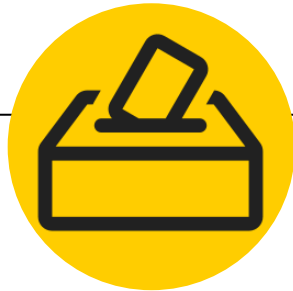


Exploring party preference

A Bayesian Network approach





Research outline

Prediction

The goal of the analysis is to build a Bayesian network that predicts party preference based on individual's characteristics, both in terms of sociodemographics and moral values.

Inference

We will then exploit the structure of the network to make inference about how the distribution of votes changes as we condition on specific individual's characteristics.



The dataset

Data collection

Data from the 9th wave of the European Social Survey

Preprocessing

- Focus on Italian cases
- Filter less numerous cases
- Remove missing values

Final output

- Variables recoding (from numerical to categorical)
- 1028 observations of 12 variables.



Variables description

Personal values

- European integration
- Gay rights
- Religiosity
- Immigration
- Ideological self-placement
- Government intervention

Sociodemographic

- Year of birth
- Domicil
- Level of education
- (Subjective) level of income

Other variables

- Life satisfaction
- **Party preference**

1

Building the network

Model selection, predictions and graph visualization



Prior knowledge

Whitelist

- Year of birth \rightarrow education
(p-value χ^2 test: $2 \cdot 10^{-23}$)
- Education \rightarrow income
(p-value χ^2 test: $9 \cdot 10^{-28}$)
- Income \rightarrow life satisfaction
(p-value χ^2 test: 10^{-15})
- Younger generations tend to be more educated
- The higher the education, the higher the income
- The higher the income, the higher life satisfaction



Prior knowledge

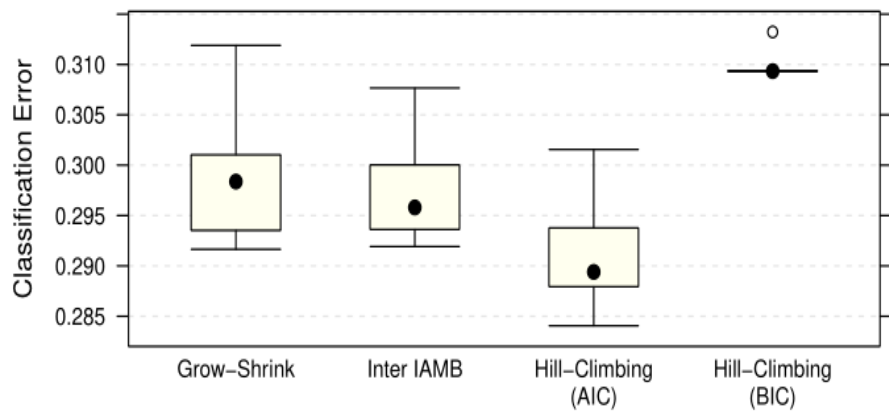
Blacklist

- **Year of birth** cannot be influenced by any variable
- **Party preference** cannot influence any variable
- **Education** cannot be influenced by any personal value other than religiosity
- **Religiosity** cannot be influenced by the attitude towards migration, gay rights, European integration and govt interventionism
- **Income** cannot be influenced by life satisfaction, ideological self-placement, attitude towards migration, gay rights, European integration and govt interventionism

