K-table methods

in practice

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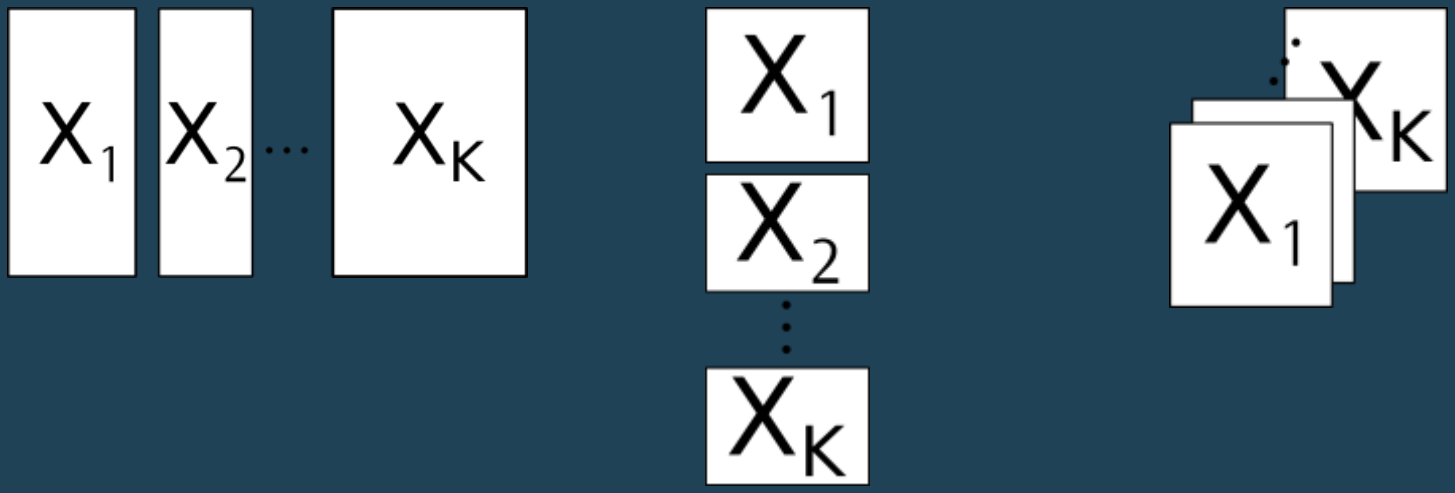
Data structure



- K-tables are stored in objects of class ktab. It is a list of dataframes that share the same row names
- If the common dimension of the tables is the columns, they must be transposed

The `ktab` class

It is a list of data frames with the additional components:

- `lw`: row weights, common to all the tables (vector)
- `cw`: column weights (vector)
- `blo`: number of columns of each table (vector)
- `TL`: index for rows (data frame containing table names and row names)
- `TC`: index for columns (data frame containing table names and column names)
- `T4`: index for 4 elements of an array (data frame containing table names and an index varying from 1 to 4), mainly for internal use
- `call`: function call

Building a `ktab`

Four alternative can be used to build a `ktab` object from different types of arguments:

- `ktab.list.df`: a list of data frames with the same rows
- `ktab.list.dudi`: a list of `dudi` objects with the same rows
- `ktab.within`: an object created by a `wca` analysis
- `ktab.data.frame`: a data frame that should be splitted by columns and a vector indicating the number of columns in each table

Managing `ktab` objects

- `c`: concatenates several ktab objects
- `[`: selects row, column or tables in a ktab
- `t`: transposes all the tables of a ktab (tables must have the same column names and weights)
- `is.ktab`: test if an object is of the class ktab
- `row.names`: returns or modifies the vector of row names shared by all the tables
- `col.names`: returns or modifies the vector of column names
- `tab.names`: returns or modifies the vector of table names
- `ktab.util.names`: automatically builds unique row, column and tab name

Available methods

Various methods are implemented in `ade4`:

