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# Persephone

## Hierarchical Time Series in R

- **persephone** builds on top of **RJDemetra**
- the focus lies on hierarchical time series
  - visualization (interactive plots)
  - diagnostics
- only available on GitHub.
  - still under development: interfaces might change
  - CRAN release is planned for this year

```
remotes::install_github("statistikat/persephone")  
library(persephone)
```

persephone objects can be constructed from time series

```
class(AirPassengers)
```

```
## [1] "ts"
```

```
per_obj <- per_x13(AirPassengers)
```

Now, different methods can be called for the object per\_obj.

```
per_obj$run()  
window(per_obj$adjusted, end = c(1950, 12))
```

##		Jan	Feb	Mar	Apr	May	Jun
##	1949	123.7166	125.2532	125.9332	128.1540	129.0103	126.8570
##	1950	128.1056	133.9933	133.2078	134.0477	134.2078	138.9436
##		Jul	Aug	Sep	Oct	Nov	Dec
##	1949	123.9033	125.7702	127.0349	128.3796	128.5895	129.3838
##	1950	142.6304	145.0065	146.9006	144.5718	140.6555	151.4765



## Autocorrelations of the Residuals



## SI Ratios and Seasonal Factors by Period



## Normal Q-Q Plot



- hierarchical ts: time series that can be broken down into several components
- typical example: price indices
- tree-like structure



Several persephone objects can be combined to a hierarchical time series.

```
data(ipi_c_eu, package = "RJDemetra")
ht <- per_hts(
  NL = per_x13(ipi_c_eu[, "NL"]),
  FR = per_x13(ipi_c_eu[, "FR"]),
  IE = per_x13(ipi_c_eu[, "IT"])
)
ht$run(); ht
```

```
## component class run seasonality log_transform
##          tramoseats TRUE Present TRUE
## NL       x13Single TRUE Present FALSE
## FR       x13Single TRUE Present FALSE
## IE       x13Single TRUE Present FALSE
## arima_mdl n_outliers q_stat
## (3 1 1)(0 1 1) 1      NA
## (0 1 1)(0 1 1) 2      0.2644848
## (0 1 1)(0 1 1) 3      0.2716330
## (3 1 1)(0 1 1) 5      0.2251183
```

```
ht$run()  
plot(ht)
```



## Further plans:

- Eurostat quality report
- dashboards
- methods for comparing direct and indirect adjustments
- hierarchical time series with dynamic weights

More information (including this presentation) can be found on GitHub pages.

- <https://statistikat.github.io/persephone/>

Thank you for your attention!