

Exploring the Insights within the Global Happiness Index

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KEYWORDS — Happiness Index, Typst, Quarto

I. INTRODUCTION

i. Global Happiness Score

The Life Ladder score, also known as the World Happiness Score, is derived from the Gallup World Poll data. The score is typically calculated based on several key variables that reflect the well-being and quality of life in different countries. Here's a general outline of the formula and components involved in calculating the World Happiness Score:

Component	Description
Life Evaluations (Ladder Question)	Respondents rate their current life from 0 (worst) to 10 (best).
GDP per Capita	Natural logarithm of GDP per capita (PPP terms).
Social Support	Binary response to: "Do you have relatives or friends you can count on for help if needed?"
Healthy Life Expectancy	Life expectancy at birth.
Freedom to Make Life Choices	Binary response to: "Are you satisfied with your freedom to choose what you do with your life?"
Generosity	Donations to charity in the past month, adjusted for GDP per capita
Perceptions of Corruption	Perceived corruption in government and business.
Positive and Negative Affect	Average responses to questions about recent experiences of positive and negative emotions (e.g., laughter, enjoyment, sadness, and anger).

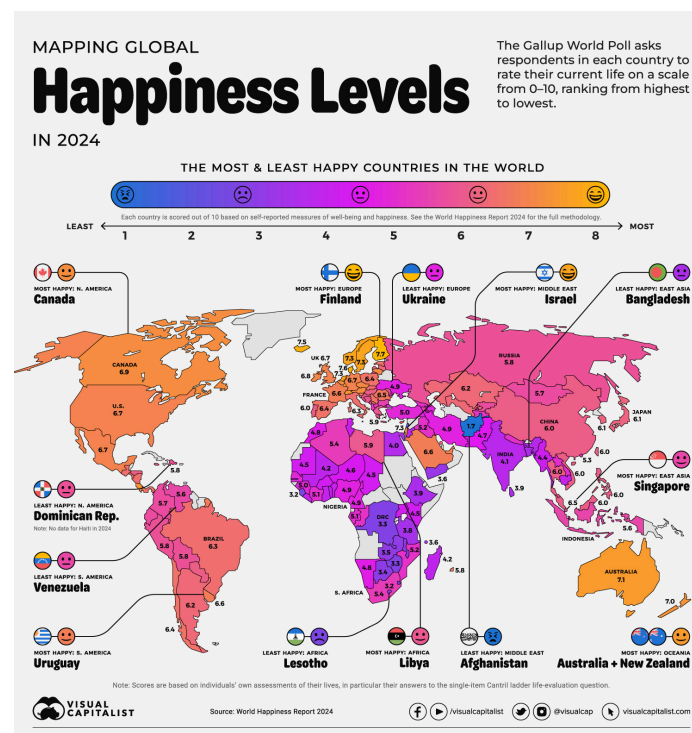
The World Happiness Score is calculated using a regression model that combines these variables to predict the happiness score for each country. The formula for the World Happiness Score can be represented as follows:

$$\text{Happiness Score} = \beta_0 + \beta_1 \times (\text{Log GDP per capita}) + \beta_2 \times (\text{Social Support}) + \beta_3 \times (\text{Healthy Life Expectancy}) + \beta_4 \times (\text{Freedom to Make Life Choices}) + \beta_5 \times (\text{Generosity}) + \beta_6 \times (\text{Perceptions of Corruption}) + \beta_7 \times (\text{Positive Affect}) - \beta_8 \times (\text{Negative Affect}) \quad (1)$$

