Introductory Data Science Course Project: Retrieving Data from an API and Conducting an EDA

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Purpose & Goals

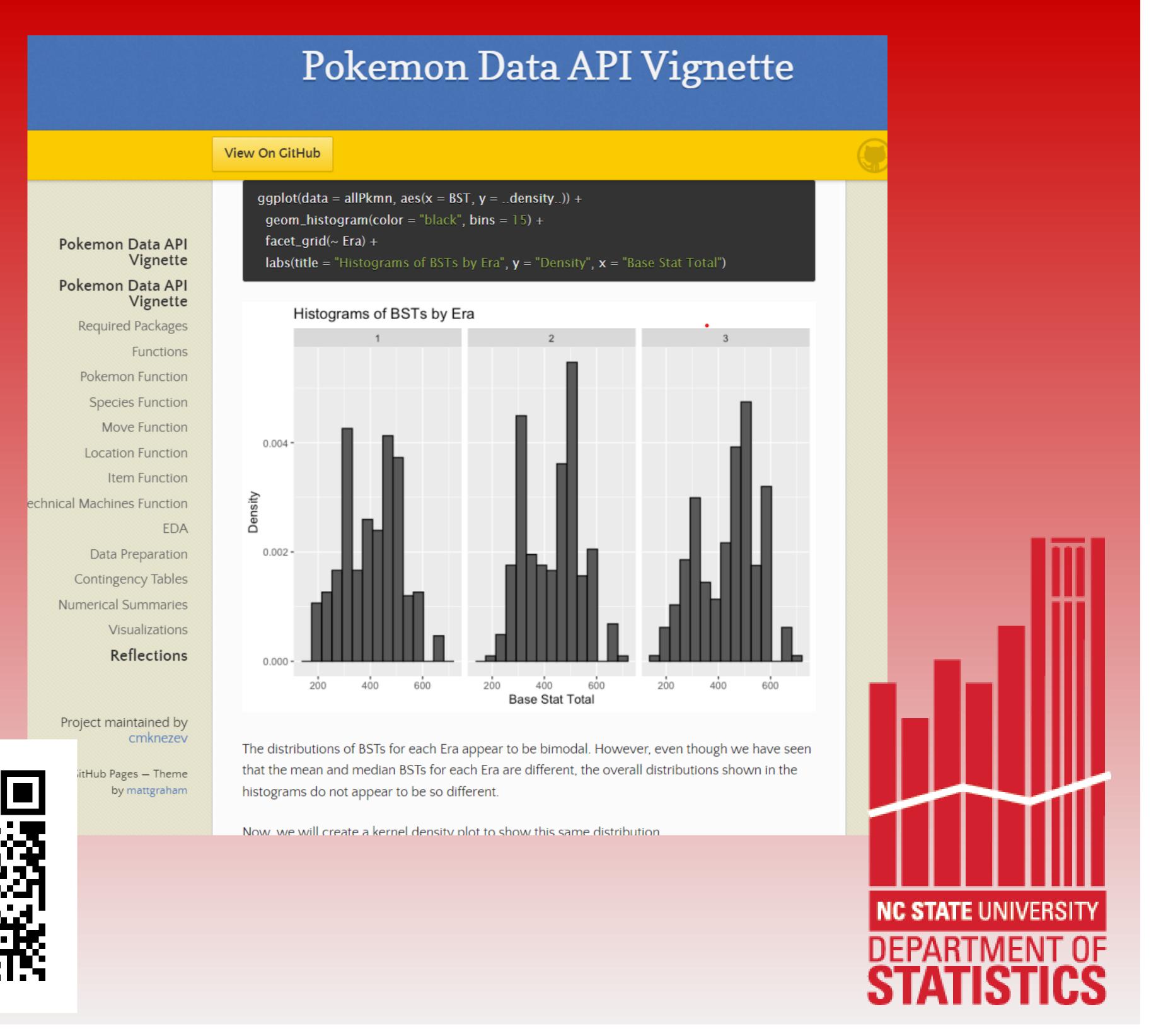
Creating meaningful projects in a data science course can be a time consuming task! With the given example project instructions students:

- must conceptualize how R data is stored and how to manipulate it into a useful form
- must be able to **write custom R functions** meant for another user
- may seek out and find a data source meaningful to them
- are forced to think about the type(s) of data they are downloading and how they can be summarized to meet the Exploratory Data Analysis (EDA) requirements
- use good programming practices in a larger project setting
- communicate their code and results
- (advanced version) create a website to show off their work through RMarkdown and github pages

Project Requirements

- R & RStudio
- RMarkdown to easily create an HTML document with code & output embedded
- dplyr (or Base R) for common data manipulation tasks
- ggplot2 (or Base R) for summarizing the data
- Ability to write custom R functions
- Github (optional) for easy creation of a web site to share their work
- Basic lesson on APIs and handling JSON data

Allow students to show off their R skills and communication ability while investigating data that is meaningful to them!



Application Program Interfaces (APIs)

API - think of as a protocol for passing information between computers

- Build URLs to request specific data:

 https://api.polygon.io/v2/aggs/ticker/AAPL/range/1/day/2023-01-09/2023-01-09?apiKey=*
- httr::GET() for contacting the API via the URL
- Process content element using rawToChar()
- Use jsonlite::fromJSON() to turn results into lists!:
 httr::GET(URL)\$content %>% rawToChar() %>%
 jsonlite::fromJSON()

Project Instructions

Create a vignette (long form description of how a problem was solved) that provides a narrative for using custom functions to contact an API, parse, and return well-structured data. They then use those functions to obtain data from the API and do some exploratory data analysis.

- Vignette written in R Markdown
- Functions return well-formatted data frames Requirement:
- Query at least five different end points
- Not the entire API!
- EDA conducted on resulting data. Requirements:
- Contingency tables
- Summary statistics (means, sds, etc.) at levels of categorical variables
- Bar plot, histogram, box plot, and scatter plot
- Narrative through document explaining process and results
- (Optional) Upload to github and use GitHub pages to render a web page

Resources

Material below available at go.ncsu.edu/uscots2023 (or use the QR code)

- Example notes for querying an API
- Two versions of project instructions
 - Basic version with no github
 - Advanced version that uses github pages to render a web page
 - Simple point rubric included
- Example course projects (thank you to these former students!):
- spoonacular API (wine and food)
- College Scorecard API
- o polygon.io Stock Data API
- Open Movie Database API
- NASA API
- Pokemon API
- Basics of R Open Course