

Assignment 1

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Exercise 1

1.1 Current Issues

- The chart uses two pictures of bananas on plane XZ and YZ to show the chart is related to banana export which has already been shown by the caption. Too much ink is used and little information is provided, and the colors are distracting and make the whole presentation messy. It violates *less chartjunk* rules. Leave the two planes white in this case is a better practice.
- The grid lines seems useless as audiences can't accurately read the value of each bar, due to its 3-Dimensional presentation, with the camera fixed diagonally above. It violates *Minimizing non-data-ink ratio*. Removing them in this case I believe is a better choice.
- The density of bars is so high that it produces *vibration(visual stress)* to users. Enlarging the space between two bars can mitigate the effect.
- According to *aesthetics* rule, graphics should usually have greater width than height. The given graphic has a longest vertical axis among three axes, which is unnatural and hard to read. Making the horizontal axes longer is a better solution
- In figure 1, though different heights of individual bars are shown, it is sometimes hard to compare the height between two neighbor bars(see figure 1.1), due to its 3-Dimensional presentation, with the camera fixed diagonally above. Changing the camera angle is a better solution.

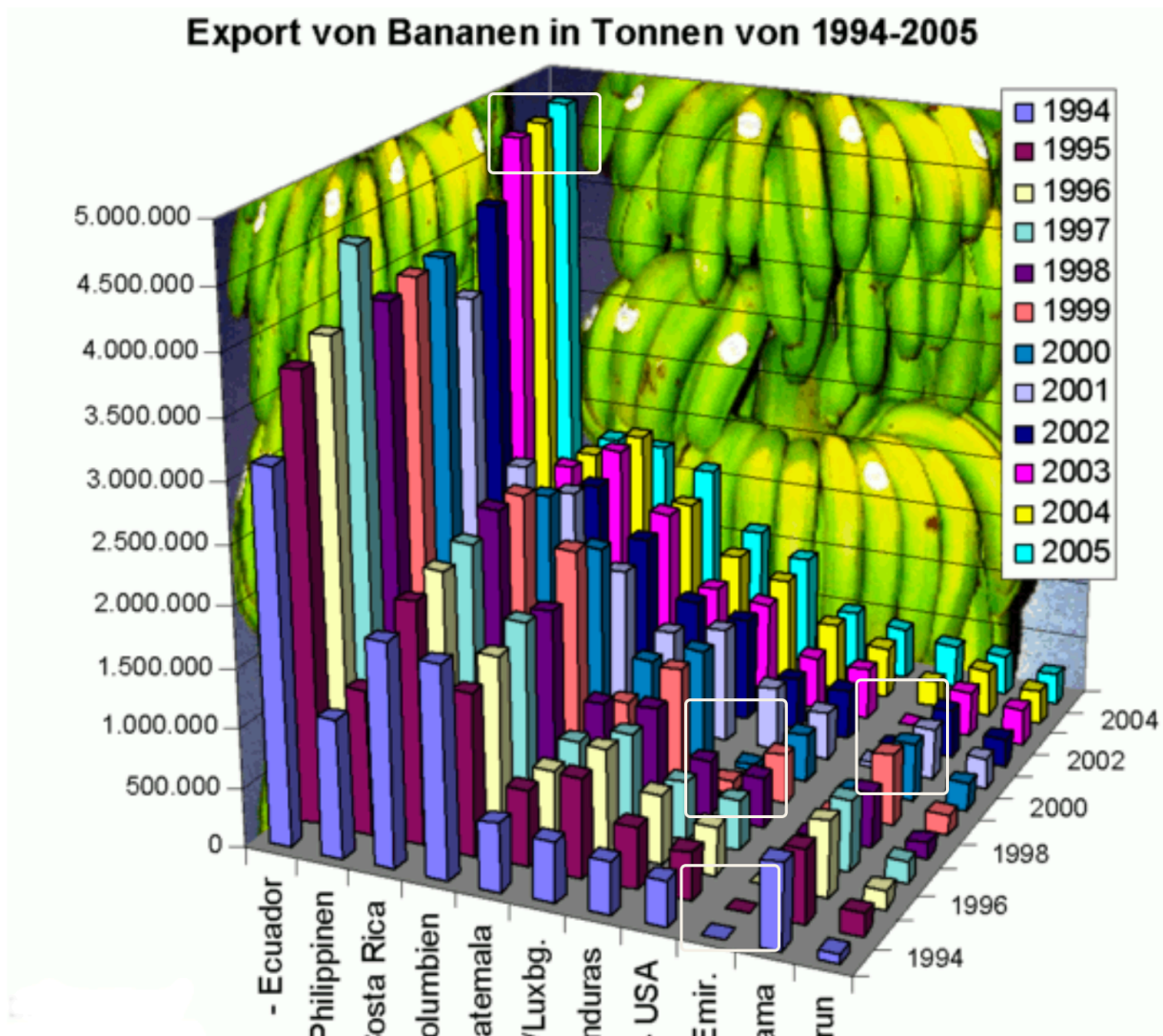


Figure 1.1 Comparison issues

1.2 Proposed Improvement

- Using 2D plot can eliminate the situation that bars are blocked by neighbors.
- Line plot shows the data changes over time more intuitively.
- The third dimension - different countries - can be represented by high contrast colors

