Package ‘LICurvature’

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Title Sensitivity Analysis for Case Weight in Normal Linear Regression
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Description This package presents a general method for assessing the
local influence of minor perturbations of case weight for the
linear regression models.
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R topics documented:

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LICurvature-package Assement on Local Influence in Case-Weight for the Linear Regression Models
Description

This Package presents a general method for assessing the local influence of minor perturbations of case-weight for the linear regression models. The method relies on a well-behaved likelihood and certain elementary ideas from differential geometry, and seems to provide a relatively simple, unified approach for handling a variety of problems. A distinguishing feature of this method is its use of log-likelihood contours to gauge influence. Although this Package is concerned primarily with local influence, some discussion of assessing global influence, which is a significantly more difficult problem. We use geometric normal curvatures to characterize the behaviour of an influence graph around omega (Generally, omega can reflect any well-defined perturbation scheme and thus is not restricted to be a collection of case weights.), although the essential results can be obtained by using less descriptive We used it in case-Weight for the linear regression models, also recommended a general reference for deciding whether there is notable local sensitivity or not.

Details

Package: LICurvature
Type: Package
Version: 1.0
Date: 2013-06-23
License: GPL (>=2)

Author(s)

Bahrami Samani and Parsa Maram
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References


Examples

data("Bahrami1")
gender<-Bahrami1$ GENDER
duration <-Bahrami1$ DURATION
y<-Bahrami1$ BMI
X=cbind(gender,duration )
Xstar=cbind(1,X)
p=2;
n=15;
ini=c(0,rep(1,p));

LICurvature(ini,X=X,Xstar=Xstar,y=y,n=n,p=p)
**Bahrami**

*Body Mass Index Data*

**Description**

The medical data set is obtained from an observational study in the Taleghani hospital in Tehran. These data record the Steatosis and BMI for 61 diabetic patients. BMI is a statistical measure of the weight of body mass index. A person scaled height body mass index may be accurately calculated using any of the formulas such as BMI = w/H^2 where W is weight and H is height. As explanatory variable for BMI, duration of diabet is an amount of time or a particular time interval which a person take diabet (a metabolic disorder characterized by high blood suger and other signs). another explanatory variable is gender.

**Usage**

```r
data(Bahrami)
```

**Format**

A data frame with 15 observations on the following 3 variables: DURATION, BMI, GENDER

**Source**

The medical data set is obtained from an observational study in the Taleghani hospital in Tehran.

**References**


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**LICurvature**

*Assessment on Local Influence in Case-Weight for the Linear Regression Models*

**Description**

This Package presents a general method for assessing the local influence of minor perturbations of case-weight for the linear regression models. The method relies on a well-behaved likelihood and certain elementary ideas from differential geometry, and seems to provide a relatively simple, unified approach for handling a variety of problems. A distinguishing feature of this method is its use of log-likelihood contours to gauge influence. Although this Package is concerned primarily with local influence, some discussion of assessing global influence, which is a significantly more difficult problem. We use geometric normal curvatures to characterize the behaviour of an influence graph around omega (Generally, omega can reflect any well-defined perturbation scheme and thus is not restricted to be a collection of case weights.), although the essential results can be obtained by using less descriptive We used it in case-Weight for the linear regression models, also recommended a general reference for deciding whether there is notable local sensitivity or not.
Usage

\texttt{LICurvature(ini = NA, X, Xstar, y, n, p, ...)}

Arguments

ini Initial values
X Covariate matrix
Xstar Design matrix
y Continuous response
n Design matrix
p The number of covariates
\ldots Other arguments

Details

Models for LICurvature are specified symbolically. A typical model has the form response \sim terms where response is the (numeric) continuous response vector and terms are a series of terms which specifies a linear predictor for responses.

