

# Package ‘gamlss.demo’

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**Description** Demos for smoothing and gamlss.family distributions.

**Title** Demos for GAMLSS

**LazyLoad** yes

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tcltk, graphics, stats, grDevices

**Suggests** MASS

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demo.BSplines

*Demos for smoothing techniques*

---

## Description

These are demos for teaching smoothing techniques to students

## Usage

```
demo.BSplines()  
demo.RandomWalk(y = NULL, ...)  
demo.histSmo(y = NULL, ...)  
demo.interpolateSmo(y = NULL, w = NULL, ...)  
demo.PSplines(y = NULL, x = NULL, ...)
```

## Arguments

y	for y variable if needed otherwise it is generated
w	for weights if needed
x	for explanatory variable if needed
...	for adding parameters in the plot

## Value

An rpanel plot

## Author(s)

Paul Eilers <p.eilers@erasmusmc.nl>, Brian Marx <bmarx@LSU.EDU>, and Mikis Stasinopoulos <d.stasinopoulos@londonmet.ac.uk>

## References

- Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN
- Eilers, P. H. C. and Marx, B. D. (1996). Flexible smoothing with B-splines and penalties (with comments and rejoinder). *Statist. Sci.*, **11**, 89-121.
- Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape, (with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.
- Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).
- Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

**Examples**

```
demo.PSplines()
```

---

demo.LocalRegression *Local Regression Smoothing*

---

**Description**

This function demonstrate some characteristics of local regression Smoothing

**Usage**

```
demo.LocalRegression(y = NULL, x = NULL, span = 0.5,  
                    position = trunc((n - 1)/2),  
                    deg = 1)  
LPOL(y, x, span = 0.5, position = trunc((n - 1)/2),  
      w = rep(1, length(y)), deg = 1)  
WLPOL(y, x, sd = 0.5, position = trunc((n - 1)/2),  
      w = rep(1, length(y)), deg = 1)
```

**Arguments**

y	The response variable
x	the explanatory variable
span	The smoothing parameters
sd	The standard deviation of a normal kernel used as smoothing parameter
position	The position of the target values in the x axis
w	weights
deg	The degree of the local polynomial

**Details**

The function `demo.LocalRegression` demonstrates some aspects of the Local (unweighed) polynomial regression. The functions `LPOL()` and `WLPOL()` produce plots related to unweighed and weighted local polynomial regression respectively.

**Value**

All function produce plots.

**Author(s)**

Mikis Stasinopoulos

## References

- R Development Core Team (2010) tcltk package, CRAN.
- Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN
- Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.
- Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).
- Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

## See Also

See also [demoDist](#), [gamlss.demo](#)

## Examples

```
demo.LocalRegression()
n <- 100
x <- seq(0, 1, length = n)*1.4
y <- 1.2 + .3*sin(5 * x) + rnorm(n) * 0.2
op <- par(mfrow=c(2,2))
LPOL(y,x, deg=0, position=5)
title("(a) moving average")
LPOL(y,x, deg=1, position=75)
title("(b) linear poly")
WLPOL(y,x, deg=2, position=30)
title("(c) quadratic poly")
WLPOL(y,x, deg=3, position= 50)
title("(b) cubic poly")
par(op)
```

---

demo.Locmean

*Demos for local polynomial smoothing*

---

## Description

Those are four demos to show weighed and unweighed local mean and polynomial smoothing.

## Usage

```
demo.Locmean(y = NULL, x = NULL, ...)
demo.Locpoly(y = NULL, x = NULL, ...)
demo.WLocpoly(y = NULL, x = NULL, ...)
demo.WLocmean(y = NULL, x = NULL, ...)
```

**Arguments**

y                    the response variable. If null it generates its own data  
x                    explanatory variable  
...                   for extra argument in the plot

**Value**

It produces an rpanel plot

**Author(s)**

Mikis Stasinopoulos <d.stasinopoulos@londonmet.ac.uk>

**References**

- Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN
- Eilers, P. H. C. and Marx, B. D. (1996). Flexible smoothing with B-splines and penalties (with comments and rejoinder). *Statist. Sci*, **11**, 89-121.
- Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape, (with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.
- Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).
- Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

**See Also**

[demo.PSplines](#)

**Examples**

```
demo.Locmean()
```

---

demo.NO

*Demos for different gamlss.family distributions*

---

**Description**

The demo functions for showing the gamlss.family distributions. The functions use the package Rpanel.