- `sepan`: separate analysis
- `pta`: partial triadic analysis
- `foucart`: Foucart analysis
- `mfa`: multiple factor analysis
- `mcoa`: multiple coinertia analysis
- `statis`: STATIS analysis

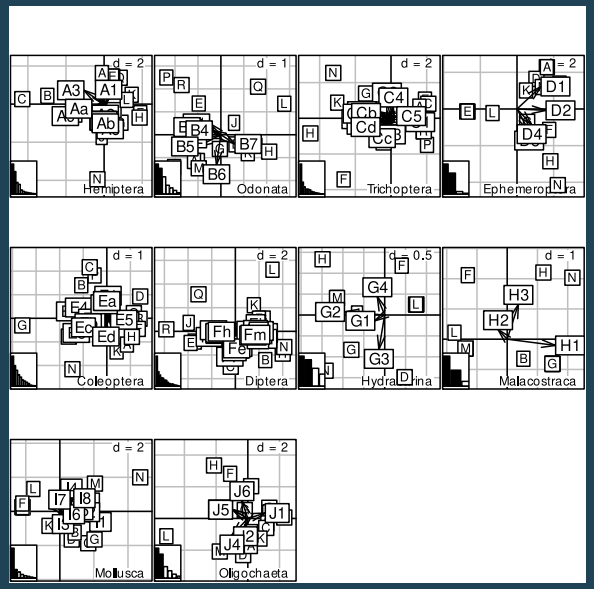
Separate Analyses

After building the `ktab` object, separate analyses can be performed

```
library(ade4)
library(adegraphics)
data(friday87)
df <- data.frame(scalewt(friday87$fau, scale = FALSE))
kta <- ktab.data.frame(df, friday87$fau.blo, tabnames = friday87$tab.nar
sepan_fri <- sepan(kta)
```

Display the results

```
kplot(sepan_fri)
```



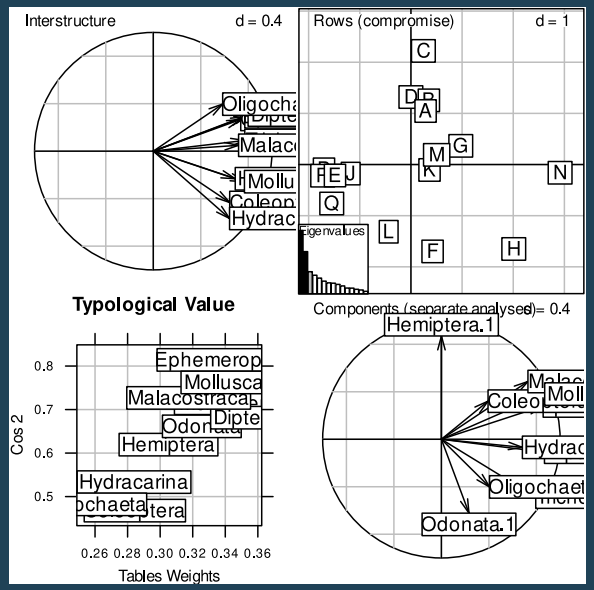
STATIS

To study the common structure, STATIS can be used. The three steps of the analysis are performed by the `statis` function

```
statis_fri <- statis(kta, scannf = FALSE)
```

Display the results

```
g1 <- plot(statis_fri)
```

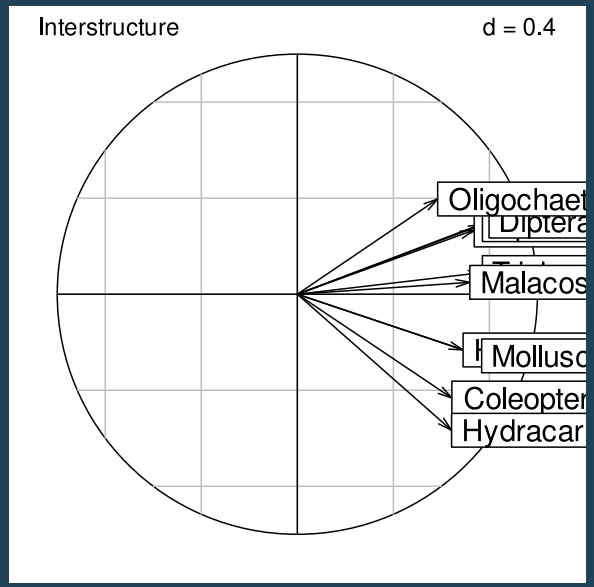



```
names(g1)
```

```
## [1] "inter" "typo"  "row"   "comp"
```

