Package 'MMiRKAT'

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Type Package

Title Multivariate Microbiome Regression-based Kernel Association Test (MMiRKAT)

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Imports CompQuadForm, vegan

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Description This package tests the association between microbiome community composition and multiple outcomes of interest via the kernel machine regression framework.

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R topics documented:

`D2K` *Distance to Kernel*

Description

This function transfer a distance matrix to a kernel matrix

Usage

```
D2K(D)
```

Arguments

`D`	A distance matrix

Details

This function transfers a distance matrix D to a kernel matrix K by $K = -(I - ee'/n)D^2(I - ee'/n)/2$, where I is the identity matrix, e is the column vector of all ones, and D^2 is the element wise matrix square.

Value

A kernel matrix of the same dimension as the original distance matrix

References

Zhao et al. (2015). Testing in microbiome profiling studies with MiRKAT, the Microbiome Regression–based Kernel Association Test (MiRKAT). The American Journal of Human Genetics, 96(5): 797-807

Examples

```
library(vegan)
n=200
m=500
OTU=matrix(runif(n*m,0,1),n,m)
D=as.matrix(vegdist(OTU, method="bray"))
D2K(D)
```

`MMiRKAT` *Multivariate Microbiome Regression-based Kernel Association Test*

Description

This function tests the association between microbiome community composition and multiple outcomes

Usage

```
MMiRKAT(Y, X = NULL, K)
```

Arguments

`Y`	Outcome matrix, each row is a sample and each column is an outcome variable
`X`	Covariate matrice, which is adjusted for testing association between outcomes and microbiome composition
`K`	Microbiome kernel matrix

Details

The function tests the association between overall microbiome composition and multiple outcomes using the kernel machine regression framework

Value

A p-value for the testing of association between overall microbiome composition and multiple outcomes after adjusting for the effects of covariates

References

Zhao et al. (2015). Testing in microbiome profiling studies with MiRKAT, the Microbiome Regression–based Kernel Association Test (MiRKAT). The American Journal of Human Genetics, 96(5): 797-807

Zhan, X., Tong, X., Zhao, N., Maity, A., Wu, M.C. and Chen, J. (2016). A small–sample multivariate kernel machine test for microbiome association studies. Technical Report.

Examples

```
library(vegan)
library(CompQuadForm)
n=200
p=10
Y=matrix(rnorm(n*p,0,1),n,p)
m=500
OTU=matrix(runif(n*m,0,1),n,m)
D=as.matrix(vegdist(OTU, method="bray"))
K.BC=D2K(D)
MMiRKAT(Y,X=NULL,K.BC)
```

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