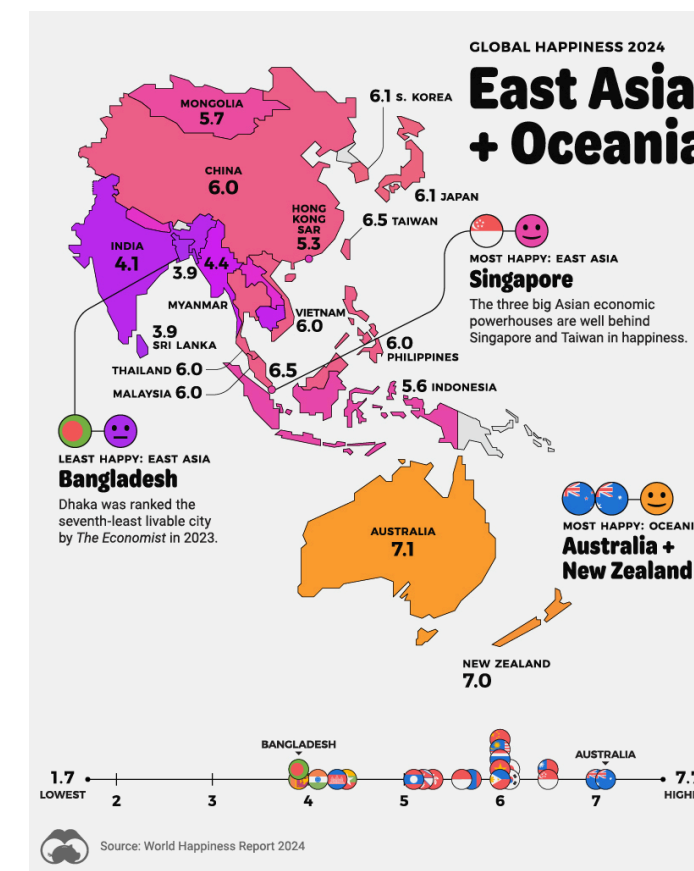
Where β_0 to β_8 are coefficients derived from regression analysis based on historical data.

ii. Visualcapitalist's Global Happiness Levels Report

The following Figure 1 from Visualcapitalist presents the global happiness levels in 2024, as reported in the **World Happiness Report**. The static world map provides a visual representation of the happiness scores across different countries, with the color gradient indicating the relative happiness levels. The visualization aims to highlight the disparities in happiness levels worldwide and the factors that contribute to these variations. However, through our critical analysis, we identified several strengths and weaknesses in the original visualization that we aim to improve as detailed below.



(a) Global Overview World map of Happiness Levels in 2024



(b) Map of Happiness Levels of East Asia + Oceania in 2024

Figure 1: Visualcapitalist Global Happiness Levels Report

II. METHODS

i. Data Sources

World Happiness Report (WHR) 2021-2023: Contains happiness scores and key variables for countries world-wide. Gallup World Poll (GWP): Provides self-reported happiness evaluations on a scale from 0 to 10.

ii. Data Understanding and Cleaning

iii. Load Data

```
df <- read_excel("data/DataForTable2.1.xls")
```

iv. List and Identify Missing Countries

```
data(World)
countries <- select(World, iso_a3, name)
countries <- countries$name
```

```
# how many countries are missing in the dataset use Country name
missing_countries <- setdiff(countries, unique(df$"Country name"))
missing_countries
```

```
[1] "Antarctica"           "Fr. S. Antarctic Lands" "Bahamas"
[4] "Bosnia and Herz."     "Brunei"                 "Central African Rep."
[7] "Cote d'Ivoire"        "Dem. Rep. Congo"       "Congo"
[10] "N. Cyprus"           "Czech Rep."            "Dominican Rep."
[13] "Eritrea"             "Fiji"                  "Falkland Is."
[16] "Guinea-Bissau"       "Eq. Guinea"            "Greenland"
[19] "Korea"               "Lao PDR"              "Macedonia"
[22] "New Caledonia"       "Papua New Guinea"      "Puerto Rico"
[25] "Dem. Rep. Korea"     "Palestine"             "W. Sahara"
[28] "S. Sudan"           "Solomon Is."          "Somaliland"
[31] "Swaziland"          "Timor-Leste"          "Turkey"
[34] "Taiwan"             "Vanuatu"
```

We can see that there are 34 countries missing from the dataset.