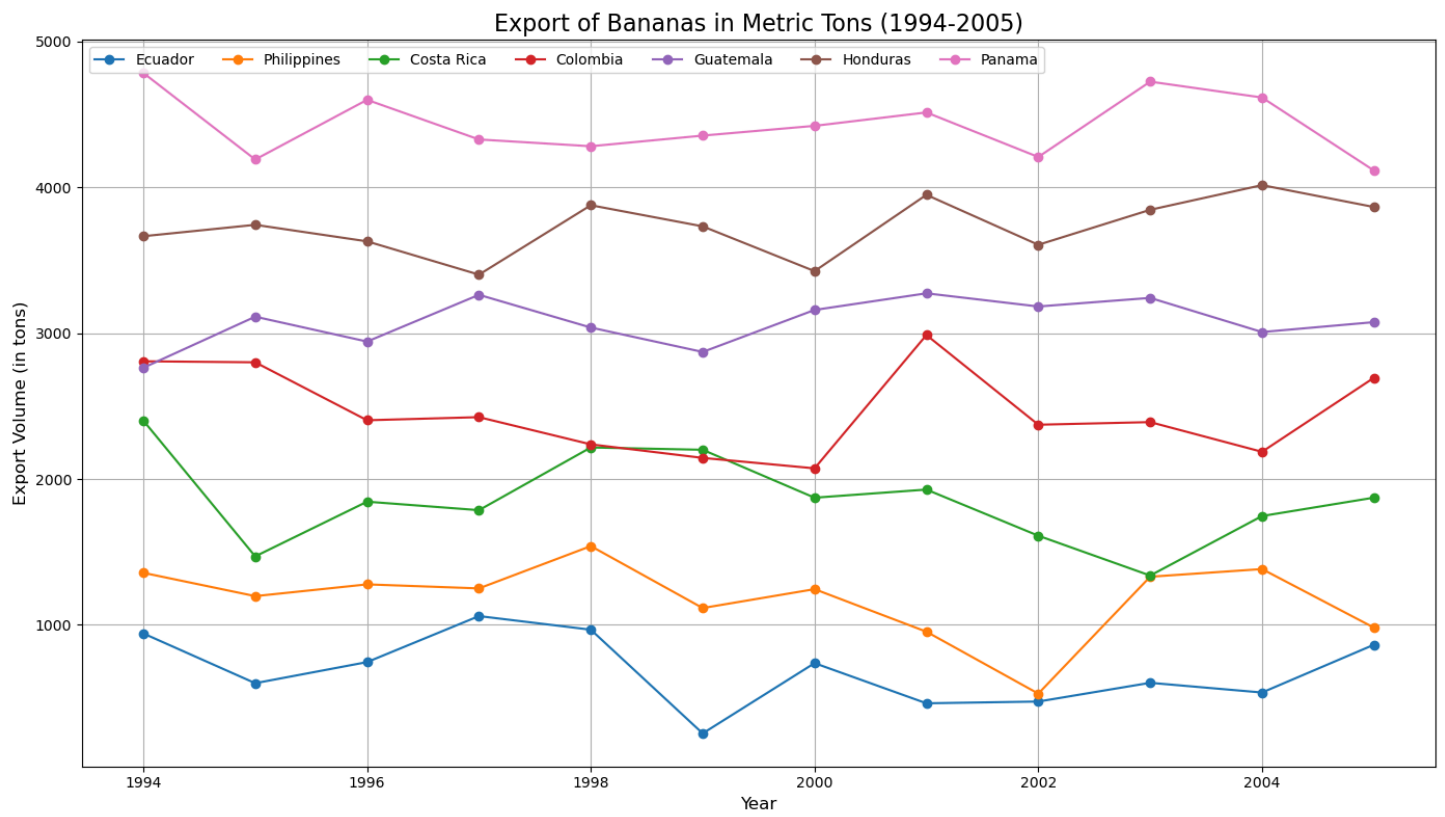


Figure 1.1 Improvement proposal on banana export plot (Fake data)

