Package ‘lphom’

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Author Jose M. Pavía [aut, cre] (<https://orcid.org/0000-0002-0129-726X>), Rafael Romero [aut]
Maintainer Jose M. Pavía <jose.m.pavia@uv.es>
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Description

Estimates confidence intervals for the (vote) transfer probabilities obtained with lphom()

Usage

confidence_intervals_pjk(lphom.object, level = 0.9, num.d = 11, B = 30)

Arguments

lphom.object An object output of the lphom() function.
level A number between 0 and 1 to be used as level of confidence for the intervals. By default 0.90
num.d Number maximum of different disturbances, d, to be initially considered. Positive integer greater than or equal to 5. By default, 11.
B Integer that determines the number of simulations to be performed for each disturbance value. By default, 30.

Value

A list with the following components

TM.estimation Transfer matrix of probability point estimates.
TM.lower Transfer matrix of lower values for the probability estimates.
TM.upper Transfer matrix of upper values for the probability estimates.
level Confidence level used when computing the confidence intervals.

Author(s)

Jose M. Pavia, <pavia@uv.es>
Rafael Romero <rromero@eio.upv.es>

References


error_lphom

See Also
lphom error_lphom

Examples

mt.lphom <- lphom(France2017P[, 1:8], France2017P[, 9:12], "raw", NULL, FALSE)
set.seed(533423)
confidence_intervals_pjk(mt.lphom, level = 0.9, num.d = 5, B = 8)

error_lphom Global error of a lphom estimated table

Description
Estimation of the error index (EI) of a RxC vote transfer matrix obtained with lphom()

Usage

error_lphom(
  lphom.object,
  upper.alfa = 0.1,
  show.plot = TRUE,
  num.d = 11,
  B = 30
)

Arguments
lphom.object An object output of the lphom() function.
upper.alfa Upper bound that will not exceed by the EI estimate with a confidence 1 - alpha. By default, 0.10.
show.plot TRUE/FALSE. Indicates whether the graphical representation describing the relationship between EI and HETe estimated by simulation for the election under study should be displayed as a side-effect. By default, TRUE.
num.d Number maximum of different disturbances, d, to be initially considered. Positive integer greater than or equal to 5. By default, 11.
B Integer that determines the number of simulations to be performed for each disturbance value. By default, 30.

Value
A list with the following components
 EI.estimate Point estimate for EI.
 EI.upper Upper bound with confidence 1 - alpha of the EI estimate
**figure**  
`ggplot2` object describing the graphical representation of the relationship between EI and HETe.

**equation**  
Im object of the adjustment between EI and HETe.

**statistics**  
A four column matrix with the values of HET, HETe, EI and d associated with each simulated scenario.

**TMs.real**  
Array with the simulated real transfer matrices associated with each scenario.

**TMs.estimate**  
Array with the estimated transfer matrices associated with each scenario.

**Note**  
`ggplot2` is needed to be installed for this function to work.

**Author(s)**

Jose M. Pavia, <pavia@uv.es>

Rafael Romero <rromero@eio.upv.es>

**References**


**See Also**

`lphom`, `confidence_intervals_pjk`

**Examples**

```r
tm.lphom <- lphom(France2017P[, 1:8], France2017P[, 9:12], "raw", NULL, FALSE)
set.seed(253443)
example <- error_lphom(tm.lphom, upper.alfa = 0.10, show.plot = FALSE, num.d = 5, B = 8)
example$EI.estimate
```

**France2017D**  
*2017 French Presidential Election. Department official results.*

**Description**

Data frame containing the official results of the first and second rounds of the 2017 French presidential election in the 107 territorial French departments plus an artificial department that groups the French electors living abroad.

