Computational Social Science

Final Projects & Shiny Applications

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Plan

1. Course updates
2. Final projects
3. Developing Shiny applications in R

Course updates

- Homework 2 released
  - Github Classroom link in Canvas Module
  - Topics: tidyverse + ggplot2, APIs, and webscraping
  - Deadline: Next Friday, 3/4, 5pm ET

Final projects

Goals

- Build an interactive data visualization app, focused on a topic of social scientific interest
- Showcase skills and knowledge developed in this class
- Add to your portfolio or resume

Final projects

Five steps

- Data collection
- Data cleaning
- Data analysis
- Data visualization
- Building and deploying an app

Final projects

Data collection

- Collect a dataset
  - Data of interest to social scientists
  - Data sources:
    - APIs
    - Webscraping
    - Existing datasets (e.g. General Social Survey, American National Election Study)

Final projects

Data cleaning

- Process dataset to extract relevant data
  - String pre-processing (more next week)
  - Parsing HTML
  - Merging datasets
  - Selecting, grouping, mutating, etc.

Final projects

Data analysis

- Conduct an analysis of the dataset. Possibilities include
  - Data summaries
  - Descriptive statistics (mean, median, mode, etc.)
  - Statistical tests (correlation, t-test, chi-squared, etc.)
  - Statistical modeling (regression, machine learning, topic modeling, etc.)

Final projects

Data visualization

- Construct visualizations of the dataset
  - Relationships between variables
  - Trends over time
  - Animations
  - Maps
- *All apps must have an interactive component*

Final projects

Building and deploying an app

- Use R Shiny to build an interactive app
- Deploy the app on the web using `Shinyapps.io`

Final projects

Final deliverables

1. A deployed Shiny app for interactive data visualization
2. An organized Github repository for the project
3. Documentation and a short written description of the app

Final projects

Milestones

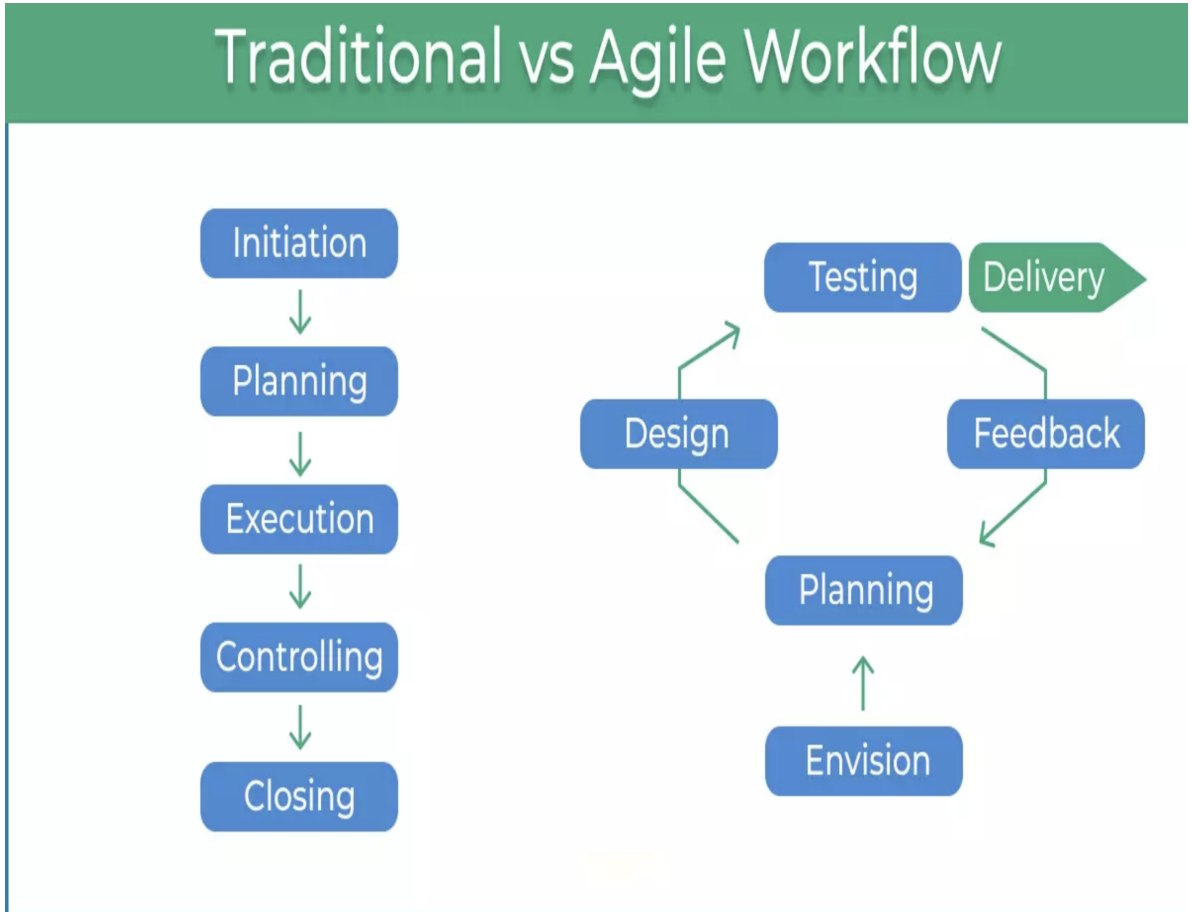
1. Identify a suitable topic
   - *All projects are subject to approval*
2. Initial proposal (due 3/9)
   - A short description of the planned project including plan for data collection, cleaning, analysis, and visualization
3. Prototype (due 4/13)
   - A simple working prototype of your app
4. Presentation (5/2)
   - A chance to present your app
5. App and deliverables submitted (5/6 at 5pm)

