

# Package ‘MAMSE’

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**Type** Package

**Title** Calculation of Minimum Averaged Mean Squared Error (MAMSE) weights.

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**Description** This package calculates the nonparametric adaptive MAMSE weights for univariate, right-censored or multivariate data. The MAMSE weights can be used in a weighted likelihood or to define a mixture of empirical distribution functions.

**Depends** R (>= 2.4.0)

**Suggests**

**License** GPL-2

**Repository** CRAN

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MAMSE-package

*Minimum Averaged Mean Squared Error (MAMSE) Weights.*

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## Description

This package provides algorithms to calculate the nonparametric adaptive MAMSE weights. The MAMSE weights can be used for the weighted likelihood (see references below), or as mixing probabilities to define mixtures of empirical distributions. They provide a framework to borrow strength with minimal assumptions.

## Details

Package:	MAMSE
Type:	Package
Version:	0.1
Date:	2009-02-01
License:	GPL-2
LazyLoad:	yes

Function [MAMSE](#) calculates the MAMSE weights for univariate data, right-censored data, or for the copula underlying the distribution of multivariate data. The function [WKME](#) is used to compute the MAMSE-Weighted Kaplan-Meier estimate with (optional) bootstrap confidence intervals.

## Author(s)

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## References

- F. Hu and J. V. Zidek (2002). The weighted likelihood, *The Canadian Journal of Statistics*, **30**, 347–371.
- J.-F. Plante (2007). *Adaptive Likelihood Weights and Mixtures of Empirical Distributions*. Unpublished doctoral dissertation, University of British Columbia.
- J.-F. Plante (2008). Nonparametric adaptive likelihood weights. *The Canadian Journal of Statistics*, **36**, 443-461.
- J.-F. Plante (2009). Asymptotic properties of the MAMSE adaptive likelihood weights. *Journal of Statistical Planning and Inference*, **139**, 2147-2161.
- J.-F. Plante (2009). About an adaptively weighted Kaplan-Meier estimate. *Lifetime Data Analysis*, **15**, 295-315.
- X. Wang (2001). *Maximum weighted likelihood estimation*, unpublished doctoral dissertation, Department of Statistics, The University of British Columbia.

**See Also**

[MAMSE](#), [WKME](#).

**Examples**

```

set.seed(2009)

# MAMSE weights for univariate data
x=list(rnorm(25),rnorm(250,.1),rnorm(100,-.1))
wx=MAMSE(x)

# Weighted Likelihood estimate for the mean (Normal model)
sum(wx*sapply(x,mean))

#MAMSE weights for copulas
rho=c(.25,.3,.15,.2)
r=2*sin(rho*pi/600)
y=list(0,0,0,0)
for(i in 1:4){
  sig=matrix(c(1,r,r,1),2,2)
  y[[i]]=matrix(rnorm(150),nc=2)
}
wy=MAMSE(y)

# Weighted coefficient of correlation
sum(wy*sapply(y,cor,method="spearman")[2,])

#MAMSE weights for right-censored data

z=list(0,0,0)
for(i in 1:3){
  zo=rexp(100)
  zc=pmin(rexp(100),rexp(100),rexp(100))
  z[[i]]=cbind(pmin(zo,zc),zo<=zc)
}

MAMSE(z,.5,surv=TRUE)

allz=pmin(.5,c(z[[1]][z[[1]][,2]==1,1],z[[2]][z[[2]][,2]==1,1],
  z[[3]][z[[3]][,2]==1,1]))
K=WKME(z,.5,time=sort(unique(c(0,.5,allz,allz-.0001))))
plot(K$time,K$wkme,type='l',col="blue",xlab="x",ylab="P(X<=x)",
  ylim=c(0,.5))
lines(K$time,K$kme[,1],col="red")
legend(0,.5,c("Weighted Kaplan-Meier","Kaplan-Meier"),
  col=c("blue","red"),lty=c(1,1))

```

**Description**

Functions used by [WKME](#) to compute the MAMSE-weighted Kaplan-Meier estimate.

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MAMSE

*Minimum Averaged Mean Squared Error Weights*


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**Description**

Computes the MAMSE weights (see references below for their definition).

**Usage**

```
MAMSE(x, surv=FALSE, ub=NULL, lb=0)
```

**Arguments**

x	A list of $m$ samples. Elements of the list must be vectors of matrices. If they are vectors, the univariate MAMSE weights are computed. Matrices should have $n$ lines with one $p$ -dimensional datum per line. The data are automatically transformed into rescaled ranks by the function <a href="#">ranked</a> . The MAMSE weights for copulas are then calculated. For survival MAMSE weights, use the argument <code>surv=TRUE</code> and provide an $n$ by 2 matrix where the second column is an indicator ( <code>delta</code> ) of whether the time in column 1 is observed ( <code>delta=1</code> ) or censored ( <code>delta=0</code> ).
surv	Controls the calculation of the survival MAMSE weights rather than the multivariate version for copulas.
ub	If <code>surv=TRUE</code> , the upper bound for the integral of the MAMSE criterion.
lb	If <code>surv=TRUE</code> , the lower bound for the integral of the MAMSE criterion.

**Details**

Provided a list of samples, this function returns the Minimum Averaged Mean Squared Error weights. The MAMSE weights can be used in a weighted likelihood, or to define mixtures of empirical distributions. In both cases, the methodology is used to infer on Population 1 while borrowing strength from the other samples provided. Refer to the articles below for the exact definition of the MAMSE weights, their asymptotic properties and simulation results, as well as additional information about the weighted likelihood.