**Usage**

```r
data(France2017D)
```
## Format

A table containing 108 observations and 13 variables:

- **ABSTENTION** Number of people abstaining (NonVoters) in the first-round of 2017 Presidential Election.
- **BLANK_NULL2** Number of people voting either blank or null in the first-round of 2017 Presidential Election.
- **MACRON** Number of votes gained at a national level for Emmanuel Macron in the first-round of 2017 Presidential Election.
- **LE_PEN** Number of votes gained at a national level for Marine Le Pen in the first-round of 2017 Presidential Election.
- **FILLON** Number of votes gained at a national level for Francois Fillon in the first-round of 2017 Presidential Election.
- **MELENCHON** Number of votes gained at a national level for Jean-Luc Melenchon in the first-round of 2017 Presidential Election.
- **HAMON** Number of votes gained at a national level for Benoit Hamon in the first-round of 2017 Presidential Election.
- **DUPONT.AIGNAN** Number of votes gained at a national level for Nicolas Dupont-Aignan in the first-round of 2017 Presidential Election.
- **OTHERS** Number of votes gained at a national level for the rest of candidates in the first-round of 2017 Presidential Election.
- **ABSTENTION2** Number of people abstaining (NonVoters) in the second-round of 2017 Presidential Election.
- **BLANK_NULL2** Number of people voting either blank or null in the second-round of 2017 Presidential Election.
- **MACRON2** Number of votes gained at a national level for Emmanuel Macron in the second-round of 2017 Presidential Election.
- **LE_PEN2** Number of votes gained at a national level for Marine Le Pen in the second-round of 2017 Presidential Election.

## Source


## Description

Data frame containing the provisional results of the first and second rounds of the 2017 French presidential election in the 12 French continental regions (Auvergne-Rhone-Alpes, Bourgogne-Franche-Comte, Brittany, Centre-Val de Loire, Grand Est, Hauts-de-France, Ile-de-France, Normandy, Nouvelle-Aquitaine, Occitaine, Pays de la Loire, Provence-Alpes-Cote d’Azur) plus an additional region that covers Corsica and the rest of French overseas regions.
Usage

data(France2017P)

Format

A table containing 13 observations and 12 variables:

- **ABSTENTION** Number of people abstaining (NonVoters) and voting either blank or null in the first-round of 2017 Presidential Election.
- **MACRON** Number of votes gained at a national level for Emmanuel Macron in the first-round of 2017 Presidential Election.
- **LE_PEN** Number of votes gained at a national level for Marine Le Pen in the first-round of 2017 Presidential Election.
- **FILLON** Number of votes gained at a national level for Francois Fillon in the first-round of 2017 Presidential Election.
- **MELENCHON** Number of votes gained at a national level for Jean-Luc Melanchon in the first-round of 2017 Presidential Election.
- **HAMON** Number of votes gained at a national level for Benoit Hamon in the first-round of 2017 Presidential Election.
- **DUPONT** Number of votes gained at a national level for Nicolas Dupont-Aignan in the first-round of 2017 Presidential Election.
- **OTHERS** Number of votes gained at a national level for the rest of candidates in the first-round of 2017 Presidential Election.
- **ABSTENTION2** Number of people abstaining (NonVoters) in the second-round of 2017 Presidential Election.
- **BLANK_NULL** Number of people voting either blank or null in the second-round of 2017 Presidential Election.
- **MACRON2** Number of votes gained at a national level for Emmanuel Macron in the second-round of 2017 Presidential Election.
- **LE_PEN2** Number of votes gained at a national level for Marine Le Pen in the second-round of 2017 Presidential Election.

Source

Description

Estimates RxC vote transfer matrices (ecological contingency tables) with lphom

Usage

```
lphom(
  votes_election1,
  votes_election2,
  new_and_exit_voters = c("regular", "raw", "simultaneous", "full", "gold"),
  structural_zeros = NULL,
  verbose = FALSE
)
```

Arguments

- `votes_election1` : data.frame (or matrix) of order IxJ (likely of final order IxJ-1 in regular and raw scenarios) with the votes gained by the J political options competing on election 1 (or origin) in the I territorial units considered.
- `votes_election2` : data.frame (or matrix) of order IxK (likely of final order IxK-1 in regular and raw scenarios) with the votes gained by the K political options competing on election 2 (or destination) in the I territorial units considered.
- `new_and_exit_voters` : A character string indicating the level of information available regarding new entries and exits of the election censuses between the two elections. This argument captures the different options discussed on Section 3 of Romero et al. (2020). This argument admits five values: regular, raw, simultaneous, full and gold. Default, regular.
- `structural_zeros` : Default NULL. A list of vectors of length two, indicating the election options for which no transfer of votes are allowed between election 1 and election 2. For instance, when new_and_exit_voters is set to "regular", lphom implicitly states structural_zeros = list(c(J, K)) in case exits and/or entries are computed because the sum by rows of votes_election1 and votes_election2 does not coincide.
- `verbose` : A TRUE/FALSE value that indicates if the main outputs of the function should be printed on the screen. Default, FALSE.

