Package ‘lagsarlmtree’

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Author Martin Wagner [aut], Achim Zeileis [aut, cre] (<https://orcid.org/0000-0003-0918-3766>), Roger Bivand [ctb] (<https://orcid.org/0000-0003-2392-6140>)
Maintainer Achim Zeileis <Achim.Zeileis@R-project.org>
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R topics documented:

GrowthNUTS2 ................................................................. 2
lagsarlmtree ................................................................. 4
WeightsNUTS2 ............................................................... 6

Index 8
GrowthNUTS2

Determinants of Regional Economic Growth

Description

Growth regression data for NUTS2 regions in the European Union.

Usage

data("GrowthNUTS2")

Format

A data frame containing 255 observations on 58 variables.

- **ggdpcap** numeric. Average annual growth rate of real GDP per capita over the period 1995-2005.
- **accessair** numeric. Measure for potential accessibility by air.
- **accessrail** numeric. Measure for potential accessibility by rail.
- **accessroad** numeric. Measure for potential accessibility by road.
- **airportdens** numeric. Airport density (number of airports per sqkm).
- **airports** factor. Number of airports.
- **arh0** numeric. Initial activity rate, highly educated.
- **arl0** numeric. Initial activity rate, low educated.
- **arm0** numeric. Initial activity rate, medium educated.
- **art0** numeric. Initial activity rate, total.
- **capital** factor. Does the region host country capital city?
- **connectair** numeric. Connectivity to comm. airports by car of the capital or centroid of region.
- **connectsea** numeric. Connectivity to comm. seaports by car of the capital or centroid of region.
- **distcap** numeric. Distance to capital city of respective country.
- **distde71** numeric. Distance to Frankfurt.
- **empdens0** numeric. Initial employment density.
- **ereh0** numeric. Initial employment rate, highly educated.
- **erel0** numeric. Initial employment rate, low educated.
- **erem0** numeric. Initial employment rate, medium educated.
- **eret0** numeric. Initial employment rate, total.
- **gdpcap0** numeric. Real GDP per capita in logs in 1995.
- **gpop** numeric. Growth rate of population.
- **hazard** numeric. Sum of all weighted hazard values.
- **hrstcore** numeric. Human resources in science and technology (core).
- **intf** numeric. Proportion of firms with own website regression.
outdens0 numeric. Initial output density.
popdens0 numeric. Initial population density.
raiddens numeric. Rail density (length of railroad network in km per sqkm).
regboarder factor. Border region?
regcoast factor. Coastal region?
regobj1 factor. Is the region within an Objective 1 region?
roaddens numeric. Road density (length of road network in km per sqkm).
seaports factor. Does the region have a seaport?
sett1 factor. Settlement structure.
shab0 numeric. Initial share of NACE A and B (Agriculture) in GVA.
shce0 numeric. Initial share of NACE C to E (Mining, Manufacturing and Energy) in GVA.
shgfcf numeric. Share of gross fixed capital formation in gross value added.
shjk0 numeric. Initial share of NACE J to K (Business services) in GVA.
shsh numeric. Share of highly educated in working age population.
shsl numeric. Share of low educated in working age population.
shlll numeric. Life long learning.
shsm numeric. Share of medium educated in working age population.
telf factor. A typology of estimated levels of business telecommunications access and uptake.
temp numeric. Extreme temperatures.
urh0 numeric. Initial unemployment rate, highly educated.
url0 numeric. Initial unemployment rate, low educated.
urmo numeric. Initial unemployment rate, medium educated.
urt0 numeric. Initial unemployment rate, total.
country factor. Country within which the region is located.
cee factor. Is the region within a Central and Eastearn European country?
piigs factor. Is the region within a PIIGS country? (Portugal, Ireland, Italy, Greece, Spain.)
de factor. Is the region within Germany?
es factor. Is the region within Spain?
fr factor. Is the region within France?
it factor. Is the region within Italy?
pl factor. Is the region within Poland?
uk factor. Is the region within the United Kingdom?

References


Examples

data("GrowthNUTS2")
summary(GrowthNUTS2)
lagsarlmtree

Spatial Lag Model Trees

Description

Model-based recursive partitioning based on linear regression adjusting for a (global) spatial simultaneous autoregressive lag.

Usage

lagsarlmtree(formula, data, listw = NULL, method = "eigen",
zero.policy = NULL, interval = NULL, control = list(),
rhowystart = NULL, abstol = 0.001, maxit = 100,
dfsplit = TRUE, verbose = FALSE, plot = FALSE, ...)