**Usage**

demo.NO()  
demo.LO()  
demo.NO.LO()  
demo.GU()  
demo.RG()  
demo.exGAUS()  
demo.PE()  
demo.PE.NO()  
demo.TF()  
demo.TF.NO()  
demo.EGB2()  
demo.GT()  
demo.JSU()  
demo.JSUo()  
demo.NET()  
demo.SHASH()  
demo.SEP1()  
demo.SEP2()  
demo.SEP3()  
demo.SEP4()  
demo.ST1()  
demo.ST2()  
demo.ST3()  
demo.ST4()  
demo.ST5()  
demo.EXP()  
demo.GA()  
demo.LOGNO()  
demo.NO.LOGNO()  
demo.IG()  
demo.WEI()  
demo.WEI2()  
demo.WEI3()  
demo.BCCG()  
demo.GG()  
demo.GIG()  
demo.ZAGA()  
demo.ZAIG()  
demo.BCT()  
demo.BCPE()  
demo.GB2()  
demo.EGB2()  
demo.BE()  
demo.BEo()  
demo.GB1()  
demo.GT()  
demo.BB()

demo.BEINF()  
demo.BEINF0()  
demo.BEINF1()  
demo.BI()  
demo.DEL()  
demo.LG()  
demo.NBI()  
demo.NBII()  
demo.PO()  
demo.SICHEL()  
demo.ZABI()  
demo.ZAGA()  
demo.ZALG()  
demo.ZAP()  
demo.ZIBI()  
demo.ZIP()  
demo.ZIP2()  
demo.BCCG()  
demo.GG()  
demo.PIG()  
demo.ZABB()  
demo.ZIBB()  
demo.ZANBI()  
demo.ZINBI()  
demo.ZIPIG()  
demo.NOtr()  
demo.GAtr()  
demo.YULE()  
demo.WARING()  
demo.GEOM()  
demo.IGAMMA()  
demo.PARETO2()  
demo.PARETO2o()  
demo.SHASHo()  
demo.SHASHo2()  
demo.LOGITNO()  
demo.LOGNO2()  
demo.SN1()  
demo.SN2()  
demo.SST()  
demo.TF2()  
demo.DPO()

**Value**

An rpanel plot

**Author(s)**

Mikis Stasinopoulos <d.stasinopoulos@londonmet.ac.uk>, Bob Rigby <r.rigby@londonmet.ac.uk>  
with contribution from Larisa Kosidou.

**References**

Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN

Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.

Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).

Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

**Examples**

```
demo.NO()
```

---

demoDist

*Interface for demonstrating the gamlss.family distributions*

---

**Description**

The function demoDist is an tcltk interface for plotting all the available gamlss.family distributions.

**Usage**

```
demoDist()
```

**Value**

It creates a tcltk menu

**Author(s)**

Konstantinos Pateras <kostas.pateras@gmail.com>



## References

- R Development Core Team (2010) tcltk package, CRAN.
- Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN
- Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.
- Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).
- Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

## Examples

```
## do not run
demoDist()
```

---

demoLpolyS

*Demo for local polynomial fits*

---

## Description

It starts the gamlss local polynomial demos. It is an tcltk interface for using the local polynomial demos.

## Usage

```
demoLpolyS()
```

## Value

It creates a tcltk menu

## Author(s)

Konstantinos Pateras <kostas.pateras@gmail.com>

## References

- R Development Core Team (2010) tcltk package, CRAN.
- Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN
- Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.
- Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).

Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

### See Also

See also [demoDist](#), [gamlss.demo](#),

### Examples

```
demoLpolyS()
```

---

demoPsplines

*Interface for demonstrating the P-splines and other smoothers*

---

### Description

The function `demoPsplines` is an tcltk interface for P. Eilers and B. Marx demos for P-splines.

### Usage

```
demoPsplines()
```

### Value

Create an tcltk menu

### Author(s)

Konstantinos Pateras <[kostas.pateras@gmail.com](mailto:kostas.pateras@gmail.com)>

### References

R Development Core Team (2010) tcltk package, CRAN.

Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN

Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.

Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).

Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

### See Also

See also [demoDist](#), ~~~

**Examples**

```
demoPsplines()
```

---

```
gamlss.demo
```

*The demo for gamlss distributions and smoothing*

---

**Description**

It starts the gamlss demos. It is an tcltk interface for using the gamlss demos.

**Usage**

```
gamlss.demo()
```

**Value**

It creates a tcltk menu

**Author(s)**

Konstantinos Pateras <kostas.pateras@gmail.com>

**References**

R Development Core Team (2010) tcltk package, CRAN.

Bowman, Bowman, Gibson and Crawford (2008) rpanel, CRAN

Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.

Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>).

Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

**See Also**

See also [demoDist](#), [gamlss.demo](#),

**Examples**

```
gamlss.demo()
```

**Description**

There are four function here to illustrate the fitting of local regressions. i) `Locmean`, which uses local means within a symmetric local window, ii) `Locpoly`, which uses a local polynomial fit within a symmetric local window. iii) `WLocmean`, which uses a Gaussian kernel and iv) `WLocpoly`, which uses local polynomials weighted by a Gaussian kernel

**Usage**

```
Locmean(y, x = seq(1, length(y)), w = rep(1, length(y)), span = 0.5)
Locpoly(y, x = seq(1, length(y)), w = rep(1, length(y)), span = 0.5, order = 1)
WLocmean(y, x = seq(1, length(y)), w = rep(1, length(y)), lambda = 0.5)
WLocpoly(y, x = seq(1, length(y)), w = rep(1, length(y)), lambda = 0.5, order = 1)
```

**Arguments**

<code>y</code>	the response variable
<code>x</code>	the x-variable
<code>w</code>	prior weights
<code>span</code>	the side of the local window compare as a proportion to the total number of observations
<code>lambda</code>	the smoothing parameter for the Gaussian kernel
<code>order</code>	the order of the polynomial

**Details**

Those functions can be used for illustration of the basic concepts of smoothing using small data sets. Do not use them with large data because are computationally inefficient.

**Value**

The functions return a `locW` object with values

<code>fitted.values</code>	the fitted value
<code>residuals</code>	the residuals
<code>edf</code>	the effective degrees of freedom
<code>rss</code>	the residual sum of squares
<code>lambda</code>	the smoothing parameter
<code>y</code>	the y variable
<code>x</code>	the x variable
<code>w</code>	the prior weights

**Author(s)**

Mikis Stasinopoulos, <d.stasinopoulos@londonmet.ac.uk>

**References**

Rigby, R. A. and Stasinopoulos D. M. (2005). Generalized additive models for location, scale and shape,(with discussion), *Appl. Statist.*, **54**, part 3, pp 507-554.

Stasinopoulos D. M., Rigby R.A. and Akantziliotou C. (2006) Instructions on how to use the GAMLSS package in R. Accompanying documentation in the current GAMLSS help files, (see also <http://www.gamlss.org/>)

Stasinopoulos D. M. Rigby R.A. (2007) Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software*, Vol. **23**, Issue 7, Dec 2007, <http://www.jstatsoft.org/v23/i07>.

**See Also**

[loess](#), [ksmooth](#)

**Examples**

```
library(MASS)
data(mcycle)
# local means
m0<-Locmean(mcycle$accel, mcycle$times, span=.1)
m1<-Locmean(mcycle$accel, mcycle$times, span=.2)
m2<-Locmean(mcycle$accel, mcycle$times, span=.3)
span <- c("span=0.1", "span=0.2", "span=0.3")
plot(accel~times, data=mcycle,main="local mean")
lines(fitted(m0)~mcycle$times, col=1, lty=1)
lines(fitted(m1)~mcycle$times, col=2, lty=2)
lines(fitted(m2)~mcycle$times, col=3, lty=3)
legend(1.5,50, legend = span, col = 1:3,
      lty = 1:3, cex = .8, y.intersp = 1)
# kernel estimation
k0<-WLocmean(mcycle$accel, mcycle$times, lambda=1)
k1<-WLocmean(mcycle$accel, mcycle$times, lambda=2)
k2<-WLocmean(mcycle$accel, mcycle$times, lambda=3)
lambda <- c("lambda=1", "lambda=2", "lambda=3")
plot(accel~times, data=mcycle,main="Gaussian kernel fit")
lines(fitted(k0)~mcycle$times, col=1, lty=1)
lines(fitted(k1)~mcycle$times, col=2, lty=2)
lines(fitted(k2)~mcycle$times, col=3, lty=3)
legend(1.5,50, legend = lambda, col = 1:3,
      lty = 1:3, cex = .8, y.intersp = 1)
# local polynomials
l1<-Locpoly(mcycle$accel, mcycle$times, span=.1)
l2<-Locpoly(mcycle$accel, mcycle$times, span=.2)
l3<-Locpoly(mcycle$accel, mcycle$times, span=.3)

span <- c("span=0.1", "span=0.2", "span=0.3")
```

```
plot(accel~times, data=mcycle,main="local linear fit")
lines(fitted(l1)~mcycle$times, col=1, lty=1)
lines(fitted(l2)~mcycle$times, col=2, lty=2)
lines(fitted(l2)~mcycle$times, col=3, lty=3)
legend(1.5,50, legend = span, col = 1:3,
      lty = 1:3, cex = .8, y.intersp = 1)
# weighted local polynomials
lw1<-WLocpoly(mcycle$accel, mcycle$times, lambda=1.5, order=1)
lw2<-WLocpoly(mcycle$accel, mcycle$times, lambda=1.5, order=2)
lw3<-WLocpoly(mcycle$accel, mcycle$times, lambda=1.5, order=3)

span <- c("linear", "quadratic", "cubic")
plot(accel~times, data=mcycle,main="Weighted local linear, quadratic and cubic fits")
lines(fitted(lw1)~mcycle$times, col=1, lty=1)
lines(fitted(lw2)~mcycle$times, col=2, lty=2)
lines(fitted(lw3)~mcycle$times, col=3, lty=3)
legend(1.5,50, legend = span, col = 1:3,
      lty = 1:3, cex = .8, y.intersp = 1)
```

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