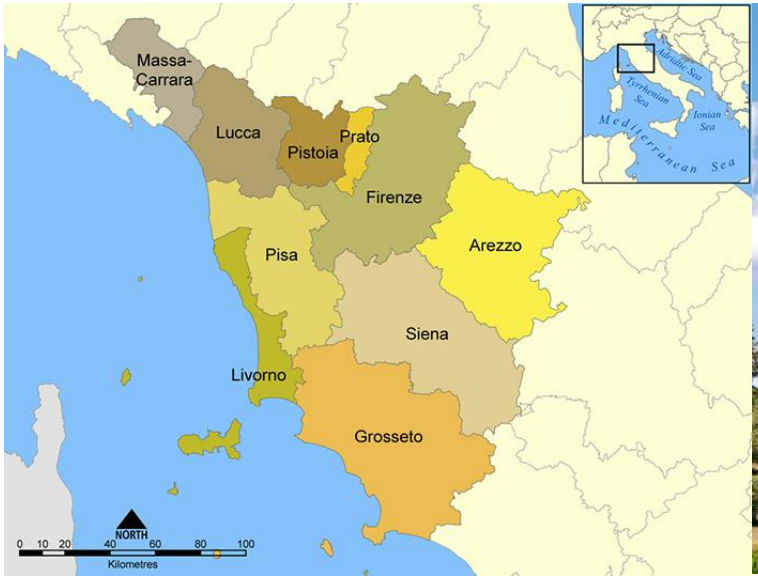
Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | The Wine

Brunello di Montalcino is a red wine produced in the area of Montalcino, in the province of Siena, Italy. Brunello is an excellent wine, usually priced $50.00 and up the bottle. Selected ‘Riserva’ bottles of desirable vintage years can cost well over $100.00.



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The maximum production of grapes per hectare must be less than 8 tons/ha (approximately 52 hl/ha of wine). Rules dictates the date of the wine being released onto the market, which is January 1st of the fifth year after harvesting.

During the five years of aging period, the wine must spend at least two years in wooden barrels and age at least four months in the bottle.

Wine makers, vendors and experts produce vintage charts that can help consumers to understand the overall quality of a vintage and wines from different producers. **Vintage charts can be star-based, with a range from one to five stars or be on scale from zero to 100, with most wines scoring 50 or above**.

https://www.consorziobrunellodimontalcino.it

Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | The Landscape

Montalcino has one of the warmest and driest climates in Tuscany with the grapes in the area ripening up to a week earlier than in nearby Montepulciano. It is the most arid Tuscan DOCG, receiving an average annual rainfall of around 700 mm, in contrast to the Chianti region which receives an average of 900 mm.

The north-facing slopes receive fewer hours of sunlight and are generally cooler than the south-facing slopes. Thus, vineyards planted on the north-facing slopes ripen more slowly and tend to produce wines that are racier and more aromatic. Vineyards on the southern and western slopes receive more intense exposure to sunlight and more maritime winds which produces wines with more power and complexity.

The best vintages take advantage of the right combination of rainfall, temperature, and sun radiation. Since the vineyards are not irrigated, weather patters play an important role in vine quality.

https://www.consorziobrunellodimontalcino.it

Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | Scope

Wine makers, vendors and experts produce vintage charts that can help consumers to understand the overall quality of a vintage.

The objective of this research is **to investigate which weather patterns, if any, can be correlated to wine quality. The analysis of meteorological information can provide viticulturists with operational and forecasting tools for improving the management of vineyards.**

Researchers at the University of Florence, Italy conducted a similar work trying to correlate Italian wine quality with weather data available to the public. The study concluded that Results highlight strong relationships between meteorological conditions and wine quality. Higher-quality wines were obtained in the years characterized by a reduction in rainfall and high temperature patterns*.

*https://www.ajevonline.org/content/57/3/339

Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | Data

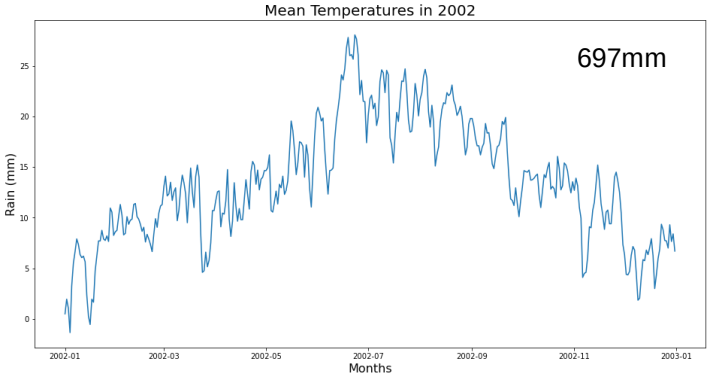
Precipitation and **temperature** (min, Max) data were downloaded from the website of 'Settore Idrologico e Geologico Regionale' (Regional Hydrological and Geological Office) of the Italian region of Tuscany*. The weather station of Radicofani (TOS11000061), in the Siena province. Historic data were available for the period 1993 (incomplete year) through 2022.