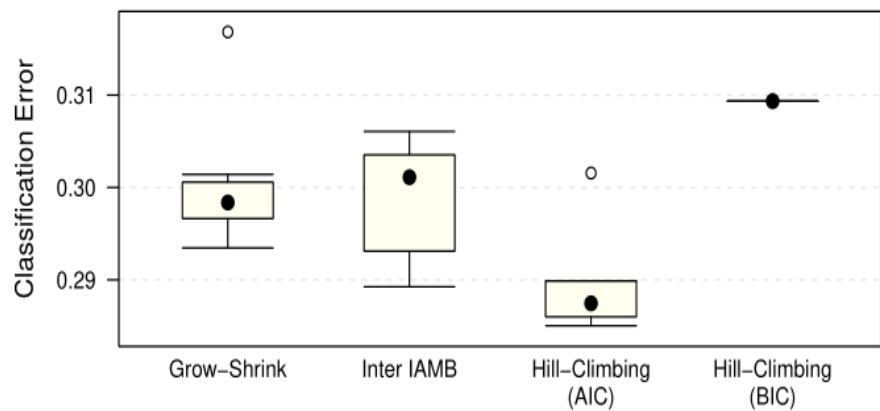


Cross-validation results

Without prior knowledge



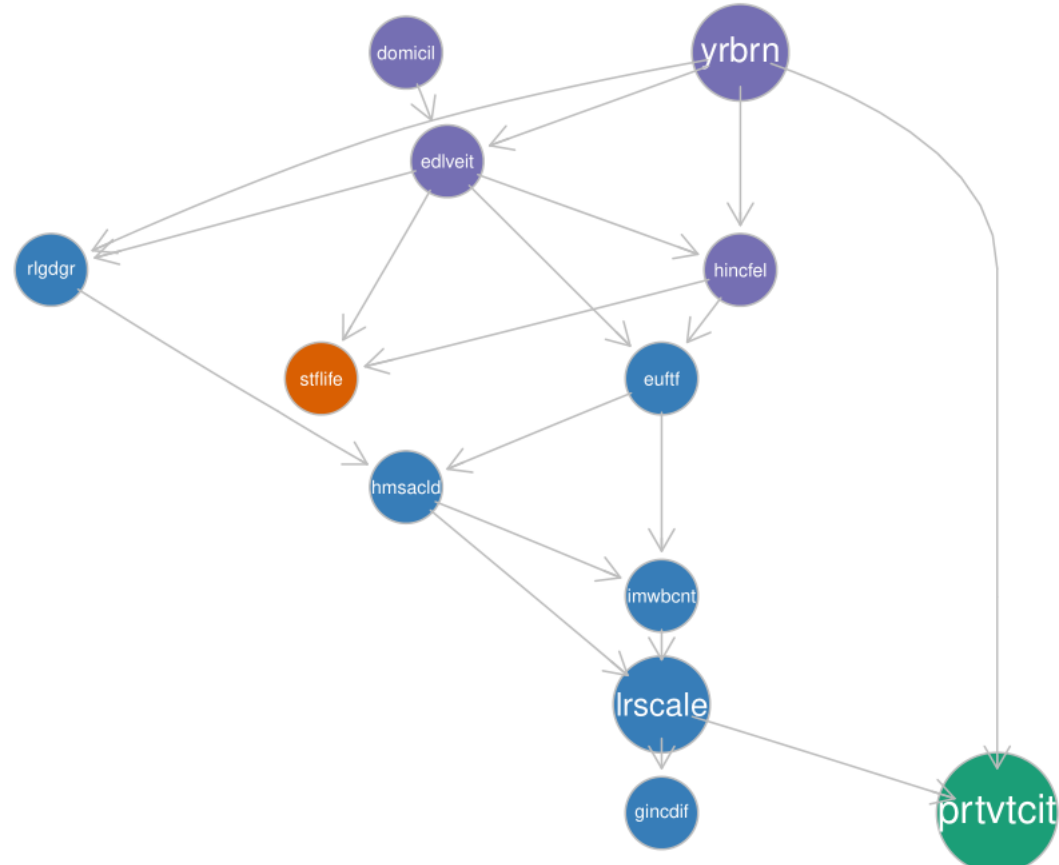
With prior knowledge





Graph visualization

After splitting the original data set into a **training set** (80% of the observations) and a **test set** (20% of the observations), we run the **Hill-Climbing algorithm with AIC score** on the training set. The resulting network is hereafter displayed.



