Inflation in the USA

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I. Introduction

Inflation, the rate at which the general level of prices for goods and services rises, eroding purchasing power, is a key economic indicator. It impacts everything from the cost of groceries to the interest rates on loans[1]. While moderate inflation is a sign of a growing economy, excessive inflation can reduce the value of money, leading to financial strain for consumers. In this project, we have built on a comprehensive visualization to monitor inflation across various consumer metrics in the USA, originally published by NBC News[2] (Figure 1). The visualization below shows monthly changes in consumer prices compared to the same time the previous year. Despite the visualization's effectiveness in showing an overview of the price changes, we aim to improve certain aspects to better highlight the underlying trend of inflation change in a year-over-year basis of different consumer metrics.
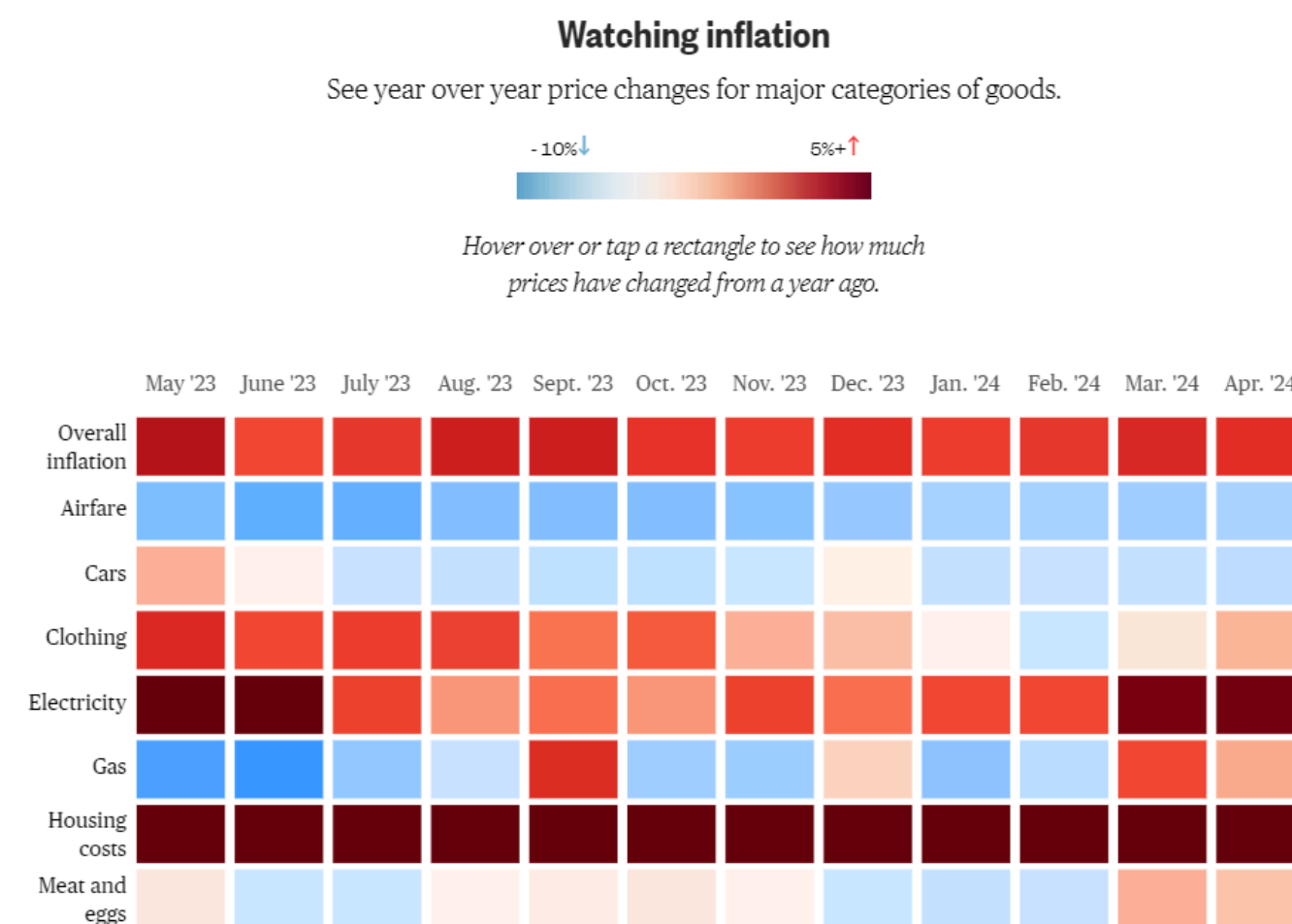
II. Previous Visualization