Exercise 2

2.1 Bitcoin has been better than the Nasdaq

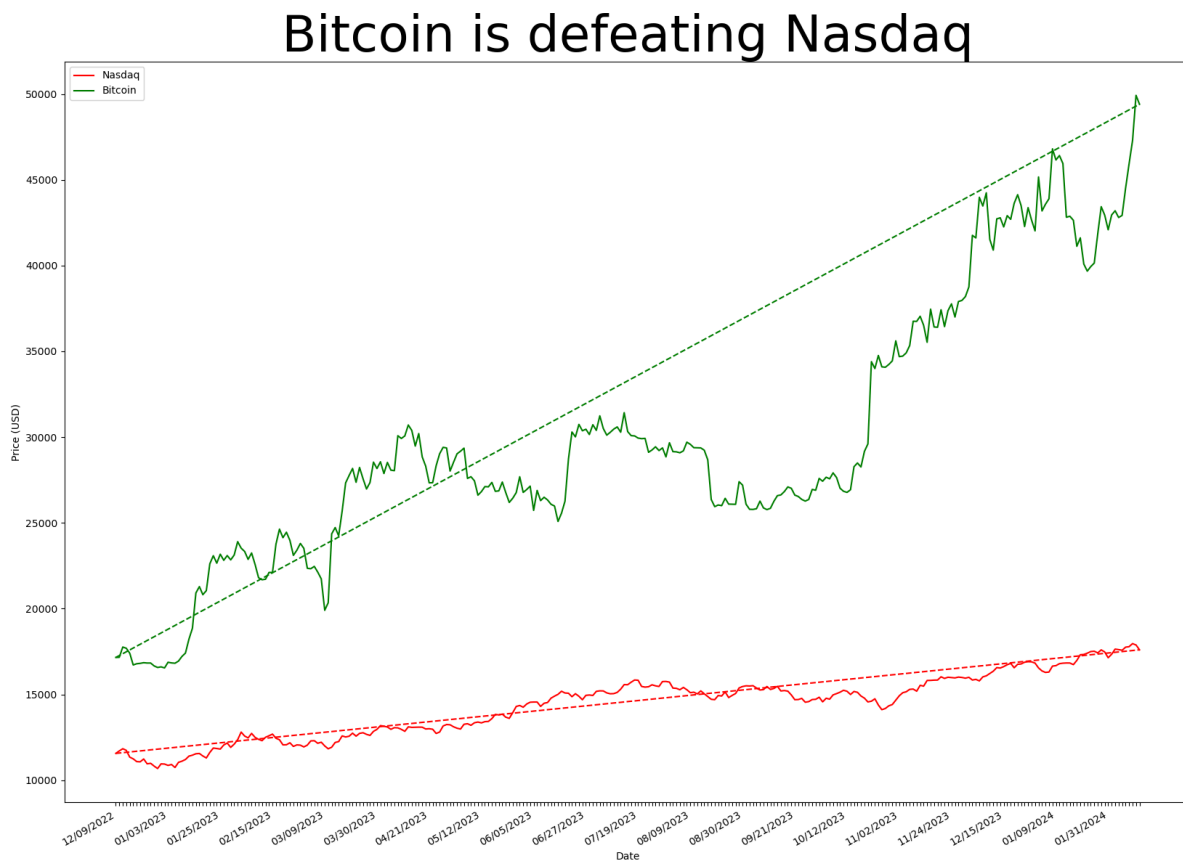


Figure 2.1 A Plot where Bitcoin is skyrocketing

2.2 The Nasdaq has been better than Bitcoin

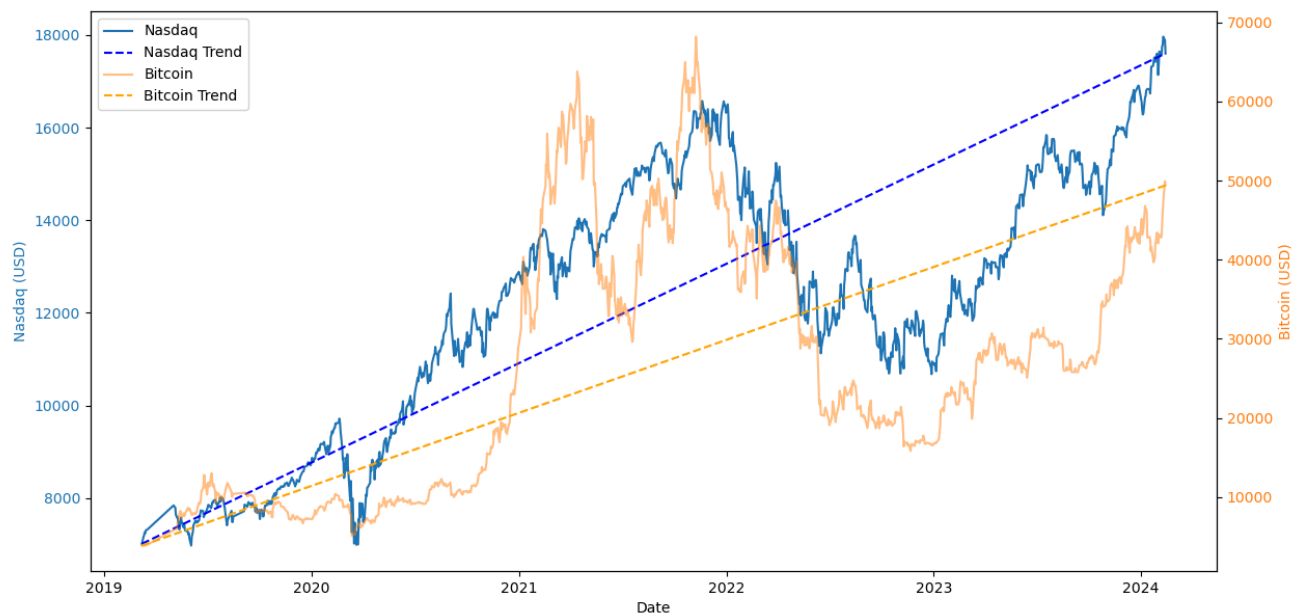


Figure 2.2 A plot where the Nasdaq index is steadier than Bitcoin

2.3 Lie factor analysis

Both plots don't contain all the dates in the dataset, with only days when one market was overperforming the other.

