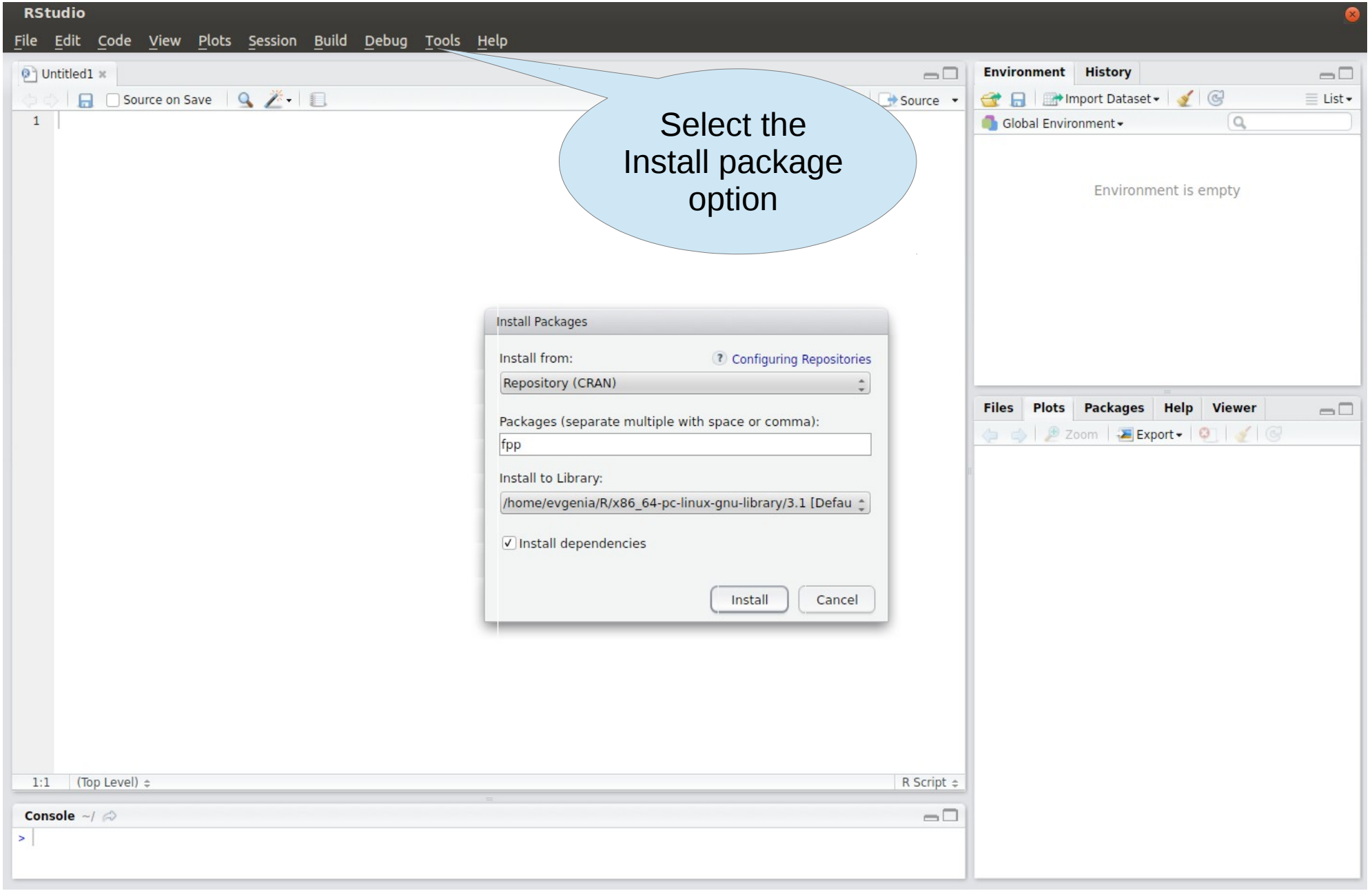
Welcome
to
Dynamic Models for Prediction

First things first...

