The Use of R Shiny at the U.S. Bureau of Labor Statistics

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Abstract

Economists and statisticians at the U.S. Bureau of Labor Statistics (BLS) have developed several R Shiny applications that are or will soon be used at various points throughout the survey lifecycle. The National Compensation Survey is nearing completion on an app that will allow field supervisors to monitor the progress of data collection at the national, regional, and state levels. The Producer Price Index uses an app which provides time series and other visualizations to aid in data review. The Consumer Expenditure Survey has developed an app that allows stakeholders to view key data quality metrics such as response rates and imputation rates over time. The Office of Publications is working on a system that will automatically generate news release statements from structured data tables. In this presentation, I will show examples of how these applications are or will be used and discuss challenges we have encountered in developing and deploying these applications. I will discuss the use of R-Portable as a workaround for deploying applications within an organization.
Outline

Intro to the Use of R at BLS
R Shiny Applications at BLS
Shiny Deployment Without a Server
Other Uses of R at BLS

Minutes

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Minutes
Intro to the Use of R at BLS

- The Bureau of Labor Statistics (BLS) is one of 13 principal U.S. federal statistical agencies (~2,000 employees)
- Collects and disseminates data on labor market activity, working conditions, and price changes
- R is NOT approved for production activities
  - We primarily use SAS for production
  - R is used for some research and assistance activities
- 73 R projects at various points in development
Not Available (Yet)
NCS Response App

- **Office:** National Compensation Survey
- **Audience:** Internal
- **Data Source:** Data Collection Management System
- **Use:** Monitor the progress of data collection in (near) real-time
- **Status:** In Development
- **Packages Used:** leaflet, highcharter, plotly
PPI Visualization Dashboard

- **Office:** Producer Price Index
- **Audience:** Internal
- **Data Source:** Pre-Release Database
- **Use:** Provide context for current month’s data for the purpose of data review
- **Status:** In Use
- **Packages Used:** Roracle, highcharter, shinydashboard
OES Data Map

- **Office**: Occupational Employment Statistics
- **Audience**: External
- **Data Source**: Public Data Tables
- **Use**: Disseminate employment and wage data with an easy-to-navigate interface.
- **Status**: Awaiting Approval
- **Packages Used**: leaflet, DT
Next-Gen News Release Statement Generator

- **Office:** Office of Publications
- **Audience:** Internal
- **Data Source:** BLS Public API
- **Use:** Generate and display news release style statements based on BLS public data
- **Status:** In Development
- **Packages Used:** blsAPI, rvest, stringr
Office: Consumer Expenditure Survey

Audience: Internal

Data Source: Post-Analysis Summary Tables

Use: Monitor time series of data quality metrics

Status: In Use

Packages Used: shinydashboard, highcharter
Challenges

- Apps for External Customers (website visitors/data users)
  - Publication standards (accessibility, branding)
  - Data security
  - Server software updates and downtime
  - Host ourselves or use external service

- Apps for Internal Customers (analysts/managers)
  - Connection to databases
  - Authentication/Access
Deploying R Shiny Apps

- BLS is working on getting internally and externally facing R Shiny Servers, but we don’t have them yet.
- For internal apps, we developed a workaround that allows us to deploy apps without a server.
Serverless Deployment

- R-Portable (SourceForge.net)
- Allows user to run a Shiny app like it’s an application on their computer
- We run this on Windows so use a Visual Basic Script to run R-Portable and the app
- App opens in the web browser
- Uses local computer resources to run the app
- Users do not have to install R or install packages
A Better Way

Remote Packages
- App
  - www
- Packages
  - dplyr
  - ...

Local
- R-Portable
  - runShinyApp.R
  - runShiny.vbs
  - log.txt
  - R.exe
Code From Files

This is the code used in the files listed on the previous slide.

■ runShiny.vbs

CreateObject("Wscript.Shell").Run "R-Portable\bin\R.exe CMD BATCH --vanilla --slave runShinyApp.R log.txt" & " " & RND & "", 0, False

■ runShinyApp.R

.libPaths(<PATH TO PACKAGES DIRECTORY>)
shiny::runApp(appDir = "<PATH TO SHINY APP DIRECTORY>", launch.browser=T)

■ server.R (add to end of server.R file or server section of the app.R file in your Shiny Application)

#### CLOSES R WHEN BROWSER WINDOW IS CLOSED ####

session$onSessionEnded(function() {
  tools::pskill(Sys.getpid()) # Ends R session
})
Centralized Deployment

- Users just have to drag a folder to their computer
- Developers can update the application without users needing to download again
- Helps with version control of the app and packages
- You could use a single instance of R-Portable to run several apps (just not simultaneously)
Other Features

- **R Console Output**
  - Can be used for troubleshooting

- **Authentication/Access**
  - Require a user login/password to enter or use the app
  - Requires additional considerations about security

- **User Logging/Audit Trail**
  - Keep a centralized record of who has used the app for auditing purposes but also for analytics
Review

- Cheap and (relatively) easy
- You can replicate most of the common features of a server
- The two-folder setup is ideal

- Works great within an organization, but doesn’t work for external customers
- Some users find it non-intuitive at first
Other Uses of R at BLS

- R Users Group (80+ members)
  - Project Presentations, Tutorials, and Code Labs
- Internal Code Sharing Using GitLab
- Classes
  - In-Person and Online
- Package Development
  - rpms, growfunctions, growcurves
Contact Information

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