Figure 2.1 only shows a period (12/09/2022 - 02/13/2024) when Bitcoin was skyrocketing while the Nasdaq remained flat. According to the lie factors, the plot overestimates the potential of Bitcoin and giving audience an illusion that Bitcoin is more worth buying.

$$\text{IncreaseRateInImageBitcoin} = (49406.6 - 17156.1) / 431 = 74.8 \text{ USD per day}$$

$$\text{IncreaseRateInImageNasdaq} = (17600.42 - 11563.33) / 431 = 14.0 \text{ USD per day}$$

$$\text{ActualIncreaseBitcoin} = (49406.6 - 3865.9) / 1803 = 25.2 \text{ USD per day}$$

$$\text{ActualIncreaseNasdaq} = (17600.42 - 7015.69) / 1803 = 5.9 \text{ USD per day}$$

$$\text{BitcoinLieFactor} = \text{IncreaseRateInImageBitcoin} / \text{ActualIncreaseBitcoin} = 3$$

$$\text{NasdaqLiefactor} = \text{IncreaseRateInImageNasdaq} / \text{ActualIncreaseNasdaq} = 2.4$$

In figure 2.2, a dual y-axis approach to visually compare the Nasdaq and Bitcoin performances is used, making adjustments to present the Nasdaq in a more favorable light. The Nasdaq is plotted on the left y-axis, and Bitcoin is on the right y-axis, each scaled independently to enhance the visual comparison.

The `NasdaqPlotCurve` is the curve of the nasdaq plot using the scaled axis

The `ActualCurve` is the curve of the nasdaq plot using the same axis as Bitcoin.

The lie factor shows that the plot is exaggerating the increase rate of Nasdaq.

$$\text{NasdaqPlotCurve} = 154/318 = 0.48$$

$$\text{ActualCurve} = 16/318 = 0.05$$

$$\text{Lie factor} = \text{NasdaqPlotCurve} / \text{ActualCurve} = 0.48/0.05 = 9.6$$

2.4 Fair plot

Justify current plot(Figure 2.3)

1. **Direct Price Comparison:** The graph displays the actual price movements of both Bitcoin and Nasdaq, which allows for a direct comparison of their values over time.
2. **Timeline Correlation:** By aligning both trends on the same time axis, it's possible to see how each investment responds to market events, global economic changes, and other temporal factors.
3. **Volatility Visualization:** The graph clearly shows the volatility of Bitcoin in comparison to the Nasdaq. This could be useful to highlight the investment risk or potential returns.
4. **Trend Analysis:** Investors or interested parties can observe long-term trends, such as growth or decline patterns, and how each market has performed relative to each other over the same period.

