Applied Time Series Analysis and Forecasting with R

USING R FOR TIME SERIES ANALYSIS

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Preparatory Information

Course structure and content

Required packages

Project based course

- Applying various methods on datasets of different time series characteristics

The most common time series functions in R

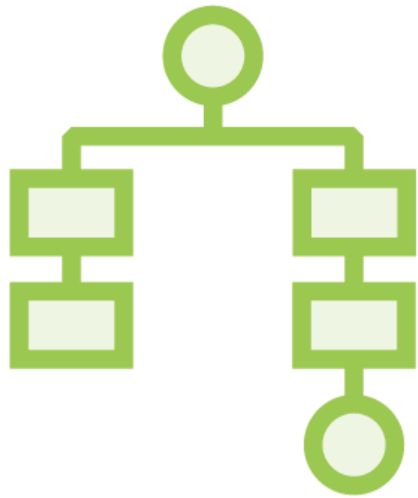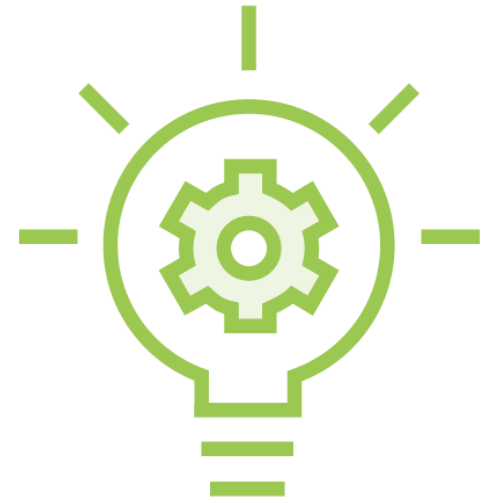**Main library of the course: 'forecast' by Rob J Hyndman**

Course Roadmap

What Is This Course About?

Structure

Content

General idea

Complementary course to: Beginning Time Series Analysis and Forecasting with R

Application of time series models and methods on real world data

Three projects

- Modeling trending time series - labor force participation rates

- Modeling seasonal time series - inflation rates

- Modeling sales data with neural networks

Data visualization techniques and model comparison

Useful Functions and Add-on Packages

Time Series Analysis in R

R is the go-to open source tool for time series analysis

Library 'forecast' and its documentation

The R Base Toolbox

Seasonal decomposition with the functions `decompose()` and `stl()`

ARIMA modeling with the functions `arima()`

- Parameter selection with ACF and PACF plots

Exponential smoothing model with the function `HoltWinters()`

Data visualization with the function `plot()`

Conversion into time series ('ts') class with the function `ts()`

The Library 'forecast'

Developed by Rob J Hyndman and team
The main package of the course
Download and activate the 'forecast' library

The 'forecast' Function

Takes standard models like ARIMA, seasonal decomposition, exponential smoothing, LOCF, or mean

The result always has the same structure

ARIMA Models in 'forecast'

Auto Function

Model parameters are selected automatically

Function: `auto.arima()`

Model adjustment via function parameters

`auto.arima(ts_object)`

Manual Function

Function: `Arima()`

Manual parameter selection

Model parameters are specified with the help of ACF and PACF plots

Lags with autocorrelation are included in the model and subtracted from the data

Exponential Smoothing Models in 'forecast'

ets()
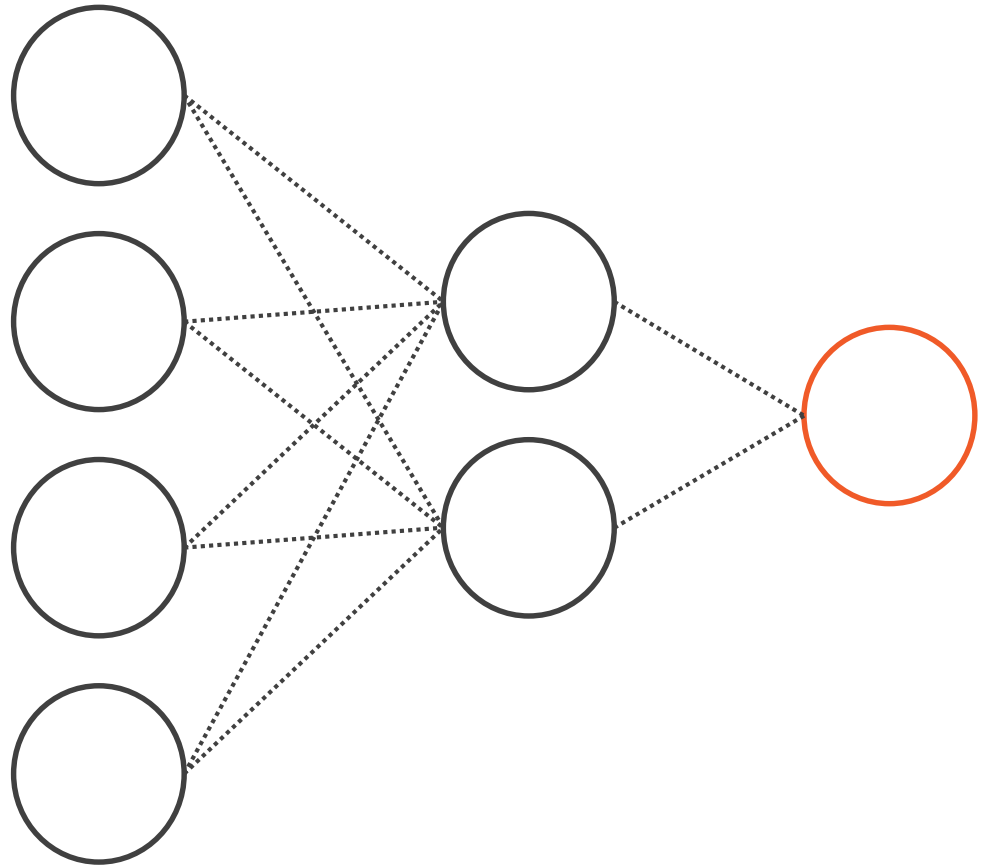Automated parameter selection

ses()
Simple exponential smoothing

hw()
Holt-Winters exponential smoothing

holt()
Holt linear trend model

Neural network model

Function: 'nnetar()'

Explanatory variables

Data Visualizing with 'forecast'

Combination of 'forecast' and 'ggplot2'
- Function 'autoplot()'

Time series specific: Monthplot and seasonplot

Layering models with the function 'autolayer()'

Library 'dygraphs' for interactive data visualizations

Preparatory Information

Three projects with time series of different characteristics

- Trend *or* seasonality
- Trend *and* seasonality

Main package: 'forecast'

Library 'dygraphs' for interactive charts

Theoretical course: Beginning Time Series Analysis and Forecasting with R