ReGenesees

(R evolved Generalised software for sampling estimates and errors in surveys)

Scope

Design-Based and Model-Assisted Analysis of Complex Sample Surveys

Main Statistical Functions

- **Complex Sampling Designs**
  - Multistage, stratified, clustered, sampling designs
  - Sampling with equal or unequal probabilities, with or without replacement
  - "Mixed" sampling designs (i.e. with both Self-Representing and Non-Self-Representing strata)
- **Calibration**
  - Global and partitioned (for factorizable calibration models)
  - Unit-level and cluster-level weights adjustment
  - Homoscedastic and heteroscedastic models
  - Linear, raking and logit distance functions
  - Bounded and unbounded weights adjustment
  - Multi-step calibration
  - Calibration on multiple regression coefficients
  - Consistent trimming of calibration weights
- **Basic Estimators**
  - Horvitz-Thompson
  - Calibration Estimators
- **Variance Estimation**
  - Multistage formulation (via Bellhouse recursive algorithm)
  - Ultimate Cluster approximation
  - Collapsed strata technique for handling lonely PSUs
  - Taylor linearization of nonlinear smooth estimators
  - Generalized Variance Functions (GVF) method
- **Estimates and Sampling Errors (standard error, variance, coefficient of variation, confidence interval, design effect) for:**
  - Totals
  - Means
  - Absolute and relative frequency distributions (marginal, conditional and joint)
  - Ratios between totals
  - Shares and ratios between shares
  - Multiple regression coefficients
  - Quantiles (variance estimation via the Woodruff method)

  - Population variance and standard deviation of numeric variables
  - Measures of Change derived from two not necessarily independent samples
- **Estimates and Sampling Errors for Complex Estimators**
  - Handles arbitrary differentiable functions of Horvitz-Thompson or Calibration estimators
  - Complex Estimators can be freely defined by the user
  - Automated Taylor-linearization
  - Design covariance and correlation between Complex Estimators
- **Estimates and Sampling Errors for Subpopulations (Domains)**
  - All the analyses above can be carried out for arbitrary domains

System Architecture

ReGenesees is a full-fledged software system entirely developed in R. It has a clear-cut two-layer architecture. The application layer of the system is embedded into an R package named itself **ReGenesees**. A second R package, called **ReGenesees.GUI**, implements the presentation layer of the system. Both packages can be run under Windows, Mac, as well as under most of the Unix-like operating systems. While the **ReGenesees.GUI** package requires the **ReGenesees** package, the latter can be used also without the GUI on top. This means that the statistical functions of the system will always be accessible by users interacting with R through the traditional command-line interface. On the contrary, less experienced R users will take advantage from the user-friendly mouse-click graphical interface.

Data Input/Output

The ReGenesees system can import data in a variety of ways. First, it can load R workspace files (with .RData or .rda extensions) storing previously saved data. Second, data can be imported from Text Files (with extensions .txt, .csv, .dat). Third, the system can import data from MS Excel spreadsheets and/or MS Access database tables. Further extensions are possible. Currently, ReGenesees can save output data into R workspace files (.RData, .rda) and/or export them into Text Files (.txt, .csv, .dat). Further extensions are possible.

Development Status

The current version of the ReGenesees system is **2.2**

Software Documentation

Both packages composing the system (**ReGenesees** and **ReGenesees.GUI**) come with their own reference manuals, which fulfill R standards for packages' documentation.

Software Distribution

The ReGenesees system is distributed as Open Source Software, under the EUPL license.