Bitcoin & Nasdaq Trend

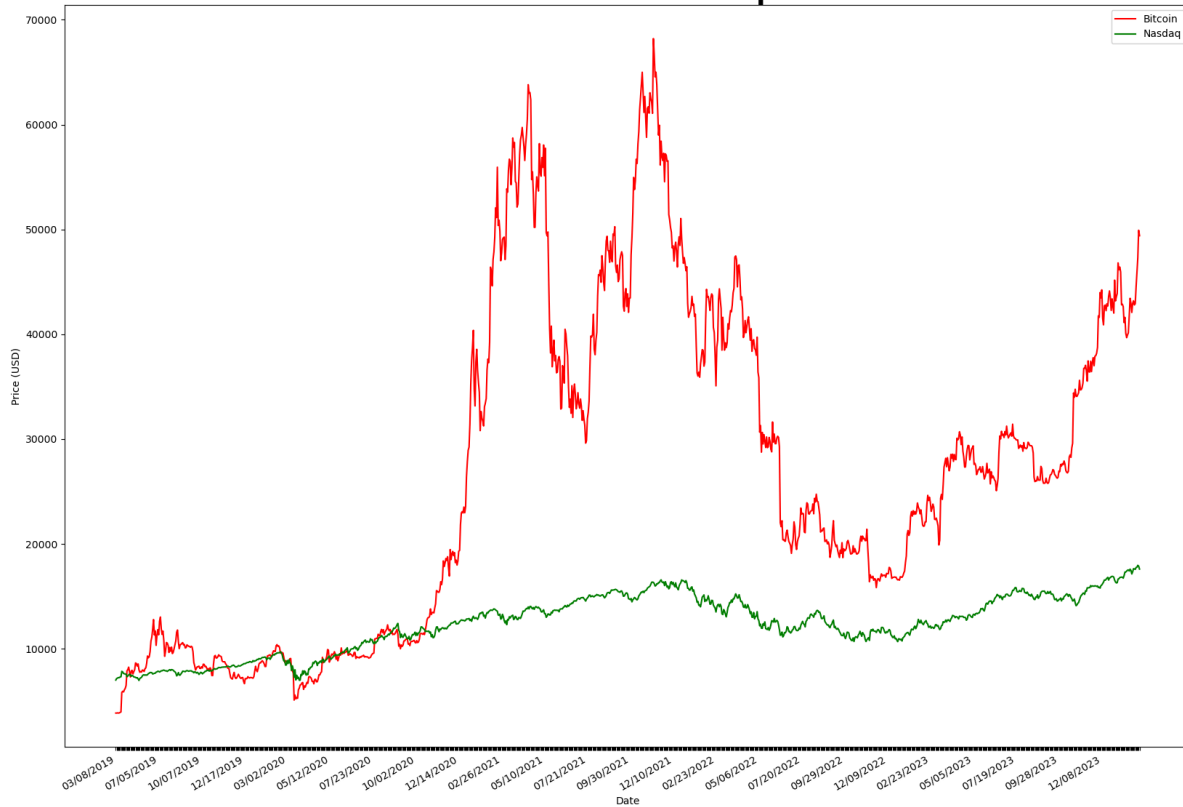


Figure 2.3 A Plot showing Bitcoin VS the Nasdaq index from 2019-2024

Future improvement

Labels and Annotation: Place labels directly next to the lines they describe, which avoids the need for a legend and reduces the cognitive load required to match colors to labels.

Data-Dense: Jorma could present more information in the same space. For example, adding markers for significant events could provide context for price changes.

Color: Use colors effectively to help distinguish data without distracting. Stick to a colorblind-friendly palette, in case Jorma's blog has colorblind readers.

Comparison: Provide clear means for comparison, such as starting both Bitcoin and Nasdaq at 100% and plotting their relative change.

