# Package ‘eive’

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**Type** Package  
**Title** An algorithm for reducing errors-in-variable bias in simple linear regression  
**Version** 2.1  
**Date** 2014-07-01  
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**Description** EIVE performs a compact genetic algorithm search to reduce errors-in-variables bias in linear regression.  
**License** GPL  
**Imports** Rcpp (>= 0.11.1)  
**LinkingTo** Rcpp  
**NeedsCompilation** yes  
**Repository** CRAN  
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Description

This package includes functions for compact genetic algorithms and errors-in-variable estimation. The function 'eive' performs a genetic search to reduce the errors-in-variable bias in ordinary least squares estimator.

Change log: * In version 2.1, more speed improvements by using lm.fit instead lm in critical code. * In version 2.0, some routines are rewritten in C++ and wrapped using Rcpp so a substantial speed improvement achieved.

Details

Package: eive
Type: Package
Version: 2.1
Date: 2014-07-04
License: GPL

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Description

Function performs a compact genetic algorithm search for a given evaluation function.

Usage

cga(chsize, popsize, evalFunc)

Arguments

chsize Number of bits
popsize Number of population. By default it is 20
evalFunc Function to minimize
Details

CGA (Compact genetic algorithms) sample chromosomes using this probability vector. A probability vector contains \([P_1,P_2,\ldots,P_N]\) and the function generates and returns a chromosome \([B_1,B_2,\ldots,B_N]\). The probability of \(B_K\) having the value of 1 is \(P_K\). So, it has more chance to have \([1,1,0,0]\) than \([0,0,0,1]\) when the probability vector is \([0.9,0.9,0.9,0.1,0.1]\).

Value

Returns the best chromosome with size of chsize.

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Description
Method performs a genetic search to find dummy variables that were used in a two stage linear regression to reduce errors-in-variables bias in linear regression.

Usage
eive.cga(dirtyx, otherx = NULL, y, numdummies = 10, popsize = 20)

Arguments
- **dirtyx**: Vector of values of independent variable measured with error
- **otherx**: Matrix of other independent variables.
- **y**: Vector of values of dependent variable
- **numdummies**: Number of dummy variables used in algorithm. By default, it is 10.
- **popsize**: Population size parameter used in CGA. By default it is 20.

Details
Algorithm performs a genetic search to separate mismeasured independent variable into clean and error parts.

Value
- **ols**: lm object calculated using original values
- **eive**: lm object calculated using the predicted variable by eive
- **proxy**: lm object of proxy regression obtained by genetic search.

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Examples
# Creating an artificial data

# Loading required package
require("eive")

# Setting random number generator seed to 12345
# so each time the script runs, same numbers will
# be generated
set.seed(12345)
# Number of observations is set to 30
n <- 30

# Unobserved X values are drawn from a Normal distribution
# with mean 10 and variance 7
clean.x <- rnorm(n, mean=10, sd=sqrt(7))

# Measurement error values are drawn from a Normal distribution
# with mean 0 and variance 3
delta.x <- rnorm(n, mean=0, sd=sqrt(3))

e <- rnorm(n, mean=0, sd=sqrt(5))

# Generating Y values using the linear model
# In this model, intercept is 20 and slope is 10.
y <- 20 + 10 * clean.x + e

# Generating observed X values by adding measurement errors
# to unobserved X
dirty.x <- clean.x + delta.x

# Performs a genetic search to find dummy variables that
# used in two stage least squares.
# Please un-comment the line below
# result <- eive.cga(dirty.x=dirty.x, y=y, numdummies=10)

# Print the result
# Please un-comment the line below
# print(result)

###########################################################################
# $ols
#
# Call:
# lm(formula = y ~ dirty.x)
#
# Coefficients:
# (Intercept)       dirty.x
#       63.590        5.533
#
# #
#
# $eive
#
# Call:
# lm(formula = y ~ ols.proxy$fitted.values)
#
# Coefficients:
# (Intercept) ols.proxy$fitted.values
#       23.863        9.229
generate.eive.data

Generates data for errors-in-variables model

Description

This function generates data using a linear regression model with size of \( n \). Then one of the independent variables is contaminated by adding measurement errors. Another independent variable can be included in model.

Usage

\[
generate.eive.data(n, e.sd, delta.sd, seed = 12345, useotherx = FALSE)
\]

Arguments

- \( n \): Number of observations.
- \( e.sd \): Standard deviation of error term of regression.
- \( delta.sd \): Standard deviation of measurement error.
- \( seed \): Random number seed. By default, it is 12345.
- \( useotherx \): Boolean variable. If it is \( \text{TRUE} \), another variable will be created with no errors. By default, it is \( \text{FALSE} \).

Value

Returns a matrix of contaminated variable, other variable (if exists) and independent variable in its columns.

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