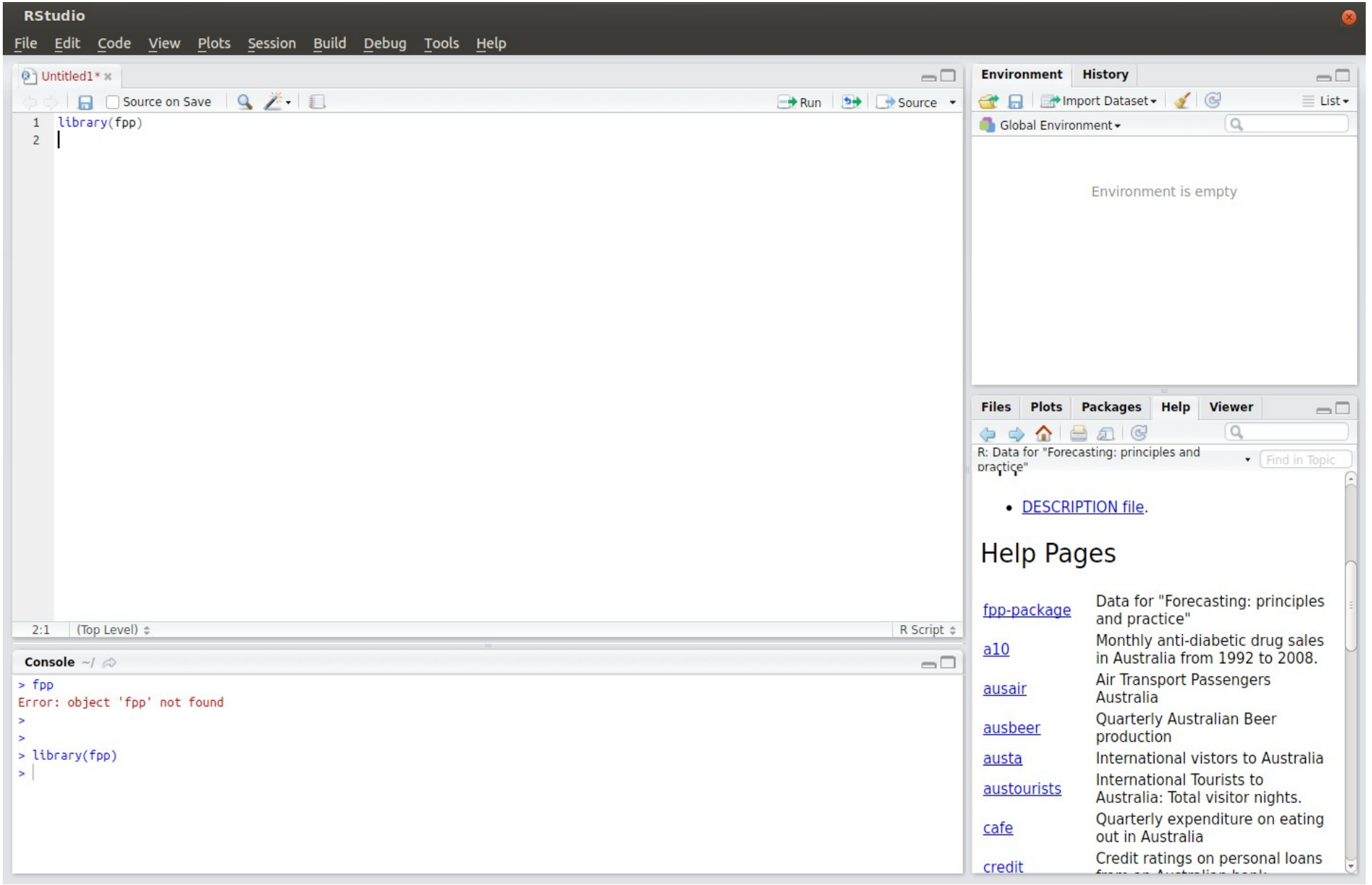
To have fun with R, we need to take a few steps:

- Download and Install R
- Download and Install RStudio

Install the fpp package



Load the package

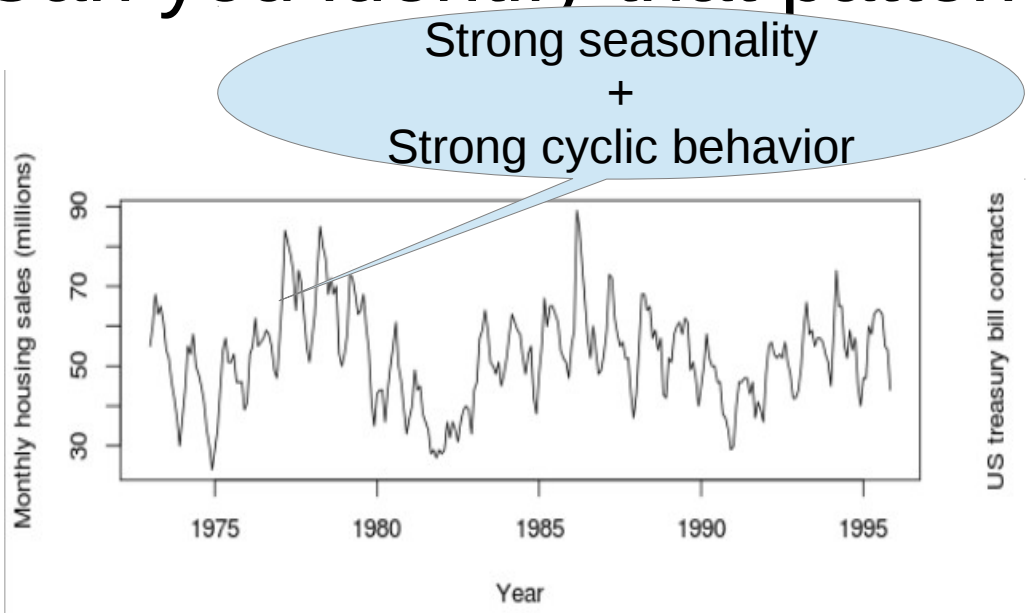


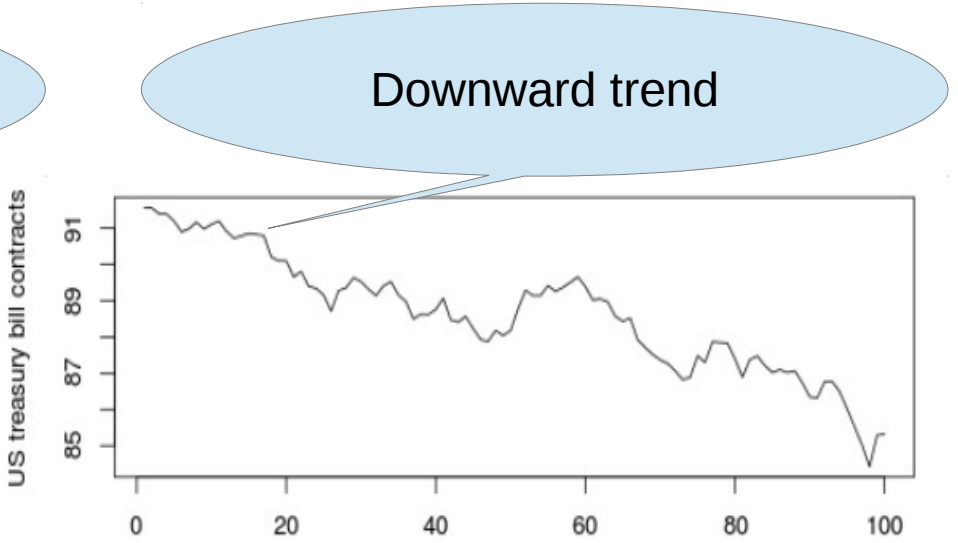
Jumping into the code...