Figure 1: Yearly Percentage Change in Consumer Prices for major catergories of goods in the USA, published by NBC News.

III. Strengths

- The plot title and subtitle is clear and informative, immediately providing context and helping readers to understand the focus of the visualization.
- The heatmap design effectively conveys a high information content without cluttering the plot. This allows for quick and intuitive understanding of the data trends.
- Pointing with the mouse at a tile opens an infotip, enabling readers to retrieve overall yearly percentage changes for each category.
- The colors chosen (red and blue) are color-blind friendly, ensuring that the visualization is accessible to a wider audience.

[1]https://www.hbs.edu/ris/Publication%20Files/Paper_Covid_Price_IMFER_23_4663bd2c-c1a8-4448-aa9f-98a3bc197142.pdf
[2]https://www.nbcnews.com/data-graphics/inflation-tracker-how-much-prices-rising-us-consumers-n1296378

- The inclusion of detailed source information at the bottom of the chart adds credibility and transparency to the data presented.
- The overall design is user-friendly, with a clean layout, intuitive color coding, and easy-to-read labels, making the visualization accessible to a broad audience.
- The color legend is clear and informative which helps readers to quickly understand the meaning of the the colors (red-increasing inflation, blue-decreasing inflation) and the range of percentage changes displayed.

IV. Suggested Improvements

1. Increasing the range of dates to provide a more comprehensive overview of inflation trends over time.

2. Adding a COVID-19 graph to show the correlation between COVID-19 cases and inflation rates.

3. Improving the year-over-year price change(%) scale to better represent the inflation rates for different categories of goods.

4. Added source for cross reference for COVID-19 data to provide transparency and credibility to the information presented in the Bureau of Labor Statistics.

## V. Implementation

i. Data

- Data Source: The data used for this project is based on the visualization data from Joella Carman and Nigel Chiwaya, featured on NBC News. They utilized the information from the Bureau of Labor Statistics and Energy Information Administration data to depict year-over-year inflation for major categories of goods.
- Data Period: Our analysis makes use of data from January 2020 to March 2024, rather than the initial period from May 2023 to April 2024. With this longer time frame, the inflation rates for the chosen main product groups are more clearly displayed.

ii. Software

We used the Quarto publication framework and the R programming language, along with the following third-party packages:

- readxl for data import
- tidyverse for data transformation, including ggplot2 for visualization based on the grammar of graphics
- knitr for dynamic document generation
- purrr for functional programming tools
- scales for additional scaling functions
- stringr for string manipulation
- dplyr for data manipulation
- grid for graphical layout management