v. Data Cleaning and Transformation

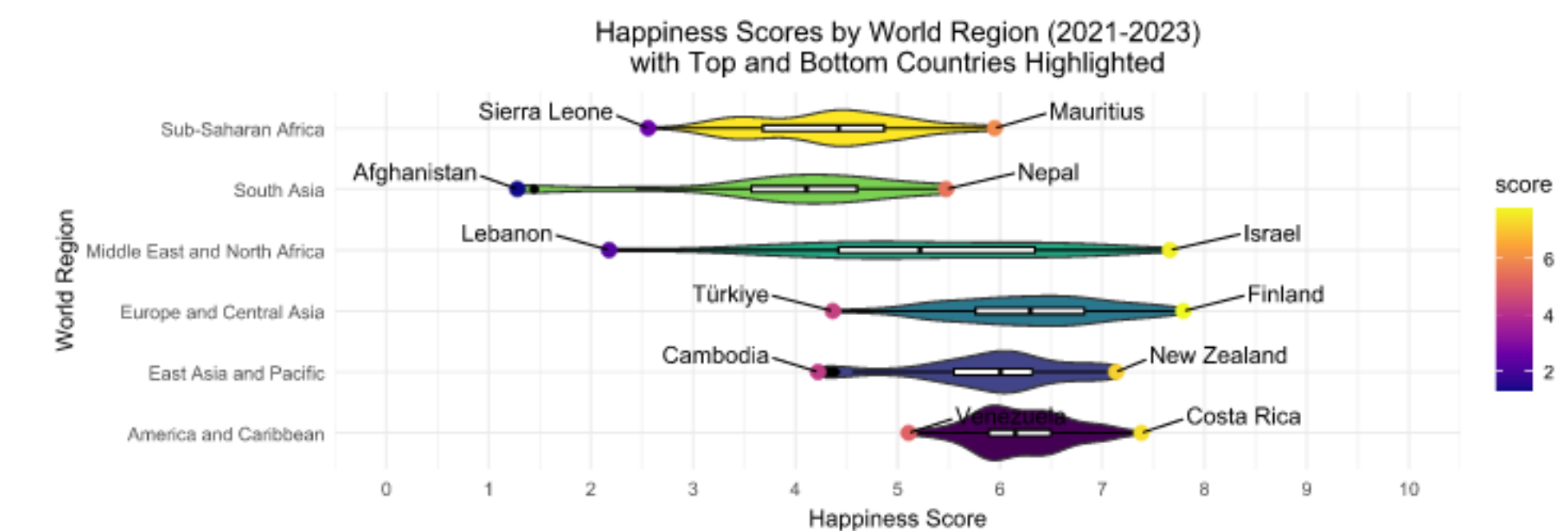
As we will be only using data from 2021 - 2023, we will filter out the data from other years. We will also check for missing data and fill in the missing values with the mean of the available data from each country.

1) Filter data for years 2021 - 2023: 2) Renaming headers and keeping only the necessary columns: 3) Include Missing Countries with NA Scores:

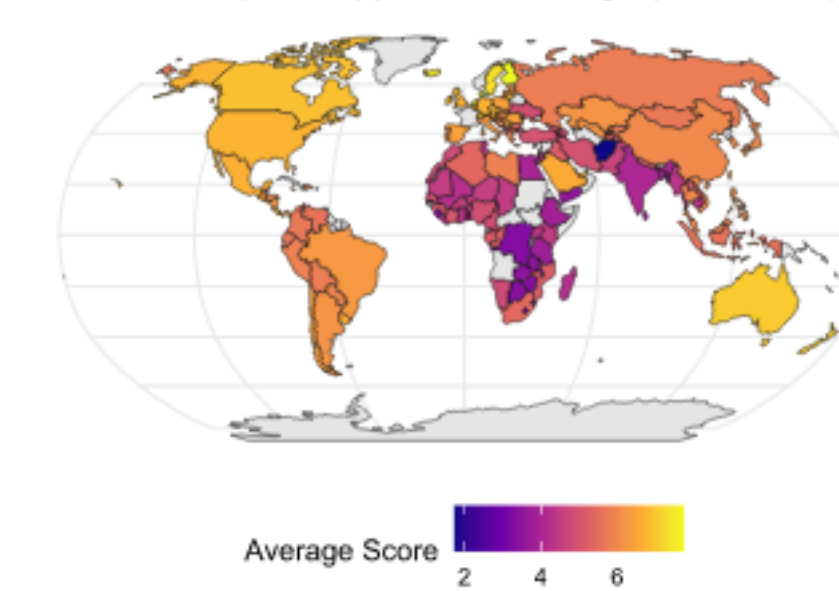
vi. Data Visualization

1) Create violin plot:

```
Warning: The `guide` argument in `scale_*()` cannot be `FALSE`. This was deprecated in ggplot2 3.3.4.
i Please use "none" instead.
```