**Value**

A vector of  $p$  elements containing the MAMSE weights for each of the populations.

## References

- F. Hu and J. V. Zidek (2002). The weighted likelihood, *The Canadian Journal of Statistics*, **30**, 347–371.
- J.-F. Plante (2007). *Adaptive Likelihood Weights and Mixtures of Empirical Distributions*. Unpublished doctoral dissertation, University of British Columbia.
- J.-F. Plante (2008). Nonparametric adaptive likelihood weights. *The Canadian Journal of Statistics*, **36**, 443-461.
- J.-F. Plante (2009). Asymptotic properties of the MAMSE adaptive likelihood weights. *Journal of Statistical Planning and Inference*, **139**, 2147-2161.
- J.-F. Plante (2009). About an adaptively weighted Kaplan-Meier estimate. *Lifetime Data Analysis*, **15**, 295-315.
- X. Wang (2001). *Maximum weighted likelihood estimation*, unpublished doctoral dissertation, Department of Statistics, The University of British Columbia.

## See Also

[MAMSE-package](#), [WKME](#).

## Examples

```
set.seed(2009)

# MAMSE weights for univariate data
x=list(rnorm(25),rnorm(25,.1),rnorm(25,.2))
MAMSE(x)

#MAMSE weights for copulas
y=list(matrix(rnorm(150),nc=2),matrix(rnorm(150),nc=2),
  matrix(rnorm(150),nc=2))
MAMSE(y)

#MAMSE weights for right-censored data
z=list(cbind(rexp(50),rbinom(50,1,.5)),cbind(rexp(50,1.1),
  rbinom(50,1,.5)),cbind(rexp(50,.9),rbinom(50,1,.5)))
MAMSE(z,3,surv=TRUE)

#For more examples, see help on "MAMSE-package"
```

## Description

Functions used by [MAMSE](#) to compute the MAMSE weights.

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ranked	<i>Function used by <a href="#">MAMSE</a> to transform the data into rescaled ranks.</i>
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**Description**

Functions used by [MAMSE](#) to convert the data into rescaled ranks. By default, `ranked=function(x){rank(x)/(length(x)+1)}`. The user can redefine the function according to other rescalings.

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WKME	<i>Kaplan-Meier Estimate</i>
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**Description**

Computes the weighted Kaplan-Meier estimate over some time points with optional confidence intervals.

**Usage**

```
WKME(x,ub,lb=0,time=NULL,boot=NULL,REP=1000)
```

**Arguments**

x	A list of m samples. Each element is an n by 2 matrix whose second column is an indicator of whether the time in column 1 is observed (1) or censored (0).
lb,ub	Lower and upper bounds of the integral of the MAMSE criterion.
time	A vector of times at which to compute the Kaplan-Meier estimate.
boot	When NULL, bootstrap confidence intervals are not generated. Otherwise must be a number in (0,1) corresponding to the coverage probability of the bootstrap intervals to be built.
REP	When bootstrap is used, controls the number of pseudo-sample to generate.

**Details**

This function calculates the weighted Kaplan-Meier estimate and can provide pointwise bootstrap confidence intervals.

**Value**

List of elements:

x	Sorted list of the times (observed and censored) from each samples
weight	The size of the jump that the Kaplan-Meier estimate allocates to each time in x.
time	Vector of time points where the function is evaluated.
kme	The Kaplan-Meier estimate for Population 1 evaluated at t ime.

kmeCI	Pointwise bootstrap confidence interval for kme.
wkme	The weighted Kaplan-Meier estimate evaluated at time.
wkmeCI	Pointwise bootstrap confidence interval for wkme.

## References

J.-F. Plante (2007). *Adaptive Likelihood Weights and Mixtures of Empirical Distributions*. Unpublished doctoral dissertation, University of British Columbia.

J.-F. Plante (2009). About an adaptively weighted Kaplan-Meier estimate. *Lifetime Data Analysis*, 15, 295-315.

## See Also

[MAMSE-package](#), [WKME](#).

## Examples

```
set.seed(2009)
x=list(
  cbind(rexp(20),sample(c(0,1),20,replace=TRUE)),
  cbind(rexp(50),sample(c(0,1),50,replace=TRUE)),
  cbind(rexp(200),sample(c(0,1),200,replace=TRUE))
)

allx=pmin(1,c(x[[1]][x[[1]][,2]==1,1],x[[2]][x[[2]][,2]==1,1],
  x[[3]][x[[3]][,2]==1,1]))
K=WKME(x,1,time=sort(unique(c(0,1,allx,allx-.0001))),boot=.9)

plot(K$time,K$wkme,type='l',col="blue",xlab="x",
  ylab="P(X<=x)",ylim=c(0,1))
lines(K$time,K$wkme[,1],col="red")

lines(K$time,K$wkmeCI[1,],lty=2,col="blue")
lines(K$time,K$wkmeCI[2,],lty=2,col="blue")

lines(K$time,K$kmeCI[1,],lty=2,col="red")
lines(K$time,K$kmeCI[2,],lty=2,col="red")
legend(.1,.9,c("Weighted Kaplan-Meier","Kaplan-Meier"),
  col=c("blue","red"),lty=c(1,1))
```

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