Capstone

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1 Google Data Analytics Capstone

You'll have the opportunity to complete an optional case study, which will help prepare you for the data analytics job hunt. Case studies are commonly used by employers to assess analytical skills. For your case study, you'll choose an analytics-based scenario. You'll then ask questions, prepare, process, analyze, visualize and act on the data from the scenario. You'll also learn other useful job hunt skills through videos with common interview questions and responses, helpful materials to build a portfolio online, and more. Current Google data analysts will continue to instruct and provide you with hands-on ways to accomplish common data analyst tasks with the best tools and resources.

Learners who complete this certificate program will be equipped to apply for introductory-level jobs as data analysts. No previous experience is necessary.

By the end of this course, you will: - Learn the benefits and uses of case studies and portfolios in the job search. - Explore real world job interview scenarios and common interview questions. - Discover how case studies can be a part of the job interview process. - Examine and consider different case study scenarios. - Have the chance to complete your own case study for your portfolio.

2 Documentation for global temperature data vis

2.1 Statement of purpose

Here, we want to explore global temperature fluctuations from 1880 to present to look at:

- global trends
- seasonal trends

2.2 Data sources

The GISS Surface Temperature Analysis ver. 4 (GISTEMP v4) is an estimate of global surface temperature change and relevant data was retrieved from: NASA GISS: Datasets –> GISTEMP surface temperature –> Global-mean monthly, seasonal, and annual means, 1880-present, updated through most recent month.

The table accessible via this link and moved into the `data` folder on November 14th, 2022.

2.3 Data analysis

2.3.1 Used libraries

```
library(tidyverse)
library(scales)
library(glue)
```

2.3.2 Read in Data

Since column names start in second row, we need to skip the first line, when reading in the data. NAs are indicated by ***

```
#read in table
temp_data <- read.csv("../data/GLB.Ts+dSST.csv", skip = 1, na =
↪  "***")

#view table
head(temp_data)
```

```
  Year   Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec
1 1880 -0.18 -0.24 -0.08 -0.15 -0.09 -0.20 -0.17 -0.09 -0.14 -0.22 -0.20 -0.17
2 1881 -0.19 -0.13  0.04  0.06  0.08 -0.18  0.01 -0.03 -0.15 -0.21 -0.17 -0.06
3 1882  0.17  0.14  0.05 -0.15 -0.13 -0.21 -0.16 -0.07 -0.14 -0.23 -0.16 -0.35
4 1883 -0.28 -0.36 -0.12 -0.18 -0.17 -0.06 -0.07 -0.13 -0.21 -0.11 -0.24 -0.11
5 1884 -0.12 -0.08 -0.36 -0.39 -0.33 -0.34 -0.30 -0.27 -0.27 -0.24 -0.33 -0.30
6 1885 -0.58 -0.33 -0.26 -0.41 -0.44 -0.43 -0.33 -0.31 -0.28 -0.23 -0.23 -0.09
    J.D   D.N   DJF   MAM   JJA   SON
1 -0.16    NA    NA -0.11 -0.16 -0.19
2 -0.08 -0.09 -0.16  0.06 -0.06 -0.18
3 -0.10 -0.08  0.08 -0.08 -0.14 -0.17
4 -0.17 -0.19 -0.33 -0.15 -0.09 -0.19
5 -0.28 -0.26 -0.10 -0.36 -0.31 -0.28
6 -0.33 -0.34 -0.40 -0.37 -0.36 -0.25
```

Initial observations:

- The data is in long data and includes both monthly data, as well as averages for intervals, such as January to December. To simplify this, we want to only keep relevant columns and store them in long format.

2.3.3 Data cleaning

```
#select only yearly averages and rename columns in a more consistent
↪  manner
JD_data <- temp_data |>
```

```
    #select relevant columns
    select(year = Year, t_diff = J.D) |>
    #drop nas
    drop_na()

head(JD_data)
```

```
  year t_diff
1 1880  -0.16
2 1881  -0.08
3 1882  -0.10
4 1883  -0.17
5 1884  -0.28
6 1885  -0.33
```

```
dim(JD_data)
```

```
[1] 142   2
```

```
#view structure
glimpse(JD_data)
```

```
Rows: 142
Columns: 2
$ year   <int> 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 189~
$ t_diff <dbl> -0.16, -0.08, -0.10, -0.17, -0.28, -0.33, -0.31, -0.36, -0.17, ~
```

```
#extract dates
annotation <- JD_data |>
    arrange(year) |>
    slice(1, n()) |>
    mutate(t_diff = 0,
           x = year + c(-5, 5))

head(annotation)
```

```
  year t_diff    x
1 1880      0 1875
2 2021      0 2026
```

```
#get max temp difference
max_t_diff <- format(round(max(JD_data$t_diff),1), nsmall = 1)
max_t_diff
```