Value

lmax Eigenvector
clmax Normal curvatures for case weight in linear regression models

Note

Supported by Shahid Beheshti University

Author(s)

Bahrami Samani and ParsaMaram

References


See Also

\texttt{nlminb}, \texttt{eigen}
Examples

```r
data("Bahrami1")
gender<-Bahrami1$ GENDER
duration <-Bahrami1$ DURATION
y<-Bahrami1$ BMI
X=cbind(gender,duration )
Xstar=cbind(1,X)
p=2;
n=15;
ini=c(0,rep(1,p));

LICurvature(ini,X=X,Xstar=Xstar,y=y,n=n,p=p)
```

## The function is currently defined as
```r
structure(function (x, N)
  useMethod("licurvature")
) UseMethod("LICurvature"), class = "LICurvature"
```

Description

This Package presents a general method for assessing the local influence of minor perturbations of case-weight for the linear regression models. The method relies on a well-behaved likelihood and certain elementary ideas from differential geometry, and seems to provide a relatively simple, unified approach for handling a variety of problems. A distinguishing feature of this method is its use of log-likelihood contours to gauge influence. Although this Package is concerned primarily with local influence, some discussion of assessing global influence, which is a significantly more difficult problem. We use geometric normal curvatures to characterize the behaviour of an influence graph around omega (Generally, omega can reflect any well-defined perturbation scheme and thus is not restricted to be a collection of case weights, although the essential results can be obtained by using less descriptive We used it in case-Weight for the linear regression models, also recommended a general reference for deciding whether there is notable local sensitivity or not

Usage

```r
## Default S3 method:
LICurvature(ini = NA,X,Xstar,y,n,p, ...)
```

Arguments

- **ini**: Initial values
- **X**: Covariate matrix
- **Xstar**: Design matrix
- **y**: Continuous response
Details

Models for LICurvature are specified symbolically. A typical model has the form response ~ terms where response is the (numeric) continuous vector and terms is a series of terms which specify a linear predictor for response.

Value

lmax Eign vector
Clmax Normal curvatures for case weight for linear regression model

Note

Supported by Shahid Beheshti University

Author(s)

Bahrami Samani and ParsaMaram

References


See Also

nlminb,eigen

Examples

function(ini = NA, X,Xstar, y,n,p,...) {
  f <- function(ini = NA, X,Xstar, y,n,p) {
    p=length(X[1,])
    n = nrow(X)
    my = matrix(0,n,p)
    l=vector("numeric",n)
    l=as.vector(l)
    y <- as.vector(y)
    ini <- as.vector(ini)
    Xstar=cbind(1,X)
    Xstar <- as.matrix(Xstar)
    muy=numeric(n)
    for(i in 1:n){
      for(j in 1:p){
        my[i,j]=ini[0:p][[j]]*Xstar[i, ][[j]]}
for (i in 1:n) {
  muy[i] <- sum(my[i,1])
  l[i] <- log(dnorm(y[i], muy[i], ini[p+1]))
}

Like=sum(l)

ini=c(0,rep(1,p))
ml = nlmnb(ini, f, X=X, Xstar=Xstar, y=y, n=n, p=p, lower = c(rep(H-Inf, p), 0), upper = c(rep(Inf,p+1)), hessian = T)
phat=as.matrix(ml$par[0:p+1])
yhat=Xstar
res=y-yhat
res=as.vector(res)
E=diag(res)
Px=Xstar
esq=(res)^2
esq=matrix(esq,n,1)
z1=t(Xstar)
z2=(esq)/(2*(ml$par[p+1])^2)
Delta=rbind(z1,z2)
v1=t(Xstar)
v2=n/(2*(ml$par[p+1])^2)
z=matrix(rep(0),(p+1))
m1=rbind(v1,t(z))
m2=rbind(z,v2)
Lzegond=(-1)*cbind(m1,m2)
Fzegond=t(Delta)
eig=eigen(Fzegond)
eigenval=eig$values
maxval=max(eigenval)
eigvec=eig$vectors
maxvec=eigvec[,which((eigenval)==maxval)]
Q=t(maxvec)
C=2*abs(Q)/(ml$par[p+1])

r <- list(call = ml, lmax=maxvec,Cmax=C)
r$call <- match.call()
  class(r) <- "LICurvature"
  r
}
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