Details

Description of the new_and_exit_voters argument in more detail.
• **regular**: The default value. This argument accounts for the most plausible scenario. A scenario with two elections elapsed at least some months. In this scenario, (i) the column \( J \) of votes\(_{election1}\) corresponds to new young electors who have the right to vote for the first time and (ii) net exits (basically a consequence of mortality), and eventually net entries, are computed according equation (7) of Romero et al. (2020), and (iii) we assume net exits affect equally all the first \( J-1 \) options of election 1, hence (8) and (9) constraints of Romero et al. (2020) are imposed.

• **raw**: This value accounts for a scenario with two elections where only the raw election data recorded in the \( I \) territorial units, in which the area under study is divided, are available. In this scenario, net exits (basically deaths) and net entries (basically new young voters) are estimated according to equation (7) of Romero et al. (2020). Constraints defined by equations (8) and (9) of Romero et al. (2020) are imposed. In this scenario, when net exits and/or net entries are negligible (such as between the first- and second-round of French Presidential elections), they are omitted in the outputs.

• **simultaneous**: This value accounts for either a scenario with two simultaneous elections or a classical ecological inference problem. In this scenario, the sum by rows of votes\(_{election1}\) and votes\(_{election2}\) must coincide. Constraints defined by equations (8) and (9) of Romero et al. (2020) are not included in the model.

• **full**: This value accounts for a scenario with two elections elapsed at least some months, where: (i) the column \( J-1 \) of votes\(_{election1}\) totals new young electors that have the right to vote for the first time; (ii) the column \( J \) of votes\(_{election1}\) measures new immigrants that have the right to vote; and (iii) the column \( K \) of votes\(_{election2}\) corresponds to total exits of the census lists (due to death or emigration). In this scenario, the sum by rows of votes\(_{election1}\) and votes\(_{election2}\) must agree and constraints (8) and (9) of Romero et al. (2020) are imposed.

• **gold**: This value accounts for a scenario similar to full, where total exits are separated out between exits due to emigration (column \( K-1 \) of votes\(_{election2}\)) and death (column \( K \) of votes\(_{election2}\)). In this scenario, the sum by rows of votes\(_{election1}\) and votes\(_{election2}\) must agree. The same restrictions as in the above scenario apply but for both columns \( K-1 \) and \( K \) of the vote transition probability matrix.

### Value

A list with the following components

- **VTM**: A matrix of order \( J \times K \) with the estimated percentages of vote transitions from election 1 to election 2.
- **OTM**: A matrix of order \( K \times J \) with the estimated percentages of the origin of the votes obtained for the different options of election 2.
- **HETe**: The estimated heterogeneity index defined in equation (11) of Romero et al. (2020).
- **EHet**: A matrix of order \( I \times K \) measuring in each spatial unit a distance to the homogeneity hypothesis, that is, the differences under the homogeneity hypothesis between the actual recorded results and the expected results in each territorial unit for each option of election two.
- **inputs**: A list containing all the objects with the values used as arguments by the function.
A matrix with the final data used as votes of the origin election after taking into account the level of information available regarding to new entries and exits of the election censuses between the two elections.

destination

A matrix with the final data used as votes of the origin election after taking into account the level of information available regarding to new entries and exits of the election censuses between the two elections.

VTM.complete

A matrix of order J'xK' with the estimated proportions of vote transitions from election 1 to election 2, including in regular and raw scenarios the row and the column corresponding to net_entries and net_exits even when they are really small, less than 1% in all units.