Exercise 3

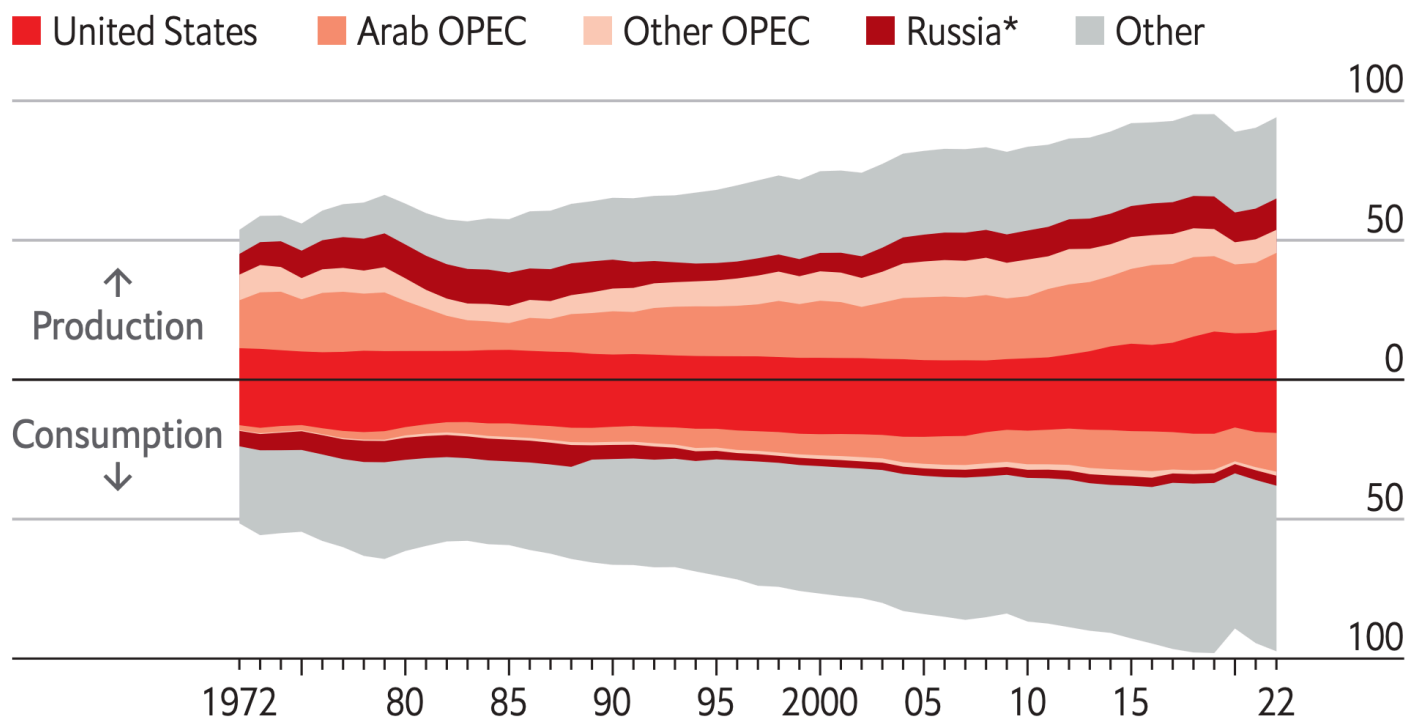
This is a stack plot(Figure 3.1) retrieved from The Economist 2024, March 16 Issue, demonstrating the global oil production and consumption comparison

The plot is effective for several reasons:

1. **Clarity:** It clearly distinguishes between different categories (countries/groups) in global oil production and consumption with different colors, making it easy to compare them at a glance.
2. **Data over time:** The chart effectively shows changes over a period of time, allowing for the observation of trends, peaks, and troughs in both production and consumption of oil.
3. **Dual-axis:** The use of a dual y-axis (production and consumption) allows for comparison of two related datasets that share the same x-axis (time). Putting consumption volume below production volume intuitively shows the meaning of consumption and production(as plus and minus) and makes it easy to observe whether it is a surplus or a deficit.
4. **Temporal context:** The mention of USSR's contribution to the Russian data up until 1989 provides historical context which is crucial for understanding the data post-1989.

These elements combined make the visual representation of data effective for an audience to quickly grasp complex information.

Global oil production and consumption, millions of barrels per day



Sources: World Bank; Refinitiv Datastream; Bloomberg; BP Statistical Review; IEA

*USSR until 1989

Figure 3.1 Global oil production and consumption, millions of barrels per day

Source:

Oil in a dangerous climate. (2024, Mar 16). The Economist, 450, 3-3, 4. Retrieved from <https://www.proquest.com/magazines/oil-dangerous-climate/docview/2956877984/se-2>

Exercise 4

4.1

Source code: <https://github.com/James-Leste/VisualizationNotebook/blob/main/exercise1/scripts/Penguin.ipynb>

Penguin Data Comparison (Species: diagonally upper half; Island: diagonally lower half)

