The most difficult school subject (according to Jeopardy)

ERHS 535

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Overview

Research question

What are the most important and most difficult school subjects according to Jeopardy?

Introduction

- Initial data investigation showed subject bias
- Prompted us to consider traditional school subjects
- Decided to compare "Jeopardy-based" education to public school education

Methods: Overview

- Created a dataframe of school subjects and related terms (from Quizlet)
- Separated Jeopardy dataset into 6 subjects (science, math, history, english, geography, and art) by "joining" it with the Quizlet dataframe

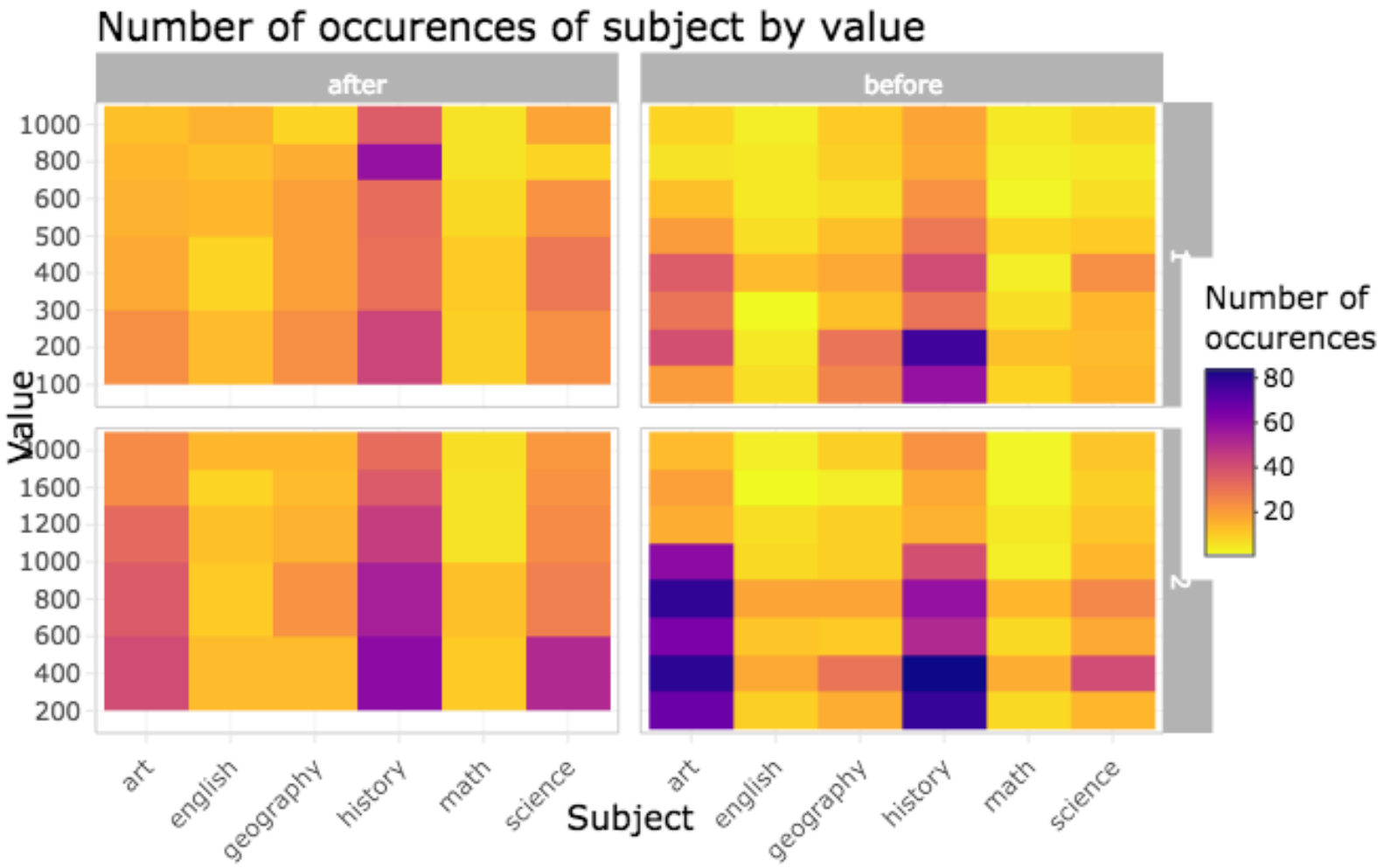
Methods: Joining dataframes

- Converted all Jeopardy data and school subject data to lowercase and removed all special characters
- Randomly sampled 155 vocab terms from school subject data
- Used `inner_join` from the `dplyr` pacakage to match a the "question" to a specific vocab term
- Grouped the "questions" by subject