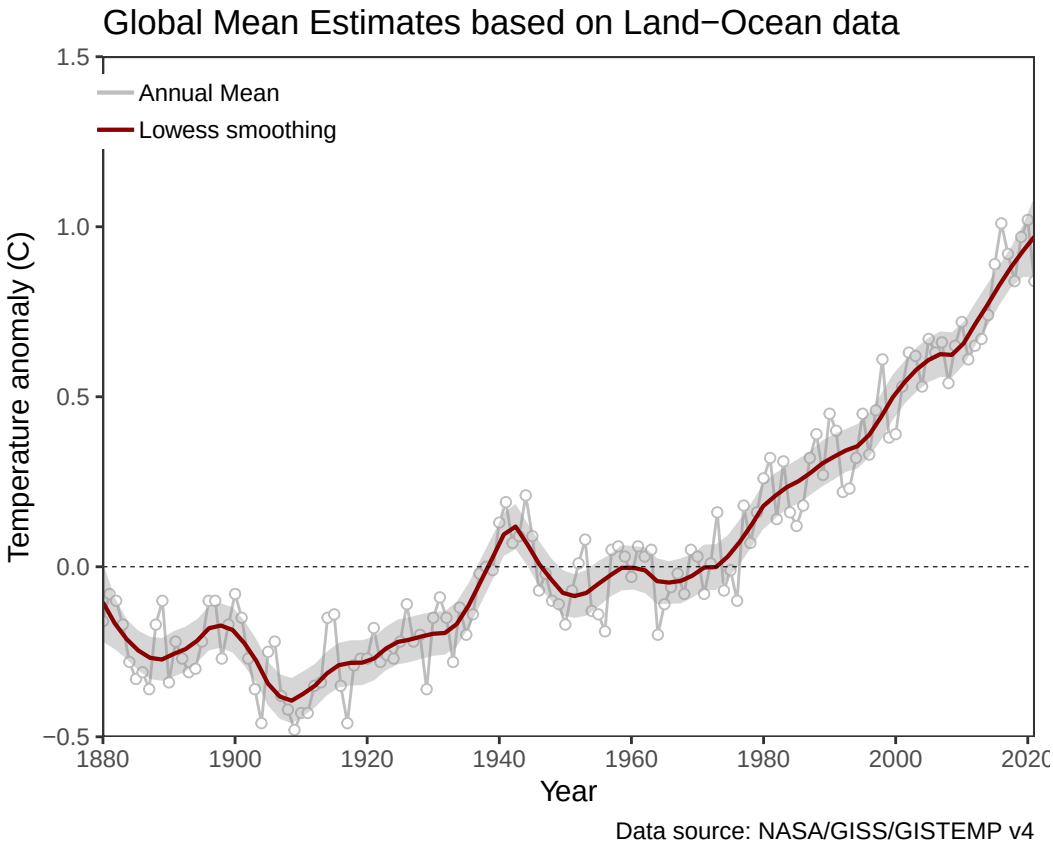
```
[1] "1.0"
```

2.3.4 Data visualization

2.3.4.1 Line plot

```
ggplot(JD_data, aes(year, t_diff)) +
    geom_line(aes(color = "1"), size = 0.5) +
    geom_point(aes(color = "1"), fill = "white", shape = 21,
    ↪  show.legend = FALSE) +
    geom_smooth(aes(color = "2"), size = 0.75, span = 0.15) +
    geom_hline(yintercept = 0, size = 0.2, linetype = "dashed") +
    #define plot boundaries
    scale_x_continuous(breaks=seq(1880, 2023, 20), expand = c(0,0)) +
    scale_y_continuous(limits = c(-0.5, 1.5), expand = c(0,0)) +
    #change colors for legend
    theme_bw() +
    scale_color_manual(name = NULL,
                       breaks = c(1,2),
                       values = c("gray", "darkred"),
                       labels = c("Annual Mean", "Lowess smoothing"))
                       ↪  +
    #remove grey box in legend
    guides(color=guide_legend(override.aes=list(fill=NA))) +
    theme(
        #axis.ticks = element_blank(),
        panel.grid = element_blank(),
        legend.position = c(0.12, 0.92),
        legend.title = element_text(size = 0),
        legend.key.height = unit(14, "pt"),
```