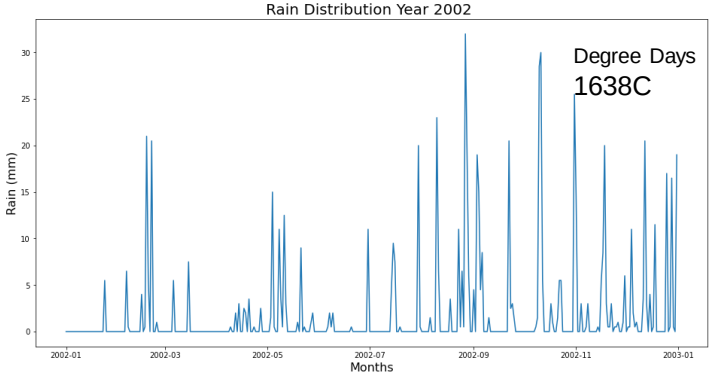
Vintage Ratings charts were copied from the website of the Consorzio del Vino Brunello di Montalcino**, The Consortium that promotes and regulates the wine industry in Montalcino. The score is based on a 1 to 5 scale. Ratings were compared to those available on wine journals for accuracy.

The following variable were created: mean temperature, delta (Max – min), degree days(Max – 10C), sums and average of min, Max, delta and degree Days.

*http://www.sir.toscana.it/consistenza-retehttps://
**www.consorziobrunellodimontalcino.it/en/home/home

Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | Climate

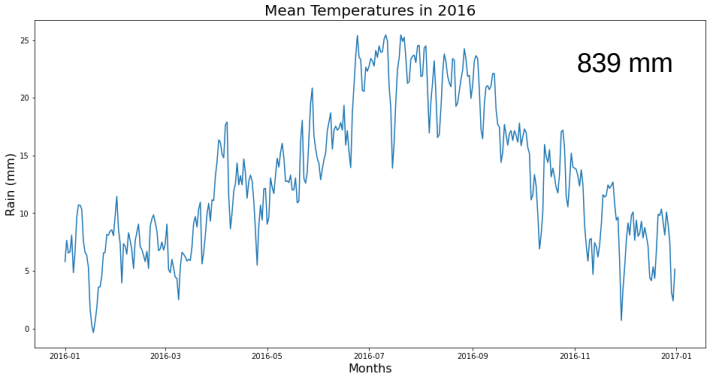


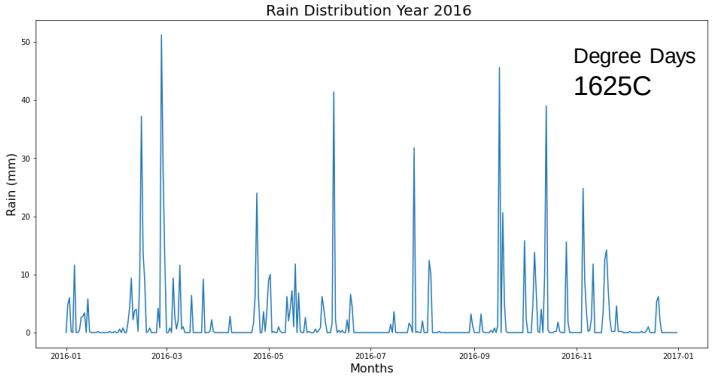


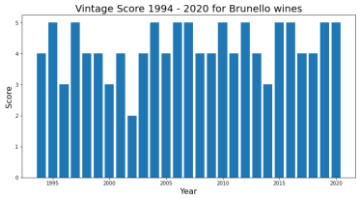
2002 ★★

"A wet growing season and harvest made mediocre wines"