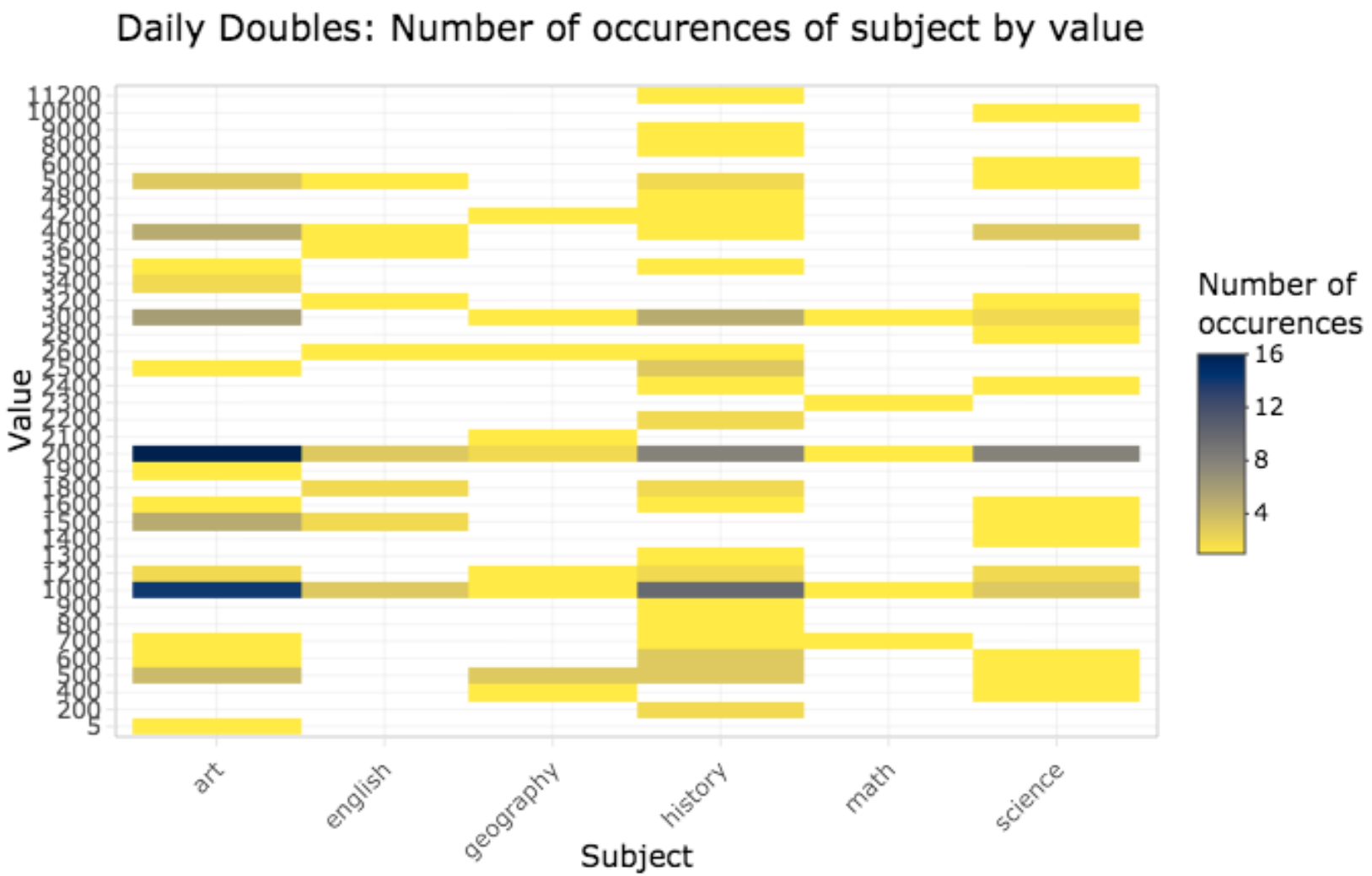
Methods: Determining subject importance and difficulty using joined dataframe