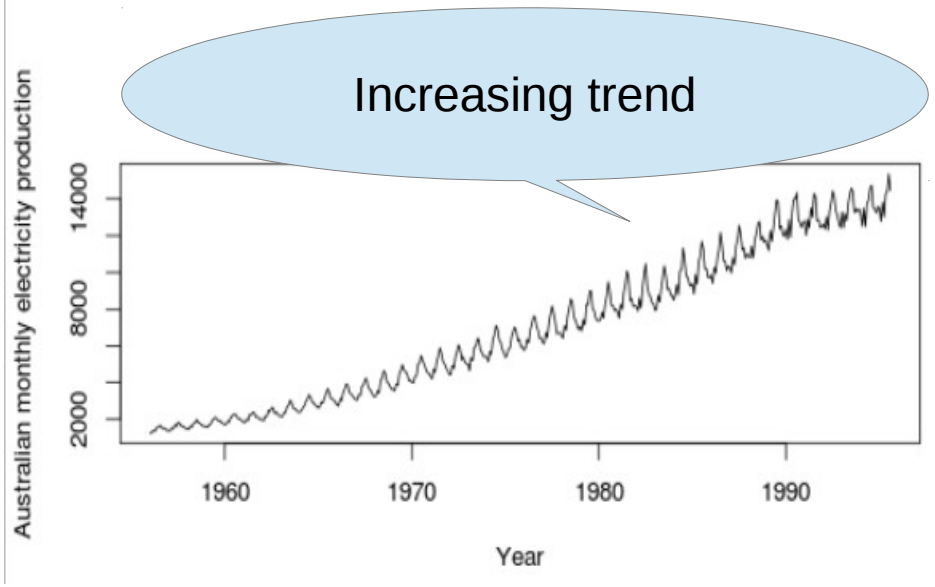

WE'RE
BACK!

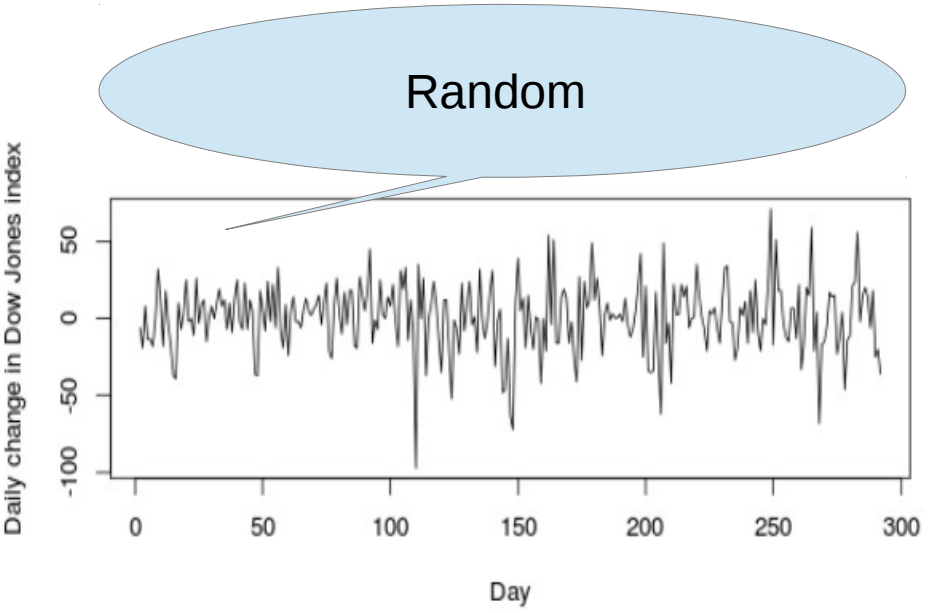
Time series decomposition

Can you identify that pattern?