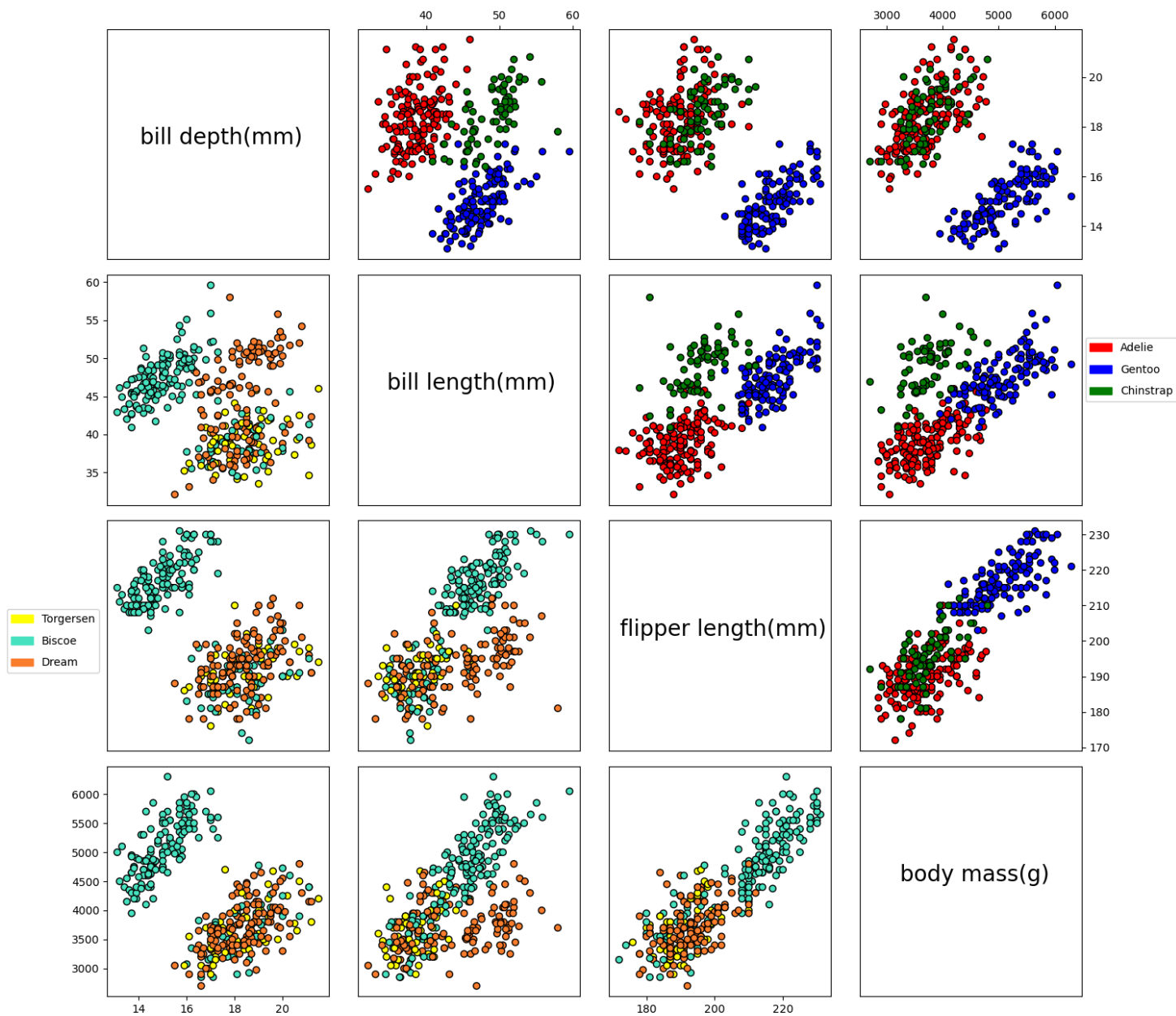


Figure 4.1 Penguin Data Comparison