

# Package ‘empichar’

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**Type** Package

**Title** Evaluates the Empirical Characteristic Function for Multivariate Samples

**Version** 1.0.0

**Description** Evaluates the empirical characteristic function of univariate and multivariate samples. This package uses 'RcppArmadillo' for fast evaluation. It is also possible to export the code to be used in other packages at 'C++' level.

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 6.1.1

**LinkingTo** Rcpp, RcppArmadillo

**Imports** Rcpp

**Suggests** testthat (>= 2.1.0), spelling, covr

**Language** en-US

**NeedsCompilation** yes

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## R topics documented:

ecf . . . . .	2
ecf_imag . . . . .	2
ecf_mod . . . . .	3
ecf_real . . . . .	4

<b>Index</b>	<b>5</b>
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ecf *Empirical characteristic function*

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**Description**

Empirical characteristic function of a d-dimensional random variable. This function is evaluated at m vectors of size d.

**Usage**

```
ecf(t, smp)
```

**Arguments**

t                    mxd matrix where the function will be evaluated.  
smp                  nxd matrix with sample size if size n.

**Details**

This function must receive matrices or vectors. It is a wrapper function that allows more general inputs.

**Value**

A complex vector of size m with the empirical characteristic function.

**Examples**

```
library(empichar)
t <- seq(-10, 10, 0.05)
X <- rnorm(150, mean = 1)
vals <- ecf(t, X)
plot(t, Re(vals), type = "l", main = "real part")
plot(t, Im(vals), type = "l", main = "imaginary part")
```

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ecf\_imag *Imaginary part of empirical characteristic function*

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**Description**

Imaginary part of empirical characteristic function of a d-dimensional random variable. This function is evaluated at m vectors of size d.

**Usage**

```
ecf_imag(t, smp)
```

**Arguments**

t                    mxd matrix where the function will be evaluated.  
smp                  nxd matrix with sample size if size n.

**Details**

This function must receive matrices or vectors. It is a wrapper function that allows more general inputs.

**Value**

A vector of size m with the imaginary part of the empirical characteristic function.

**Examples**

```
library(empichar)
t <- seq(-10, 10, 0.05)
X <- rnorm(150, mean = 1)
vals <- ecf_imag(t, X)
plot(t, vals, type = "l")
```

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ecf\_mod

*Modulus of empirical characteristic function*

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**Description**

Modulus of empirical characteristic function of a d-dimensional random variable. This function is evaluated at m vectors of size d.

**Usage**

```
ecf_mod(t, smp)
```

**Arguments**

t                    mxd matrix where the function will be evaluated.  
smp                  nxd matrix with sample size if size n.

**Details**

This function must receive matrices or vectors. It is a wrapper function that allows more general inputs.

**Value**

A vector of size m with the modulus of the empirical characteristic function.

**Examples**

```
library(empichar)
t <- seq(-10, 10, 0.05)
X <- rnorm(150)
vals <- ecf_mod(t, X)
plot(t, vals, type = "l")
```

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ecf\_real

*Real part of empirical characteristic function*

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**Description**

Real part of empirical characteristic function of a d-dimensional random variable. This function is evaluated at m vectors of size d.

**Usage**

```
ecf_real(t, smp)
```

**Arguments**

t	mxd matrix where the function will be evaluated.
smp	nxd matrix with sample size if size n.

**Details**

This function must receive matrices or vectors. It is a wrapper function that allows more general inputs.

**Value**

A vector of size m with the real part of the empirical characteristic function.

**Examples**

```
library(empichar)
t <- seq(-10, 10, 0.05)
X <- rnorm(150)
vals <- ecf_real(t, X)
plot(t, vals, type = "l")
```

# Index

ecf, 2  
ecf\_imag, 2  
ecf\_mod, 3  
ecf\_real, 4