Arguments

formula formula specifying the response variable and regressors and partitioning variables, respectively. For details see below.
data data.frame to be used for estimating the model tree.
listw a weights object for the spatial lag part of the model.
method "eigen" (default) - the Jacobian is computed as the product of (1 - rho*eigenvalue) using eigenw, and "spam" or "Matrix_J" for strictly symmetric weights lists of styles "B" and "C", or made symmetric by similarity (Ord, 1975, Appendix C) if possible for styles "W" and "S", using code from the spam or Matrix packages to calculate the determinant; "Matrix" and "spam_update" provide updating Cholesky decomposition methods; "LU" provides an alternative sparse matrix decomposition approach. In addition, there are "Chebyshev" and Monte Carlo "MC" approximate log-determinant methods; the Smirnov/Anselin (2009) trace approximation is available as "moments". Three methods: "SE_classic", "SE_whichMin", and "SE_interp" are provided experimentally, the first to attempt to emulate the behaviour of Spatial Econometrics toolbox ML fitting functions. All use grids of log determinant values, and the latter two attempt to ameliorate some features of "SE_classic".
zero.policy default NULL, use global option value; if TRUE assign zero to the lagged value of zones without neighbours, if FALSE (default) assign NA - causing lagsarlm() to terminate with an error
interval default is NULL, search interval for autoregressive parameter
control list of extra control arguments - see lagsarlm
rhowystart numeric. A vector of length nrow(data), to be used as an offset in estimation of the first tree. NULL by default, which results in an initialization with the root model (without partitioning).
abstol numeric. The convergence criterion used for estimation of the model. When the difference in log-likelihoods of the model from two consecutive iterations is smaller than abstol, estimation of the model tree has converged.


`lagsarlmtree`

- **maxit**: numeric. The maximum number of iterations to be performed in estimation of the model tree.
- **dfsplit**: logical or numeric. `as.integer(dfsplit)` is the degrees of freedom per selected split employed when extracting the log-likelihood.
- **verbose**: Should the log-likelihood value of the estimated model be printed for every iteration of the estimation?
- **plot**: Should the tree be plotted at every iteration of the estimation? Note that selecting this option slows down execution of the function.
- **...**: Additional arguments to be passed to `lmtree()`. See `mob_control` documentation for details.

**Details**

Spatial lag trees learn a tree where each terminal node is associated with different regression coefficients while adjusting for a (global) spatial simultaneous autoregressive lag. This allows for detection of subgroup-specific coefficients with respect to selected covariates, while adjusting for spatial correlations in the data. The estimation algorithm iterates between (1) estimation of the tree given an offset of the spatial lag effect, and (2) estimation of the spatial lag model given the tree structure.

The code is still under development and might change in future versions.

**Value**

The function returns a list with the following objects:

- **formula**: The formula as specified with the `formula` argument.
- **call**: the matched call.
- **tree**: The final `lmtree`.
- **lagsarlm**: The final `lagsarlm` model.
- **data**: The dataset specified with the `data` argument including added auxiliary variables `.rhowy` and `.tree` from the last iteration.
- **nobs**: Number of observations.
- **loglik**: The log-likelihood value of the last iteration.
- **df**: Degrees of freedom.
- **dfsplit**: degrees of freedom per selected split as specified with the `dfsplit` argument.
- **iterations**: The number of iterations used to estimate the `lagsarlm`.
- **maxit**: The maximum number of iterations specified with the `maxit` argument.
- **rhowystart**: Offset in estimation of the first tree as specified in the `rhowystart` argument.
- **abstol**: The prespecified value for the change in log-likelihood to evaluate convergence, as specified with the `abstol` argument.
- **listw**: The `listw` object used.
- **mob.control**: A list containing control parameters passed to `lmtree()`, as specified with ....
References


See Also

lm, lagsarlm, lmtree

Examples

## data and spatial weights
data("GrowthNUTS2", package = "lagsarlmtree")
data("WeightsNUTS2", package = "lagsarlmtree")

## spatial lag model tree
system.time(tr <- lagsarlmtree(ggdpcap ~ gdpcap0 + shgfcf + shsh + shsm |
gdpcap0 + accessrail + accessroad + capital + regboarder + regcoast + regobj1 + cee + piigs,
data = GrowthNUTS2, listw = WeightsNUTS2$invw,
minsize = 12, alpha = 0.05))
print(tr)
plot(tr, tp_args = list(which = 1))

## query coefficients
coeff(tr, model = "tree")
coeff(tr, model = "rho")
coeff(tr, model = "all")

system.time({
ev <- eigenw(WeightsNUTS2$invw)
tr1 <- lagsarlmtree(ggdpcap ~ gdpcap0 + shgfcf + shsh + shsm |
gdpcap0 + accessrail + accessroad + capital + regboarder + regcoast + regobj1 + cee + piigs,
data = GrowthNUTS2, listw = WeightsNUTS2$invw, method = "eigen",
control = list(pre_eig = ev), minsize = 12, alpha = 0.05)
})
coeff(tr1, model = "rho")

WeightsNUTS2

Spatial Weights for European Union NUTS2 Regions

Description

Spatial weight matrices for NUTS2 regions in the European Union.

Usage

data("WeightsNUTS2")

Format

A list containing 40 listw weight matrices.
WeightsNUTS2

Source

Journal of Applied Econometrics Data Archive.


References

Index

* datasets
  GrowthNUTS2, 2
  WeightsNUTS2, 6
* tree
  lagsarlm, 4, 6
  lagsarlm, 4
  lm, 6
  lmtree, 6
  logLik.lagsarlm (lagsarlm), 4
  mob_control, 5
  plot.lagsarlm (lagsarlm), 4
  predict.lagsarlm (lagsarlm), 4
  print.lagsarlm (lagsarlm), 4
  sctest.lagsarlm (lagsarlm), 4
  WeightsNUTS2, 6