Pattern Matrix

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$\boldsymbol{M}_k\left(d\right)$ is the $k \times k$ diagonal pattern matrix with

$$\left(\boldsymbol{M}_k\left(d\right)\right)_{ij,gh} = \begin{cases} 1 & \text{if} \quad i = j = g = h, \\ 0 & \text{otherwise.} \end{cases} \tag{1}$$

$\boldsymbol{M}_k\left(s\right)$ is the $k \times k$ symmetric pattern matrix with

$$\left(\boldsymbol{M}_k\left(s\right)\right)_{ij,gh} = \begin{cases} 1 & \text{if} \quad i = j = g = h, \\ \frac{1}{2} & \text{if} \quad (i,j) = (g,h) \,\text{or}\, (i,j) = (h,g)\,, \\ 0 & \text{otherwise.} \end{cases} \tag{2}$$

$\boldsymbol{M}_k\left(c\right)$ is the $k \times k$ correlation pattern matrix with

$$\left(\boldsymbol{M}_k\left(c\right)\right)_{ij,gh} = \begin{cases} \frac{1}{2} & \text{if} \quad (i,j) = (g,h) \,\text{or}\, (i,j) = (h,g)\,, \quad i \neq j, g \neq h, \\ 0 & \text{if} \quad i = j = g = h, \\ 0 & \text{otherwise.} \end{cases} \tag{3}$$

Examples

```
library(linearAlgebra)
```

```
matrix(
  c("rho_11", "rho_12", "rho_21", "rho_22"),
  nrow = 2
)
```

```
##      [,1]     [,2]
## [1,] "rho_11" "rho_21"
## [2,] "rho_12" "rho_22"
```

```
mcap_diag(2)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    0    0
## [2,]    0    0    0    0
## [3,]    0    0    0    0
## [4,]    0    0    0    1
```

```
mcap_sym(2)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1  0.0  0.0    0
## [2,]    0  0.5  0.5    0
## [3,]    0  0.5  0.5    0
## [4,]    0  0.0  0.0    1
```

```
mcap_cor(2)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    0  0.0  0.0    0
## [2,]    0  0.5  0.5    0
## [3,]    0  0.5  0.5    0
## [4,]    0  0.0  0.0    0
```

Readings

See Nel (1985) p. 141–142.

References

Nel, D. G. (1985). A matrix derivation of the asymptotic covariance matrix of sample correlation coefficients. *Linear Algebra and its Applications*, *67*, 137–145. https://doi.org/10.1016/0024-3795(85)90191-0