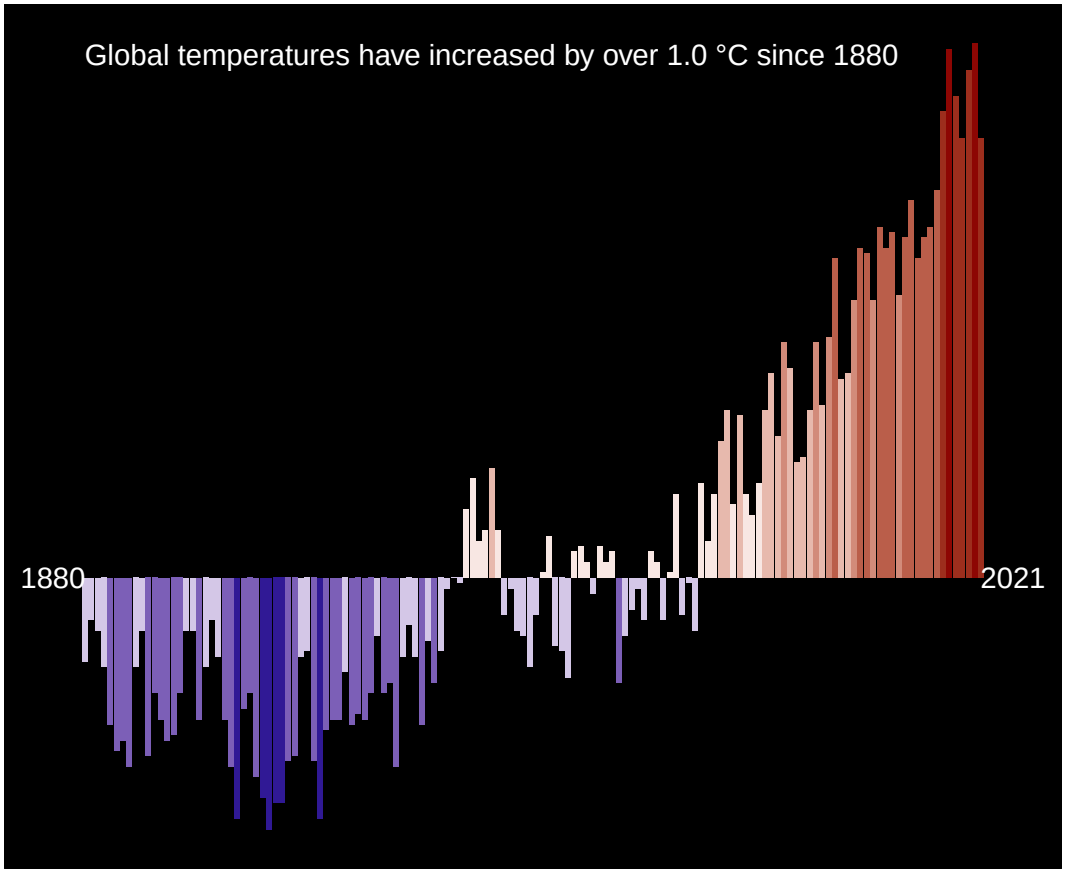
```
        legend.margin = margin(0,0,0,0)
        ) +
    labs(title = "Global Mean Estimates based on Land-Ocean data",
         caption = "Data source: NASA/GISS/GISTEMP v4",
         x = "Year", y = "Temperature anomaly (C)")
```




```
ggsave("../figures/temperature_line_graph.pdf", width = 7, height =
↪  4)
```

2.3.4.2 Bargraphs

```
ggplot(JD_data, aes(x = year, y= t_diff, fill = t_diff)) +
    geom_col(show.legend = FALSE) +
    geom_text(data = annotation, aes(x = x, label = year), color =
    ↪  "white") +
    annotate("text", x = 1880, y = 1, size = 4, hjust = 0,
             label = glue("Global temperatures have increased by
             ↪  over {max_t_diff} \u00B0C since
             ↪  {min(JD_data$year)}"),
             color = "white") +
    #scale_fill_gradient2(low = "darkblue", mid = "white", high =
    ↪  "darkred",
    #                     midpoint = 0, limits = c(-0.5, 1.5) ) +
    #scale_fill_gradientn(colors = c("darkblue", "white", "darkred"),
    #                      values = rescale(c(min(JD_data$t_diff), 0,
    ↪  max(JD_data$t_diff))),
    #                      limits = c(min(JD_data$t_diff),
    ↪  max(JD_data$t_diff))) +
    scale_fill_stepsn(colors = c("darkblue", "white", "darkred"),
                      values = rescale(c(min(JD_data$t_diff), 0,
                      ↪  max(JD_data$t_diff))),
                      limits = c(min(JD_data$t_diff),
                      ↪  max(JD_data$t_diff)),
                      n.breaks = 9) +
    theme_void() +
    theme(
        plot.background = element_rect(fill = "black"),
        legend.text = element_text(color = "white", size = 8)
    )
```




```
ggsave("../figures/temperature_columns.pdf", width = 7, height = 4)
```

2.4 Summary of analysis

- Global temperatures have increased since the 1880s by 1.0C, this increase was almost linear since 1980.

2.5 Supporting visualizations and key findings