2

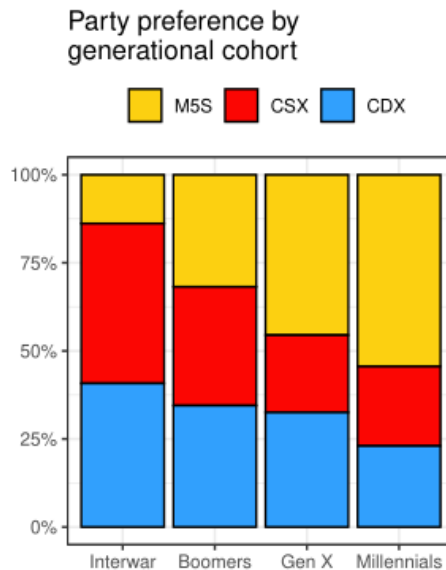
Exploring the network

Dependencies and independencies encoded in the graph
Graph-based inference

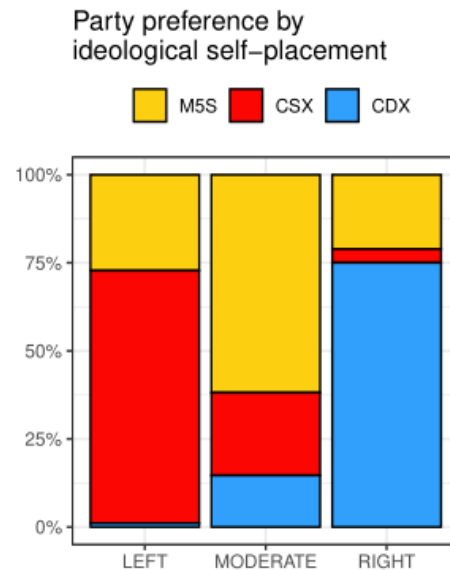


Dependencies

The only two factors directly affecting the party preference are the **year of birth** and the **ideological self-placement**. The plots displayed on the right help us understanding how these two factors influence our target variable.



p-value χ^2 test: $2.4e-14$



p-value χ^2 test: $2.81e-143$



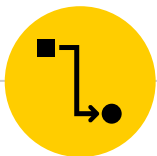
Independencies

edlveit \perp hmsacld | rlgdgr, eufth

Support for gay rights does not depend on education, once we take into account religiosity and support for EU integration. This seems to suggest that support for gay rights has mainly to do with someone's personal values, rather than with their education.

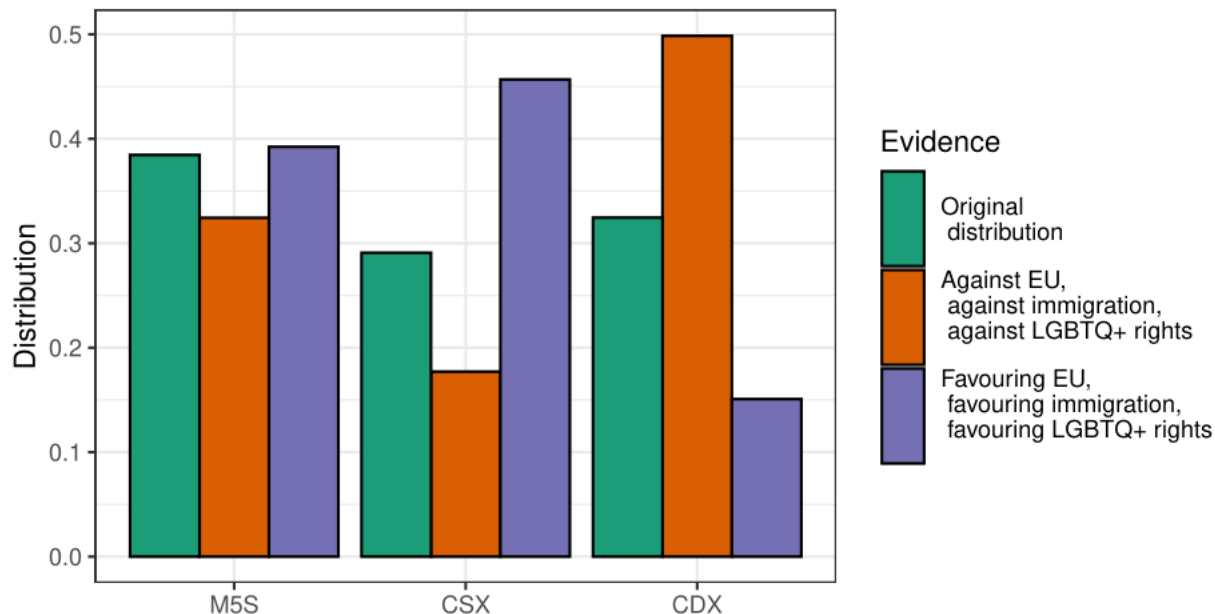
edlveit \perp lrscale | hmsacld, eufth

Ideological self-placement is independent from education, once we fix attitude towards gay rights and European integration. Again, this seems to suggest that one's political view does not really depend on education, but rather on personal values.



Inference

Relying on the network structure, we now investigate how personal opinions about LGBTQ+ rights, immigration and European integration influence the party preference.





Conclusions

With this research, we found some evidence opposed to common belief: while many think that **older generations** are mainly in favor of right-wing parties, we found out that members of this generation more or less equally distribute between center-left and center-right parties.

On the contrary, in confirmation of the **heterogeneity of M5S' electorate**, we found out that those having conservative views (on gay rights, European integration and immigration) are more or less as likely to vote M5S as those having opposite views on all the exact same issues.