EXTENDING CRAN PACKAGES WITH BINARIES:
THE EXAMPLE OF X13BINARY

Dirk Eddelbuettel and Christoph Sax
useR! 2016 at Stanford, CA
x13binary (and seasonal)
What is seasonal adjustment?

trend / cycle
  · long term trend

seasonal
  · intra-year fluctuations repeated regularly

irregular
  · Random fluctuations not explained by previous components
**Example: US Unemployment Rate I**

The diagram illustrates a time series decomposition of the US unemployment rate from 1990 to 2015. The decomposition is divided into four components:

- **Original**: The raw data without decomposition.
- **Trend**: The long-term systematic movement in the data.
- **Seasonal**: The periodic fluctuations that recur at regular intervals.
- **Irregular**: The random or unpredictable fluctuations.

The x-axis represents time, ranging from 1990 to 2015, while the y-axis shows the values of the unemployment rate, which is measured in percent. The graph visually separates the different components, allowing for a clearer understanding of the underlying patterns and trends in the unemployment data.
EXAMPLE: US UNEMPLOYMENT RATE II

Original and Adjusted Series

Time


4 5 6 7 8 9 10
Mainly

- To recover the underlying core ‘signal’
- Remove *predictable* seasonal pattern

Why do this? Why not y/y comparisons?

- Turning points
- Calendar effects
What is X-13ARIMA-SEATS?

Key Aspects

- Seasonal Adjustment Software by the US-Census Bureau
- Combination of X-12 and TRAMO/SEATS (Bank of Spain)
- Written in Fortran, delivered as an executable (and its source)
- X-13 (and predecessors) used in almost all (official) statistical offices around the world
library(seasonal) # depends on x13binary
m <- seas(AirPassengers); plot(m)
Online Seasonal Adjustment: www.seasonal.website
GitHub complementing CRAN
Principal Issue

In a nutshell

- **seasonal** package makes it easy to work with **X13-ARIMA**
- However, it *still* requires the user to do manual installation
- How large a drop-off in users does this create?
- Now **CRAN** is *wonderful*:
  - quality, curation, checks, availability
  - we just press a button or run an installer function
  - and it all *just works*
Our insight

- Leverage the strength of CRAN and R
- Provide an installer package which when installed will complement with a ‘hidden’ binary
- Other key idea: GitHub as a (web, file) server
Key Steps

- A GitHub repository `x13prebuilt` is set up containing the binaries of `x13ashtml` for the three key OSs we care about.
- A CRAN package `x13binary` (with corresponding code in a GitHub repo) then relies on the former and copies binaries as needed (upon package creation via the `configure` step).
- We added additional bells and whistles for checks once installed etc pp.
Simple, really

- `x13binary` is now a CRAN package, available globally and in the repository system
- *Clients* such as `seasonal` (and therefore second-degree clients like `gunsales` and `ggseas`) just depend on it
- `x13binary` then utilizes `x13prebuilt` to provide `x13ashtml` during ‘compilation’ of the `x13binary` package
- CRAN does not offer (externally-built) binaries (for security reasons) but allows access to them during compilation step
- *And it all just works*
Summary
Takeways

- De-seasonalisation is very powerful, very widely used, and implemented *once* by US Census
- Use from R was already easy and convenient thanks to *seasonal*
- but manual / tedious to set up
- By leveraging CRAN and GitHub infrastructure all steps can now be automated
Takeways

- De-seasonalisation is very powerful, very widely used, and implemented *once* by US Census
- Use from R was already easy and convenient thanks to `seasonal`
- By leveraging CRAN and GitHub infrastructure all steps can now be automated