- Discovered answer value changes after November 26, 2001 and decided to separate data into two categories
- Calculated number of occurances of each school subject (most important subject)
- Calculated average value of all "answers" for each school subject (most difficult subject)
- Graphed results using interactive heat map faceted by round and date

Results: Heat map for round 1 and 2



Results: Merging round 1 and 2 heat maps



Results: Summary Statistics before 11/26/2001

	Before November 26, 2001	
subject	**mean_value**	**subject_total**
history	**679.62**	**471**
art	**782.87**	**397**
science	746.59	249
geography	563.98	236
english	645.60	125
math	574.29	105

Results: Summary statistics after 11/26/2001

	After November 26, 2001	
subject	**mean_value**	**subject_total**
history	**965.05**	**309**
science	925.00	280
art	**1034.51**	**226**
geography	842.44	172
english	1007.35	136
math	803.85	78

Conclusion

- AP test scores: Geo, English, History, Science, Math, Art
- Round 1: Art, Science, History, English, Math, Geo
- Round 2: Art, English, History, Science, Geo, Math

Tutorial

Overview: Approach in R

- The data for the subjects which, we would use to filter down the Jeopardy!, questions needed to be created and cleaned
- Initial Jeopardy! and subject data cleaning steps were taken to make the data more uniform (lowercase columns and values) removing special characters and numbers to facilitate our joining.
- The Jeopardy! and subject terms data were then joined, using `inner_join`, by the "question" column to only keep the rows which are in are in Jeopardy! and subjects terms data frames, and `inner_join` returns all columns.

Overview: Approach in R

- For the creation of the subject data we had to utilize the `sample_n()` function from `dplyr` since we had more words for some subjects than others, and we chose to randomly select 155 words from each subject.
- Following our join of the two data frames we had to create one more column to depict the change in value of the question/answers that occurred after November 26, 2001.

Packages

- packages for data filtering
  - library(readr)
  - library(dplyr)
  - library(stringr)
- package for tables
  - library(kableExtra)
- packages for plots
  - library(ggplot2)
  - library(viridis)
  - library(forcats)
  - library(plotly)
  - library(ggthemes)
  - library(RColorBrewer)

Our Code

```r
# jeopardy data
jeop_data <- read_tsv(
  file = "../data/jeopardy_clue_dataset-master/master_season1-35.tsv") %>%
  dplyr::mutate(question = stringr::str_to_lower(question)) %>%
  dplyr::mutate(question = stringr::str_remove_all(question,
                                                   "[^[:alnum:][:blank:]]"))
```

Our Code

```r
# subjects and terms data
sub_term_data <- read_csv("../data/subjects_and_terms.csv") %>%
  rename(vocab_term = Term,
      subject = Subject) %>%
  dplyr::mutate(vocab_term =
                  stringr::str_to_lower(vocab_term)) %>%
  dplyr::mutate(vocab_term =
                  stringr::str_remove_all(vocab_term,
                                          "[^[:alnum:][:blank:]]")) %>%
  dplyr::distinct() %>%
  dplyr::mutate(question = vocab_term) %>%
  dplyr::group_by(subject) %>%
  dplyr::sample_n(size = 155, replace = FALSE) %>%
  dplyr::ungroup()
```

Our Code

```r
jeop_school_joined <- jeop_school_joined %>%
  dplyr::mutate(air_date_type = if_else(air_date < "2006-11-26",
                                        "before", "after"))
```

Lessons learned

- .Rmd can be a curse and a blessing
  - Getting exactly what you think your .pdf should look like knitted isn't always the easist thing.
- GitHub is a wonderful tool for collaborative work
  - Be very sure to inform others when you have pushed large amounts of changes...

References

- Quizlet Inc. (2019). Quizlet. Retrieved from https://quizlet.com/
- R Programming for Research Retrieved from https://geanders.github.io/RProgrammingForResearch/
- Stack Exchange Retrieved from https://stackexchange.com/