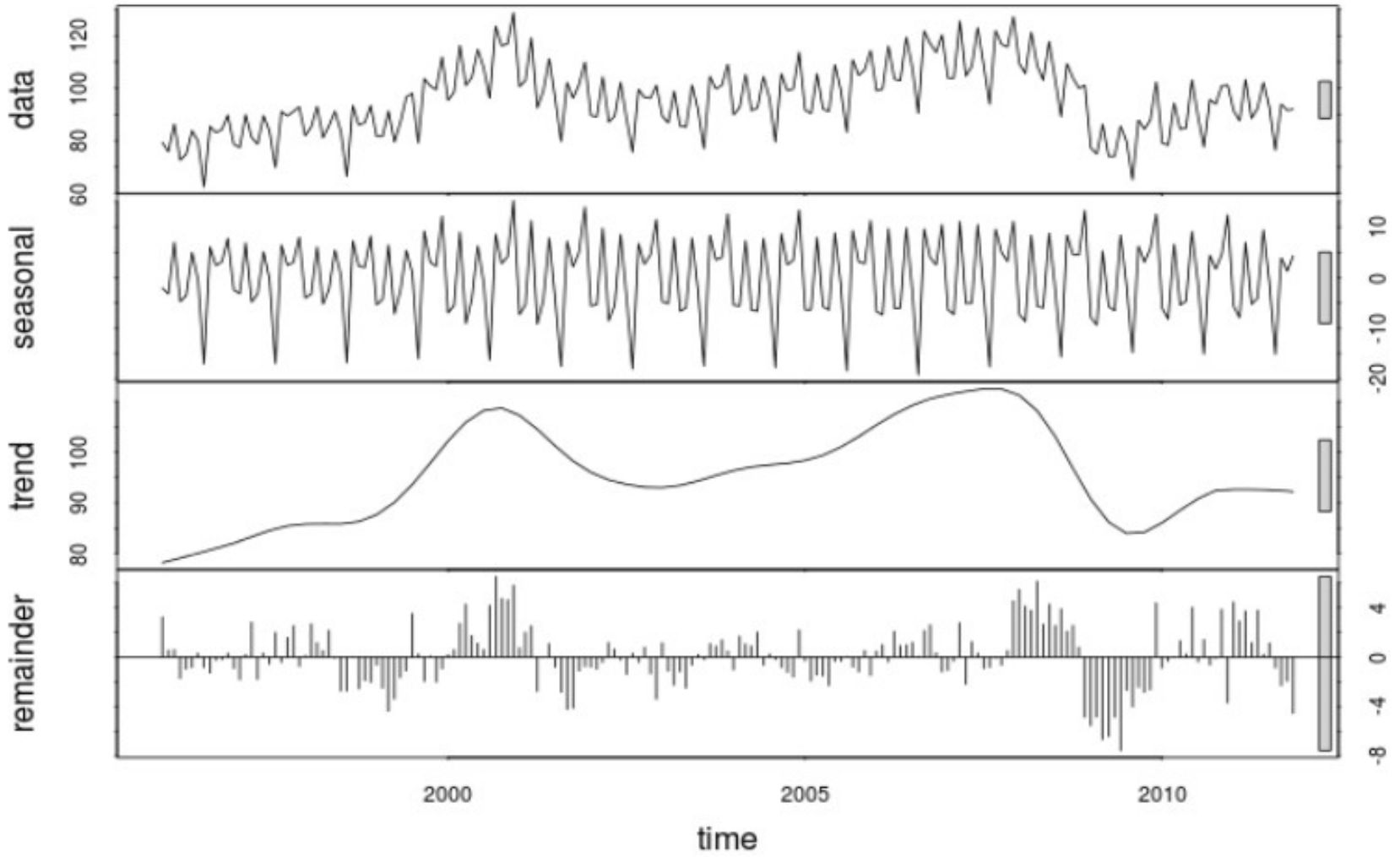








Additive decomposition of data



Examples

Example 1

- Use the Dow Jones index (data set dowjones) to do the following

  a) Produce a time plot of the series

  b) Produce forecasts using the drift method and plot them

  c) Show that the graphed forecasts are identical to extending the line drawn between the first and last observation

  d) Try some of the other benchmark functions to forecast the same data set. Which do you think is best? Why?

Example 2

For the data set *bricksq*:

(a) Split the data into two parts using

bricks1 <- window(bricksq, end = 1987.99)

bricks2 <- window(bricksq, start = 1988)

(b) Check that your data have been split appropriately by producing the following plot

plot(bricksq)

lines(bricks1,col="red")

lines(bricks2, col="blue")

Example 2 (Continuing)

(c) Calculate forecasts using each of the four benchmarks methods applied to bricks1

(d) Compare the accuracy of your forecasts against the actual values stored in *bricks2.* For example:

bricks1mean <- meanf(bricks1)

accuracy(bricks1mean,bricks2)

(e) Which method does best? Why?

Example 2 (Continuing)

(f) For the best method, compute the residuals and plot them. For example

res<- residuals(bricks1drift)

plot(res)

hist(res, breaks="FD")

Do the residuals appear to be uncorrelated and normally distributed?

Example 3

A) From Example 2, use the preferred forecasting method you identified for the bricksq time series and apply it to the full data set.

B) Compute the residuals and plot their ACF. Do the residuals appear to be white noise? What did your forecasting method miss?

C) Do a Ljung-Box test on the residuals. What do the results mean?

Example 4

Use the seasonplot and monthplot functions to explore the seasonal patterns in the following time series:

bricksq,writing,fancy

(a) What can you say about the seasonal patterns?

(b) Can you identify any unusual years?