VI. Improved Visualization
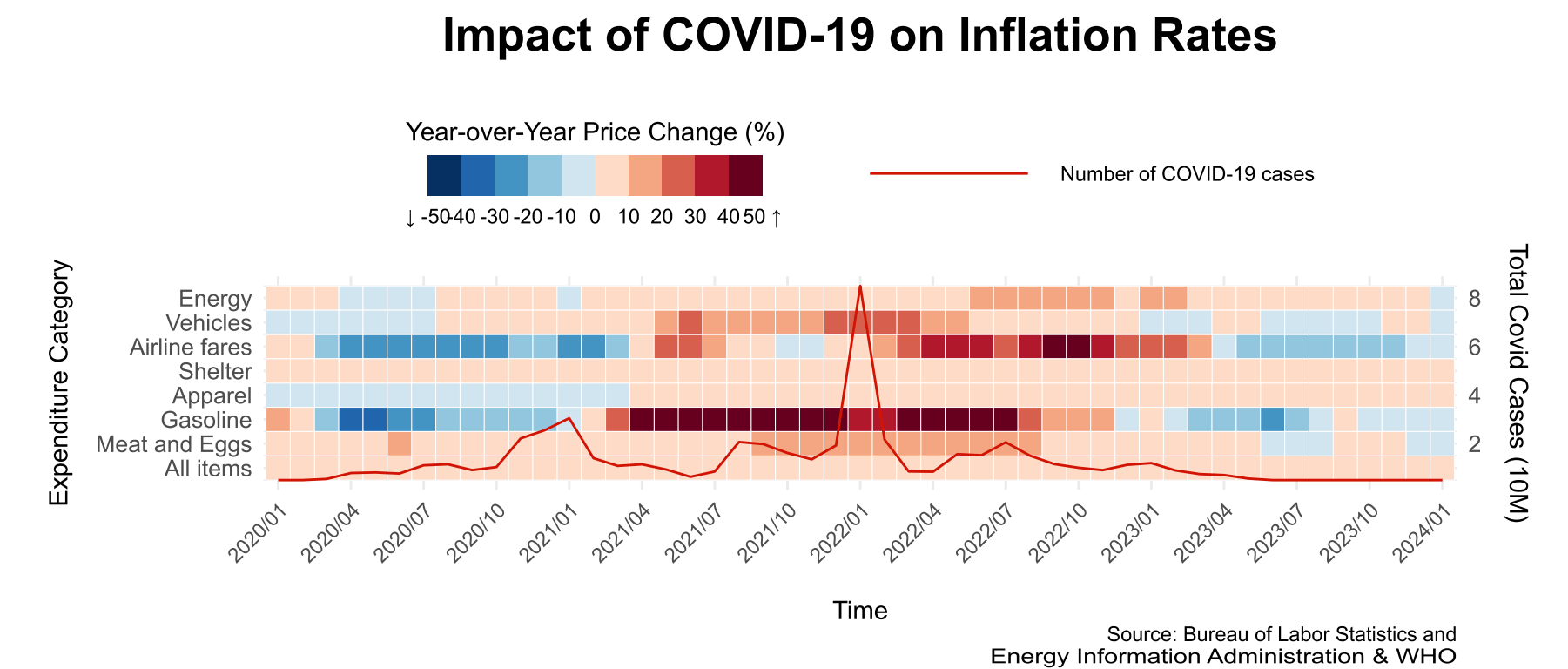
VII. Further Suggestions for Interactivity

1. Interactive Tooltip: Add an interactive tooltip to display the exact inflation rate and COVID-19 cases for each category and date when hovering over the heatmap tiles and line graph.
2. Interactive Legend: Make the legend interactive to allow users to filter the categories displayed on the heatmap.
3. Zoom Functionality: Implement a zoom feature to allow users to focus on specific time periods and categories for a more detailed analysis.
4. Data Filtering: Add a filter to allow users to select specific categories or time periods for a more focused analysis.

These features would enhance the user experience and provide more detailed insights into the data and could be implemented using R packages like plotly or Shiny.

VIII. Conclusion

The enhancements to the visualization, including the integration of major event like COVID-19 and its impact on inflation, provide a richer contextual understanding of the data. The use of a continuous timeline and a heat map color gradient from blue (inflation decrease) to red (inflation increase) effectively illustrates trends and changes over time and provides more clarity compared to the original plot. Additionally, incorporating COVID-19 case data adds depth, emphasizing the correlation between the pandemic and inflation fluctuations. Adjusting the x-axis ratio allows for better analysis, highlighting the significance of dates in relation to COVID-19 cases and inflation rates. The addition of bins allow ease of readability for users to distinguish the shades of color. These improvements make the visualization effectively illustrate trends and correlations over time.