

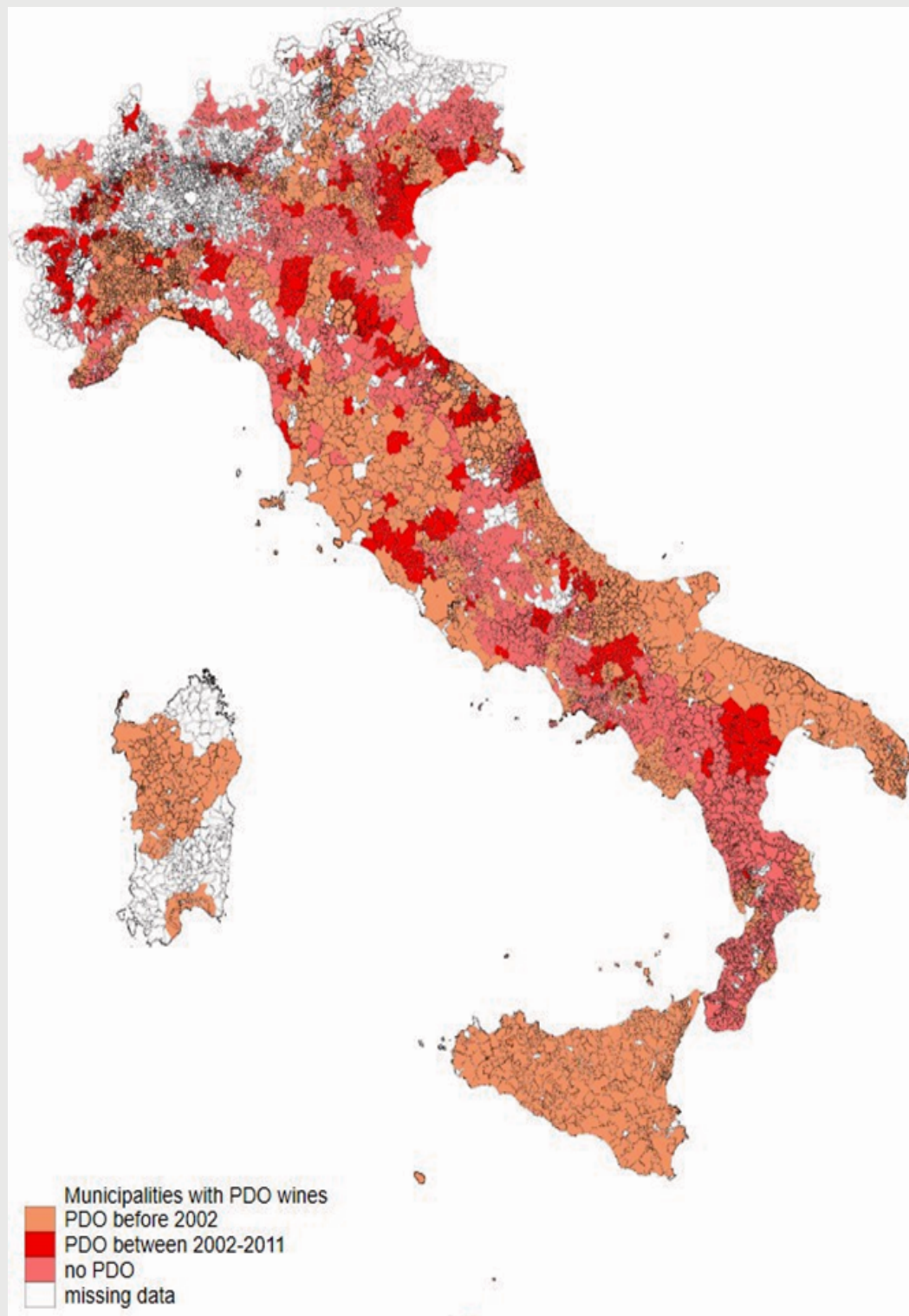
# PREDICTING QUALITY ACROSS SPACE: A MACHINE LEARNING MODEL FOR THE ACKNOWLEDGEMENT OF GEOGRAPHICAL INDICATIONS



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Poster prepared for presentation at the AES Annual Conference, Leuven 2022



62% Municipalities with PDOs



PDOs are GIs that have the strongest links with the place in which they are made.

Every part of the production has to be located within the region of origin, whose specific characteristics constitute the defining factor for their high quality

In Italy, more than 520 wines are GIs

77% PDOs

## INTRODUCTION



GIs, offer a unique scheme to preserve high-quality agri-food productions (Huysmans and Swinnen, 2019) and support sustainable rural development (Crescenzi et al. 2021). However, not all the areas with traditional agri-food products are acknowledged with a GI

## OBJECTIVE

Test whether ex-ante-spatial features contain enough information to predict the future acknowledgement of GIs

- we focus on PDOs

## METHODOLOGY

Machine Learning algorithms to make out-of-sample predictions of municipalities with PDO

- 4 different ML models: Least Absolute Shrinkage and Selection Operator, Random Forest, Gradient Boosting Machines, Neural Network

## DATA

Municipality-level geo-referenced database (1981-2011)

- census data (ISTAT)
- digitalized Product Specifications
- remote sensing data (GIS)

## SAMPLE

Municipalities with a positive level of viticulture (>0 ha) and without a PDO in 2001

- 509 received PDO over 2002 - 2011 period

## RESEARCH DESIGN

1. Target binary variable =1 if the municipality is PDO in 2011 (0 otherwise)
2. Geographical-Demographic- Socioeconomic-Agricultural factors; Spatial and time lags

## RESULTS

- The Random Forest algorithm is the best model
- Accuracy of 84%

Among the area-level indicators, the winegrowing tradition of municipalities and regions, local employment and education rates emerge as crucial in the prediction of the PDO acknowledgement



## CONCLUSION

Yes, it is possible to make out-of-sample predictions of municipalities obtaining PDOs!

## POLICY

## IMPLICATIONS

It is a valuable tool for designing effective rural development policies, targeting investment allocation in advance and supporting ecological transition

## RELATED LITERATURE

Crescenzi, R., De Filippis, F., Giua, M., and Vaquero-Piñero, C. (2021). Geographical indications and local development: the strength of territorial embeddedness. *Regional Studies*, pp.1-13  
 Hastie, T., Tibshirani, R., Friedman, J.H., and Friedman, J.H. (2009). *The elements of statistical learning: data mining, inference, and prediction* (Vol. 2, pp. 1-758). New York: Springer  
 Huysmans, M. and Swinnen, J. (2019). No terroir in the cold? Note on the geography of geographical indications. *Journal of agricultural economics*, 70(2): 550-559

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