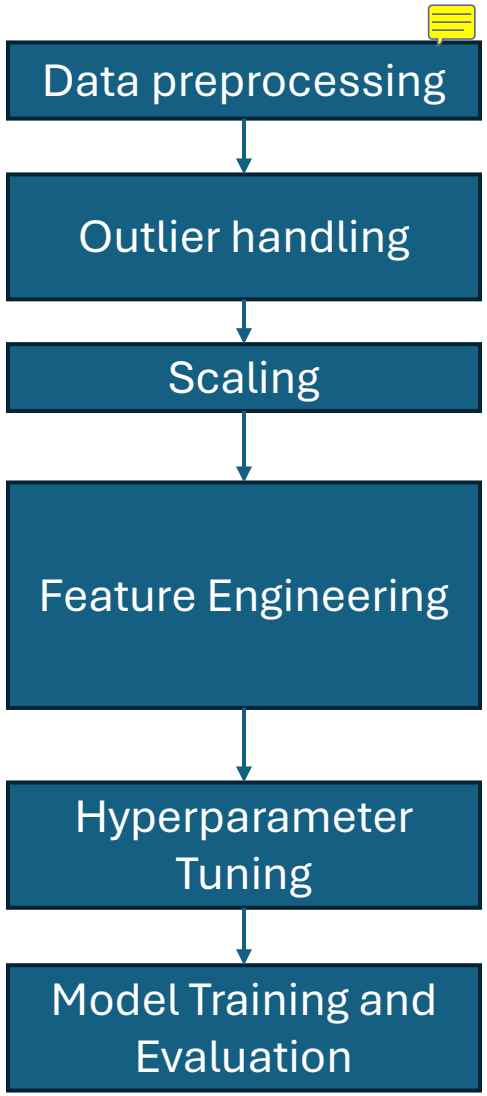
Weak representation

Examples: Alcohol, the main Quality Indicator





Machine Learning Model



- Remove Duplicates

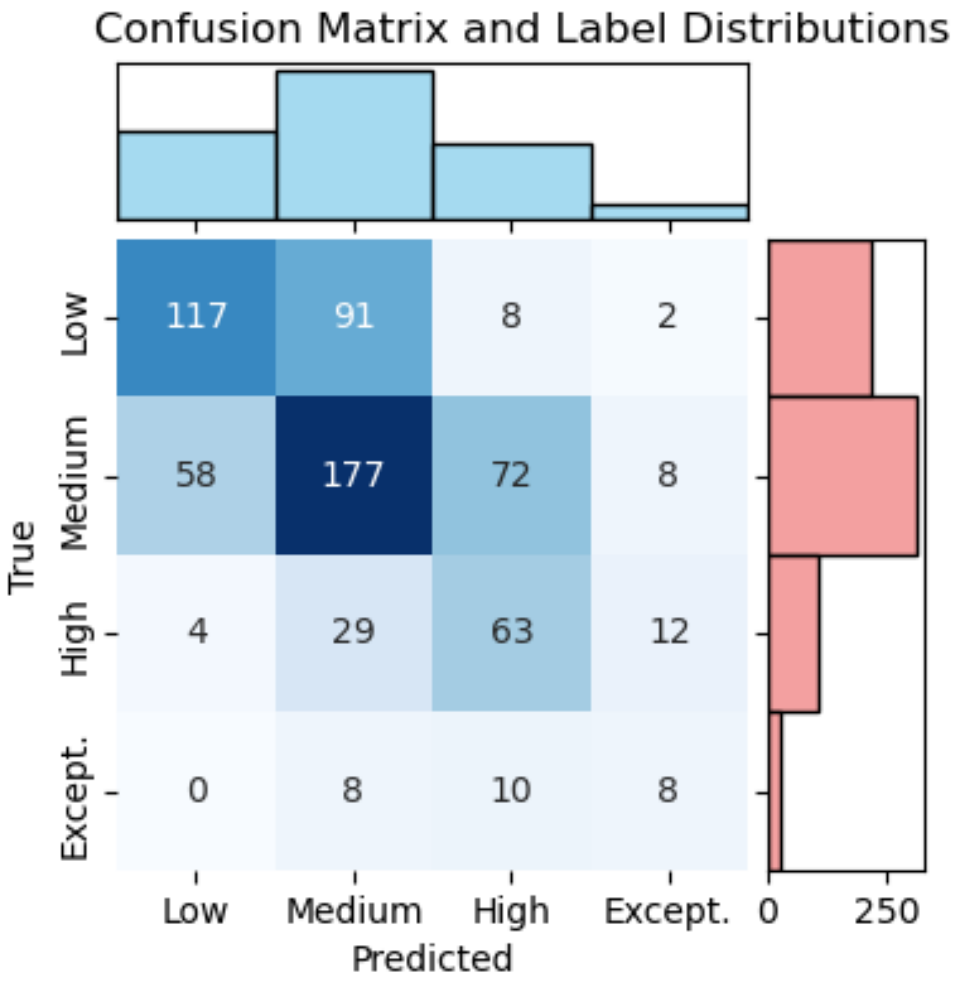
- Use Univariate and multivariate methods
- **Drop low quality outliers**