Author(s)

Jose M. Pavia, <pavia@uv.es>
Rafael Romero <rromero@eio.upv.es>

References


See Also

tslphom nslphom

Other linear programing ecological inference functions: nslphom(), tslphom()

Examples

```r
lphom(France2017[, 1:8] , France2017[, 9:12], new_and_exit_voters = "raw", structural_zeros = NULL, verbose = FALSE)
```

Description

Estimates RxC vote transfer matrices (ecological contingency tables) with nslphom

Usage

```r
nslphom(
  votes_election1,
  votes_election2,
  new_and_exit_voters = c("regular", "raw", "simultaneous", "full", "gold"),
  structural_zeros = NULL,
  iter.max = 10,
) ```
Arguments

votes_election1

data.frame (or matrix) of order IxJ (likely of final order IxJ-1 in regular and raw scenarios) with the votes gained by the J political options competing on election 1 (or origin) in the I territorial units considered.

votes_election2

data.frame (or matrix) of order IxK (likely of final order IxK-1 in regular and raw scenarios) with the votes gained by the K political options competing on election 2 (or destination) in the I territorial units considered.

new_and_exit_voters

A character string indicating the level of information available regarding new entries and exits of the election censuses between the two elections. This argument captures the different options discussed on Section 3 of Romero et al. (2020). This argument admits five values: regular, raw, simultaneous, full and gold. Default, regular.

structural_zeros

Default, NULL. A list of vectors of length two, indicating the election options for which no transfer of votes are allowed between election 1 and election 2. For instance, when new_and_exit_voters is set to "regular", lphom implicitly states structural_zeros = list(c(J, K)) in case exits and/or entries are computed because the sum by rows of votes_election1 and votes_election2 does not coincide.

iter.max

Maximum number of iterations to be performed. The process ends when either the number of iterations reaches iter.max or when the maximum variation between two consecutive estimates of the probability transfer matrix is less than tol. By default, 10.

min.first

A TRUE/FALSE value. If FALSE, the matrix associated with the minimum HETe after performing iter.max iterations is taken as solution. If TRUE, the associated matrix to the instant in which the first decrease of HETe occurs is taken as solution. The process stops at that moment. In this last scenario (when min.first = TRUE), burnin = 0 is forced and iter.max is at least 100. Default, FALSE.

uniform

A TRUE/FALSE value that indicates if census exits affects all the electoral options in a (relatively) similar fashion in each voting unit: equation (13) of Pavia and Romero (2021). Default, TRUE.

distance.local

A string argument that indicates whether the second step of the lphom_local algorithm should be performed in order to resolve potential indeterminacies of local solutions. Default, "abs". If distance.local = "abs" lphom_local selects in its the second step the matrix closer to the temporary global solution
under L_1 norm, among the first step compatible matrices. If distance.local = "abs" lphom_local selects in its the second step the matrix closer to the temporary global solution under L_Inf norm, among the first step compatible matrices. If distance.local = "none", the second step of lphom_local is not performed.

burnin Number of initial solutions to be discarded before determining the final solution. By default, 0.

verbose A TRUE/FALSE value that indicates if the main outputs of the function should be printed on the screen. Default, FALSE.

tol Maximum deviation allowed between two consecutive iterations. The process ends when the maximum variation between two proportions for the estimation of the transfer matrix between two consecutive iterations is less than tol or the maximum number of iterations has been reached. By default, 0.00001.

Details

Description of the new_and_exit_voters argument in more detail.

• regular: The default value. This argument accounts for the most plausible scenario. A scenario with two elections elapsed at least some months. In this scenario, (i) the column J of votes_election1 corresponds to new young electors who have the right to vote for the first time and (ii) net exits (basically a consequence of mortality), and eventually net entries, are computed according equation (7) of Romero et al. (2020), and (iii) we assume net exits affect equally all the first J-1 options of election 1, hence (8) and (9) constraints of Romero et al. (2020) are imposed.

• raw: This value accounts for a scenario with two elections where only the raw election data recorded in the I territorial units, in which the area under study is divided, are available. In this scenario, net exits (basically deaths) and net entries (basically new young voters) are estimated according to equation (7) of Romero et al. (2020). Constraints defined by equations (8) and (9) of Romero et al. (2020) are imposed. In this scenario, when net exits and/or net entries are negligible (such as between the first- and second-round of French Presidential elections), they are omitted in the outputs.