The interstructure

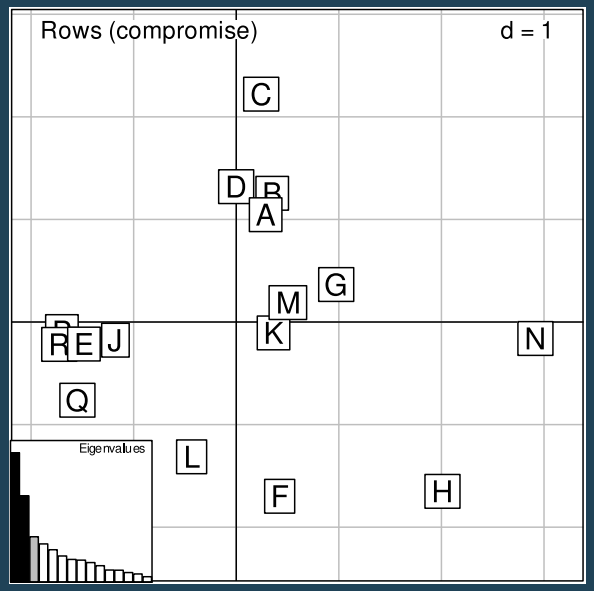
```
g1$inter
```



Eigenvectors and eigenvalues of the matrix of RV coefficients (`statis_fri$RV.coo` and `statis_fri$RV.eig`)

The compromise

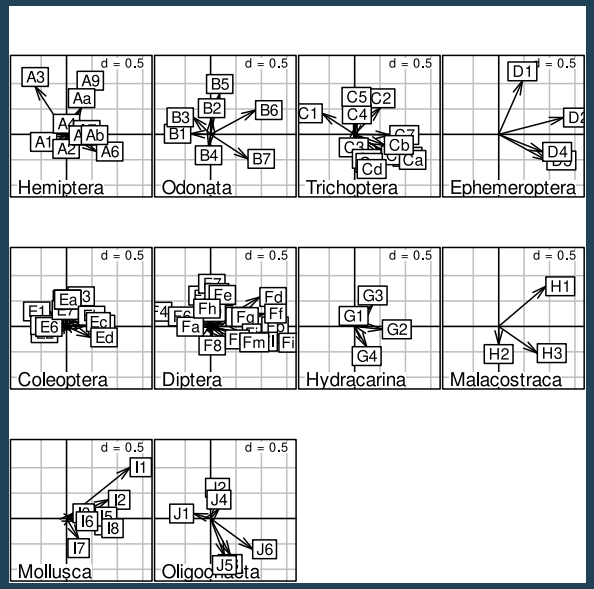
```
g1$row
```



The coordinates of individuals of the compromise are given by $\mathbf{L} = \mathbf{WDUA}^{\frac{1}{2}}$ (`statis_fri$C.li`)

The intrastructure

```
kplot(statis_fri, psub.cex = 1.5)
```



Variables of each table $\mathbf{X}_k$ are represented by the scores $\mathbf{C}_k = \mathbf{X}_k{}^\top \mathbf{D}\mathbf{U}$ (`statis_fri$C.Co`)

Your Turn

1. Create a Rmd or a R file
2. Load one data set from `ade4` that is presented in the course
3. Create an object of the class `ktab` with appropriate function
4. Perform separate analyses
5. Use STATIS to study simultaneously all the tables
6. Interpret