Website

ReGenesees' website is hosted on GITHUB at the following URL:

- https://diegozardetto.github.io/ReGenesees

Authors

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Application layer (i.e. **ReGenesees** package): Diego Zardetto

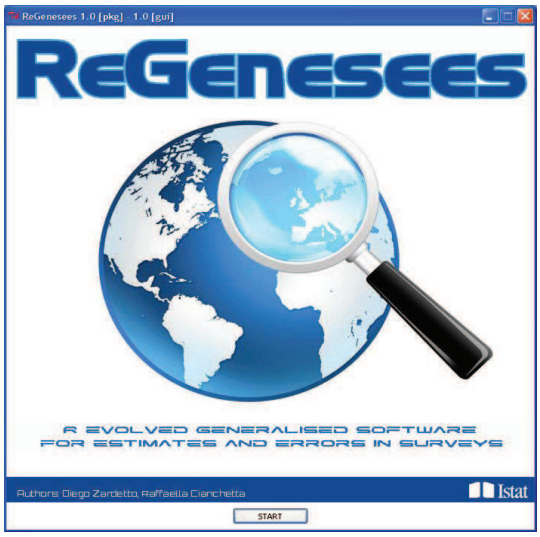
Presentation layer (i.e. **ReGenesees.GUI** package): Diego Zardetto, and Raffaella Cianchetta

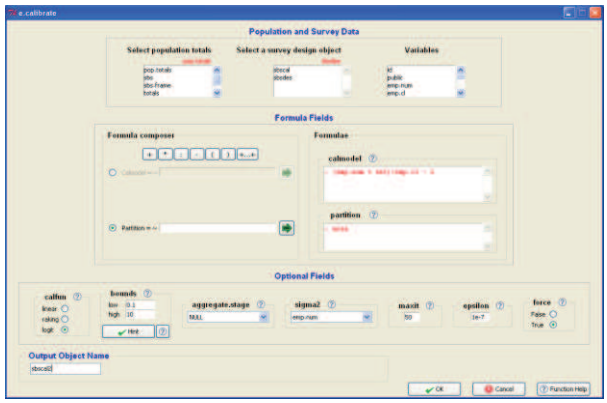
Download

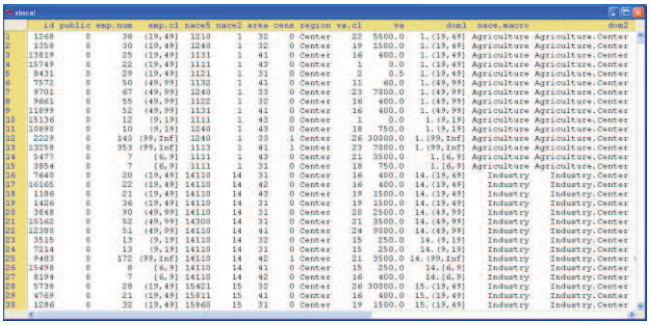
The ReGenesees system can be downloaded from:

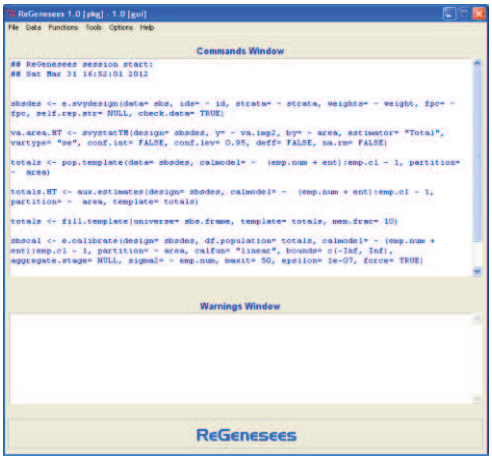
- **Istat website**
  - English:
    http://www.istat.it/en/tools/methods-and-it-tools/processing-tools/regenesees
  - Italian:
    http://www.istat.it/it/strumenti/metodi-e-strumenti-it/strumenti-di-elaborazione/regenesees
- **GITHUB**
  - ReGenesees:
    https://github.com/DiegoZardetto/ReGenesees
  - ReGenesees.GUI:
    https://github.com/DiegoZardetto/ReGenesees.GUI
- **The European Commission Repository for Open Source Software (Joinup):**
  https://joinup.ec.europa.eu/software/regenesees/description

Sample GUI Screenshots









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