• simultaneous: This value accounts for either a scenario with two simultaneous elections or a classical ecological inference problem. In this scenario, the sum by rows of votes_election1 and votes_election2 must coincide. Constraints defined by equations (8) and (9) of Romero et al. (2020) are not included in the model.

• full: This value accounts for a scenario with two elections elapsed at least some months, where: (i) the column J-1 of votes_election1 totals new young electors that have the right to vote for the first time; (ii) the column J of votes_election1 measures new immigrants that have the right to vote; and (iii) the column K of votes_election2 corresponds to total exits of the census lists (due to death or emigration). In this scenario, the sum by rows of votes_election1 and votes_election2 must agree and constraints (8) and (9) of Romero et al. (2020) are imposed.

• gold: This value accounts for a scenario similar to full, where total exits are separated out between exits due to emigration (column K-1 of votes_election2) and death (column K of votes_election2). In this scenario, the sum by rows of votes_election1 and votes_election2 must agree. The same restrictions as in the above scenario apply but for both columns K-1 and K of the vote transition probability matrix
Value

A list with the following components:

- **VTM**
  - A matrix of order \( J \times K \) with the estimated percentages of vote transitions from election 1 to election 2.

- **OTM**
  - A matrix of order \( K \times J \) with the estimated percentages of the origin of the votes obtained for the different options of election 2.

- **HETe**
  - The estimated heterogeneity index as defined in equation (15) of Pavia and Romero (2021).

- **VTM.complete**
  - A matrix of order \( J' \times K' \) with the estimated proportions of vote transitions from election 1 to election 2, including in regular and raw scenarios the row and the column corresponding to net_entries and net_exits even when they are really small, less than 1% in all units.

- **VTM.sequence**
  - Array of order \( J' \times K' \times (iter+1) \) (where \( iter \) is the effective number of iterations performed) of the estimated matrices corresponding to each iteration.

- **HETe.sequence**
  - Numeric vector of length \( iter+1 \) with the \( HETe \) coefficients corresponding to the matrices in \( VTM.sequence \).

- **VTM_units**
  - An array of order \( J' \times K' \times I \) with the estimated proportions of vote transitions from election 1 to election 2 attained for each unit in the selected iteration.

- **VTM_votes**
  - An array of order \( J' \times K' \times I \) with the estimated matrix of vote transitions from election 1 to election 2 attained for each unit in the selected iteration.

- **zeros**
  - A list of vectors of length two, indicating the election options for which no transfer of votes are allowed between election 1 and election 2.

- **iter**
  - The real final number of iterations performed before ending the process.

- **iter.min**
  - Number of the iteration associated to the selected \( VTM \) solution.

- **inputs**
  - A list containing all the objects with the values used as arguments by the function.

- **origin**
  - A matrix with the final data used as votes of the origin election after taking into account the level of information available regarding to new entries and exits of the election censuses between the two elections.

- **destination**
  - A matrix with the final data used as votes of the origin election after taking into account the level of information available regarding to new entries and exits of the election censuses between the two elections.

- **EHet**
  - A matrix of order \( I \times K \) measuring in each spatial unit a distance to the homogeneity hypothesis, that is, the differences under the homogeneity hypothesis between the actual recorded results and the expected results with the solution in each territorial unit for each option of election two.

- **solution_init**
  - A list with the main outputs produced by \( lphom() \).

  - **VTM_init**
    - A matrix of order \( J \times K \) with the estimated percentages of vote transitions from election 1 to election 2 initially obtained by \( lphom() \).

  - **OTM_init**
    - A matrix of order \( K \times J \) with the estimated percentages of the origin of the votes obtained for the different options of election 2 initially obtained by \( lphom() \).
HETe_init: The estimated heterogeneity index defined in equation (10) of Romero et al. (2020).