WineSpectator







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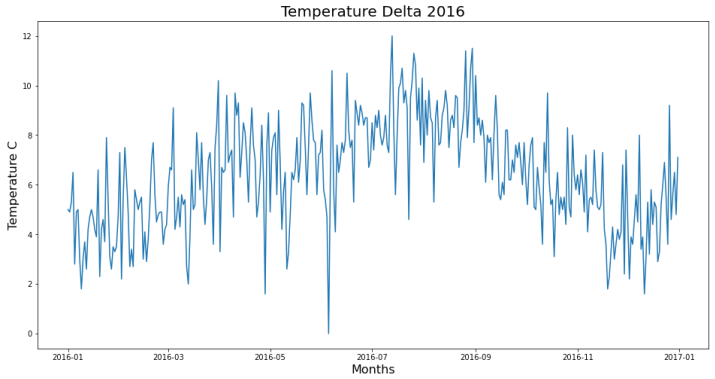
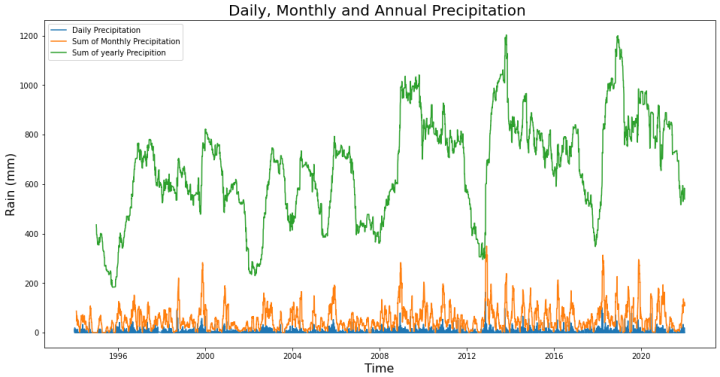
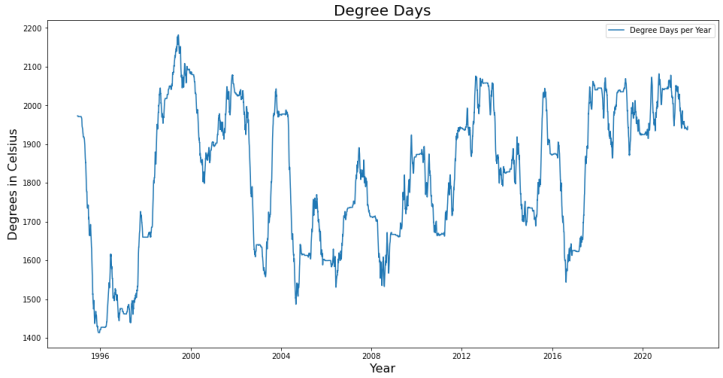
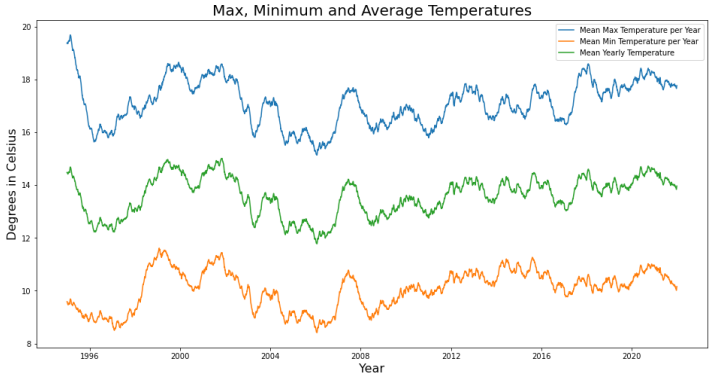




1600-1800
Degree Days for
Sangiovese
(Winkler Index)

During the ripening
period a high delta
promotes quality*





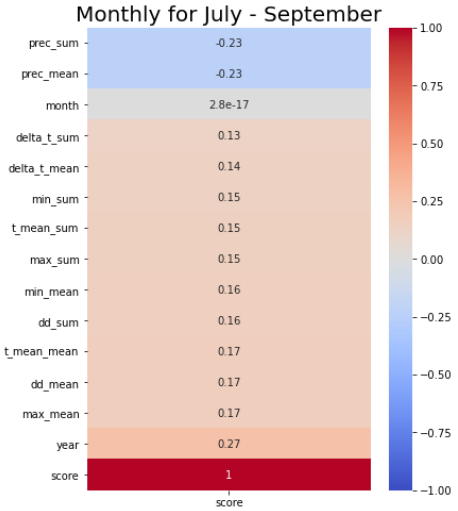
Vercesi et al. 2003
Supplemento
all'informatore Agrario

Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | Models

Correlation between vintage rating and all the variable was low.

The best correlation was observed when the observation period was narrowed to the July – September interval. Precipitation had a negative correlation with rating (score), while temperature and degree days had a positive correlation.

Yet, the data could not successfully predict the vintage.



Predicting Vintage Rating of the Red Italian Wine Brunello di Montalcino | Conclusions

Possible reasons for the inability to successfully predict vintage ratings with commonly available weather data:

- Montalcino consistently produces good to excellent wines. Too many scores are concentrated at the top, making it difficult for the model to identify any significant difference.
- Montalcino has an exceptionally unique climate, more arid than the bordering areas. Weather data may not fully describe the unique climate and how it affects wine production.

Possible solutions:

- Use the same approach for another wine/s from a larger area.
- Identify which period in the year is more affected by weather and add more variables.
- Include chemical analysis.
- Analyze data coming from precision agriculture, especially those that monitor the ripening process and soil properties.
- Brunello, like most quality wines, comes from vineyards with capped maximum yield. This can mitigate the effect of weather patterns on quality.