Final projects

Feedback

- There will be several opportunities for formal and informal feedback
  - Office hours
  - Discussions with classmates
  - Feedback on proposal and prototype
  - Presentation

Final projects



Final projects

Teamwork

- You can work on the project individually or as part of a team
- Make a decision when you submit your proposal
- Teams will be require to submit an additional document describing contributions of each member
  - Ensure fair distribution of work
  - Git commit history to highlight contributions

Developing Shiny applications in R

What is Shiny?

- Shiny is a package you can use to build interactive web pages directly from R
  - It does not require any experience with HTML, CSS, or Javascript, etc.
- Apps can be hosted on standalone webpages, enabling anyone to access them
- Many extensions available, making Shiny a powerful tool for data visualization and construction of dashboards.

Developing Shiny applications in R

Example 1: Explore your weather

- A simple app to show trends in temperature and precipitation using data from NOAA

Developing Shiny applications in R

Example 1: Explore your weather

- This app visualizes an existing dataset containing information about average temperatures in a given location
- Features
  - Two different plots show temperature and precipitation
  - The user interface contains a search bar, return button, and a random city button
  - Options to change light/dark mode
  - Links to original data and code on Github

Developing Shiny applications in R

Example 2: Bloodbanks in India

- This app maps bloodbanks in India using data from the Open Government Platform
- Interactive, clickable map
- Tabs to show raw data and provide further details

Developing Shiny applications in R

More examples

- There are many more examples in the Gallery on the Shiny website.

Developing Shiny applications in R

Extensions

- There are many extensions of the Shiny framework
  - D3 for data-driven visualization. See 'r2d3' website
  - Leaflet for interactive mapping
  - Plotly for interactive plots
  - STMinsights for exploring structural topic models (Week 9)
- This Github page lists a ton of Shiny resources.

Developing Shiny applications in R

Further readings

- RStudio's Shiny cheatsheet is a really useful quick reference.
- *Mastering Shiny* by Hadley Wickham is available for free online.
- RStudio has a two and a half hour long video tutorial, along with a set of short online tutorials
- Lots of videos on YouTube

Developing Shiny applications in R

Deployment

- Apps can be deployed for free using the Shiny Apps website.* You just need to do the following:
  - Sign up (you can use Github account)
  - Get credentials (key and secret)
  - Authorize credentials
  - Package app in appropriate format
  - Deploy
- Free accounts are limited to 5 apps and 25 active hours a month. You will need to ensure you do not exceed these limits.

Developing Shiny applications in R

Information on example files

- `app.R` is an example of simple Shiny app to interactively plot correlations, along with other descriptive statistics
- `app2.R` modifies the previous app to use the `shinydashboards` framework
- `/app` is a directory containing two files, `ui.R` and `server.R` (the components of `app.R`)
  - `test.R` uses the files in `/app` to launch a local version of the app
  - `app_deploy_template.R` can be run to deploy the app to shinyapps.io.
    - You must add credentials and other information to this template before running it.

Course updates

- Homework 1 feedback and grades
  - Visit Github your repository
  - Click on my comment to see a `diff` or pull changes to your local repo.

Next week

- Introduction to Natural Language Processing

Questions