EHet_init: A matrix of order IxK measuring in each spatial unit the distance to the homogeneity hypothesis, that is, the differences under the homogeneity hypothesis between the actual recorded results and the expected results, using the lphom() solution, in each territorial unit for each option of election two.

VTM.complete_init: A matrix of order J'xK' with the estimated proportions of vote transitions from election 1 to election 2 initially obtained by lphom(), including in regular and raw scenarios the row and the column corresponding to net_entries and net_exits even when they are really small, less than 1% in all units.

Author(s)

Jose M. Pavia, <pavia@uv.es>
Rafael Romero <rromero@eio.upv.es>

References


See Also

lphom tslphom

Other linear programing ecological inference functions: lphom(), tslphom()

Examples

mt.ns <- nslphom(France2017[, 1:8], France2017[, 9:12],
                 new_and_exit_voters= "raw")
mt.ns$VTM
mt.ns$HETe
mt.ns$solution_init$HETe_init

Tslphom

Implements tslphom algorithm

Description

Estimates RxC vote transfer matrices (ecological contingency tables) with tslphom
Usage

tslphom(
  votes_election1,
  votes_election2,
  new_and_exit_voters = c("regular", "raw", "simultaneous", "full", "gold"),
  structural_zeros = NULL,
  uniform = TRUE,
  distance.local = c("abs", "max", "none"),
  verbose = FALSE
)

Arguments

votes_election1
data.frame (or matrix) of order IxJ (likely of final order IxJ-1 in regular and raw scenarios) with the votes gained by the J political options competing on election 1 (or origin) in the I territorial units considered.

votes_election2
data.frame (or matrix) of order IxK (likely of final order IxK-1 in regular and raw scenarios) with the votes gained by the K political options competing on election 2 (or destination) in the I territorial units considered.

new_and_exit_voters
A character string indicating the level of information available regarding new entries and exits of the election censuses between the two elections. This argument captures the different options discussed on Section 3 of Romero et al. (2020). This argument admits five values: regular, raw, simultaneous, full and gold. Default, regular.

structural_zeros
Default NULL. A list of vectors of length two, indicating the election options for which no transfer of votes are allowed between election 1 and election 2. For instance, when new_and_exit_voters is set to "regular", lphom implicitly states structural_zeros = list(c(J, K)) in case exits and/or entries are computed because the sum by rows of votes_election1 and votes_election2 does not coincide.

uniform
A TRUE/FALSE value that indicates if census exits affects all the electoral options in a (relatively) similar fashion in each voting unit: equation (13) of Pavia and Romero (2021). Default, TRUE.

distance.local
A string argument that indicates whether the second step of the lphom_local algorithm should be performed in order to resolve potential indeterminacies of local solutions. Default, "abs". If distance.local = "abs" lphom_local selects in its the second step the matrix closer to the lphom() solution under \( L_1 \) norm, among the first step compatible matrices. If distance.local = "abs" lphom_local selects in its the second step the matrix closer to the lphom() solution under \( L_\infty \) norm, among the first step compatible matrices. If distance.local = "none", the second step of lphom_local is not performed.

verbose
A TRUE/FALSE value that indicates if the main outputs of the function should be printed on the screen. Default, FALSE.
Details

Description of the new_and_exit_voters argument in more detail.

- **regular**: The default value. This argument accounts for the most plausible scenario. A scenario with two elections elapsed at least some months. In this scenario, (i) the column $J$ of votes_election1 corresponds to new young electors who have the right to vote for the first time and (ii) net exits (basically a consequence of mortality), and eventually net entries, are computed according equation (7) of Romero et al. (2020), and (iii) we assume net exits affect equally all the first $J-1$ options of election 1, hence (8) and (9) constraints of Romero et al. (2020) are imposed.

- **raw**: This value accounts for a scenario with two elections where only the raw election data recorded in the $I$ territorial units, in which the area under study is divided, are available. In this scenario, net exits (basically deaths) and net entries (basically new young voters) are estimated according to equation (7) of Romero et al. (2020). Constraints defined by equations (8) and (9) of Romero et al. (2020) are imposed. In this scenario, when net exits and/or net entries are negligible (such as between the first- and second-round of French Presidential elections), they are omitted in the outputs.