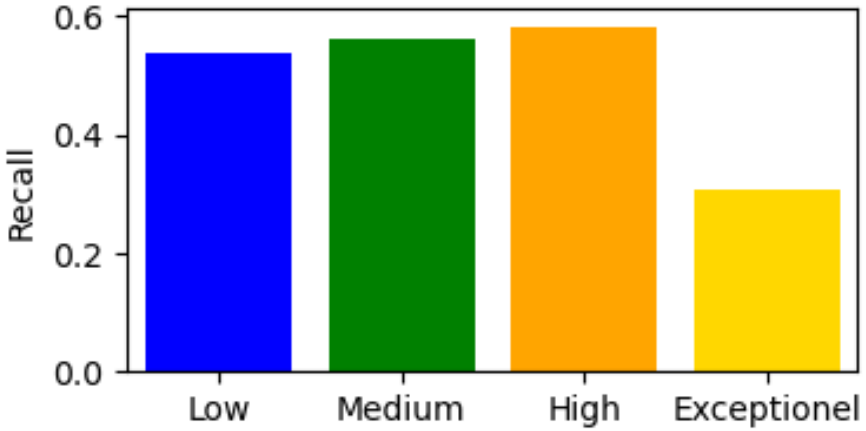
- **Introduce Quality Label**
- **Incorporate Features Interactions**
  - 15 most important interactions
  - Avoid interactions of noisy features

- Optimize for high recall

- **Fix class Imbalance: Over- and Undersampling**
- Pay attention Overfitting

Results





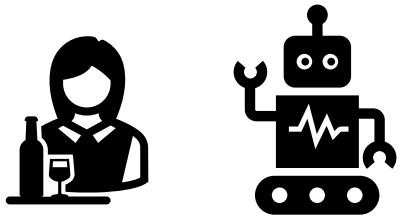
Pros

- Model predicts both high quality categories pretty well
- Reasonable parameters and param. behaviour
- Feature Importances

Cons

- Accuracy 0.54
  - Low
  - Big gap to training accuracy

Conclusions

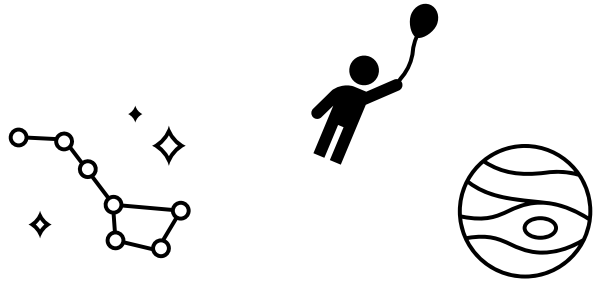


WQS in practice

- The model can support the Tasters in selecting a good wine with zero effort.
- It has to be used with caution, wine quality still has to be finally determined by an expert.
- Ensure a good fermentation process.

More Data!

- Ensure high data quality
- Continue collecting data
- Measure more quantities
- Standardize quality measurements



Model Refinement

- Mulitlabel classification
- Advanced algorithms can be applied

Thank you for your attention!

Are there any Questions?