- **simultaneous**: This value accounts for either a scenario with two simultaneous elections or a classical ecological inference problem. In this scenario, the sum by rows of votes_election1 and votes_election2 must coincide. Constraints defined by equations (8) and (9) of Romero et al. (2020) are not included in the model.

- **full**: This value accounts for a scenario with two elections elapsed at least some months, where: (i) the column $J-1$ of votes_election1 totals new young electors that have the right to vote for the first time; (ii) the column $J$ of votes_election1 measures new immigrants that have the right to vote; and (iii) the column $K$ of votes_election2 corresponds to total exits of the census lists (due to death or emigration). In this scenario, the sum by rows of votes_election1 and votes_election2 must agree and constraints (8) and (9) of Romero et al. (2020) are imposed.

- **gold**: This value accounts for a scenario similar to full, where total exits are separated out between exits due to emigration (column $K-1$ of votes_election2) and death (column $K$ of votes_election2). In this scenario, the sum by rows of votes_election1 and votes_election2 must agree. The same restrictions as in the above scenario apply but for both columns $K-1$ and $K$ of the vote transition probability matrix.

Value

A list with the following components

- **VTM**: A matrix of order $J\times K$ with the estimated percentages of vote transitions from election 1 to election 2.

- **OTM**: A matrix of order $K\times J$ with the estimated percentages of the origin of the votes obtained for the different options of election 2.

- **HETe**: The estimated heterogeneity index as defined in equation (15) of Pavia and Romero (2021).

- **VTM.complete**: A matrix of order $J'\times K'$ with the estimated proportions of vote transitions from election 1 to election 2, including in regular and raw scenarios the row and the column corresponding to net_entries and net_exits even when they are really small, less than 1% in all units.
VTM_units An array of order $J' \times K' \times I$ with the estimated proportions of vote transitions from election 1 to election 2 attained for each unit after adjusting the lphom() initial estimate.

VTM_votes An array of order $J' \times K' \times I$ with the estimated matrix of vote transitions from election 1 to election 2 attained for each unit after adjusting the lphom() initial estimate.

zeros A list of vectors of length two, indicating the election options for which no transfer of votes are allowed between election 1 and election 2.

inputs A list containing all the objects with the values used as arguments by the function.

origin A matrix with the final data used as votes of the origin election after taking into account the level of information available regarding to new entries and exits of the election censuses between the two elections.

destination A matrix with the final data used as votes of the origin election after taking into account the level of information available regarding to new entries and exits of the election censuses between the two elections.

EHet A matrix of order $I \times K$ measuring in each spatial unit a distance to the homogeneity hypothesis, that is, the differences under the homogeneity hypothesis between the actual recorded results and the expected results with the solution in each territorial unit for each option of election two.

solution_init A list with the main outputs produced by lphom().

- VTM_init: A matrix of order $J \times K$ with the estimated percentages of vote transitions from election 1 to election 2 initially obtained by lphom().
- OTM_init: A matrix of order $K \times J$ with the estimated percentages of the origin of the votes obtained for the different options of election 2 initially obtained by lphom().
- HETe_init: The estimated heterogeneity index defined in equation (10) of Romero et al. (2020).
- EHet_init: A matrix of order $I \times K$ measuring in each spatial unit the distance to the homogeneity hypothesis, that is, the differences under the homogeneity hypothesis between the actual recorded results and the expected results, using the lphom() solution, in each territorial unit for each option of election two.
- VTM.complete_init: A matrix of order $J' \times K'$ with the estimated proportions of vote transitions from election 1 to election 2 initially obtained by lphom(), including in regular and raw scenarios the row and the column corresponding to net_entries and net_exits even when they are really small, less than 1% in all units.

Author(s)
Jose M. Pavia, <pavia@uv.es>
Rafael Romero <rromero@eio.upv.es>

References
See Also

lphom nslphom

Other linear programing ecological inference functions: lphom(), nslphom()

Examples

mt.ts <- tslphom(France2017P[, 1:8] , France2017P[, 9:12],
new_and_exit_voters= "raw")
mt.ts$VTM
mt.ts$HETe
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