World Map of Happiness - Average (2021-2023)



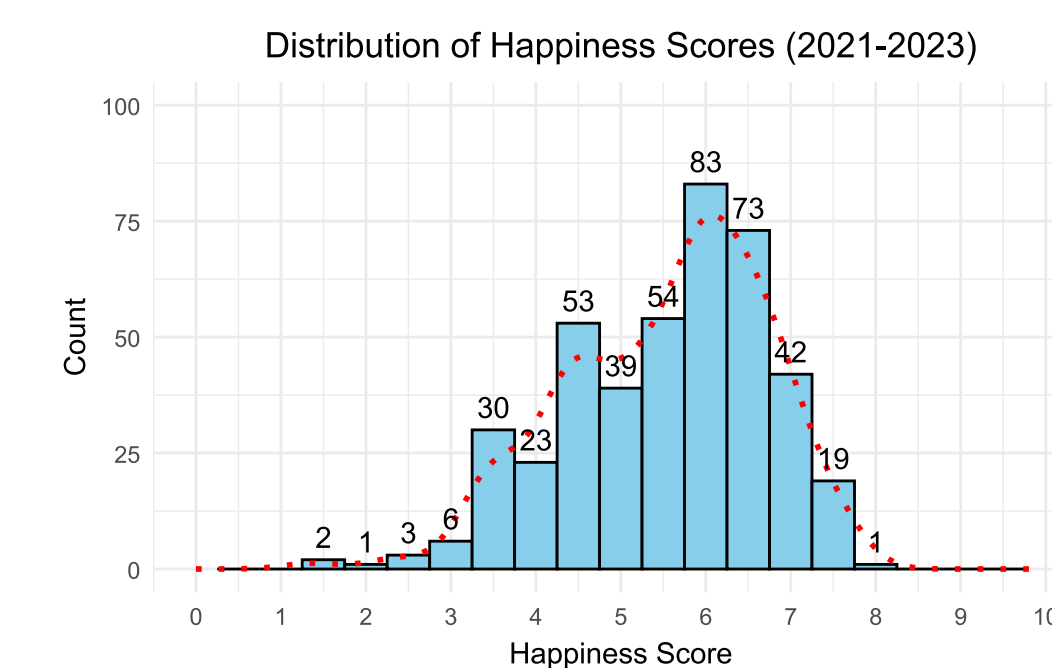
2) World Map:

3) Distribution Chart of Scores:

```
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
i Please use `linewidth` instead.
```

```
Warning: The dot-dot notation (`..count..`) was deprecated in ggplot2 3.4.0.
i Please use `after_stat(count)` instead.
```

```
Warning: Removed 2 rows containing missing values or values outside the scale range
(`geom_bar()`).
```



Overall:

The distribution suggests that while there is a central tendency around a happiness score of 6, there is considerable variability in happiness scores among countries, with more countries experiencing moderate to low levels of happiness.

Distribution Shape:

The distribution of happiness scores is approximately normal with a slight positive skew. This means most countries have happiness scores clustered around the middle range (4 to 6), but there are more countries with lower scores than higher scores.

vii. Critical Assessment and Proposed Improvements

1. Interactive Data Visualization:

- Implement hover-over information for detailed country data.
 - Add filtering and sorting capabilities.
 - Include historical comparison using a time slider.
2. Consistent Labeling and Annotations:

- Standardize labeling format for readability.
 - Provide annotations explaining key variables influencing happiness.
3. Accessible Design:

- Ensure a user-friendly interface.
 - Use color schemes accessible to color-blind users.
4. Data Insights and Analysis:

- Provide summaries and comparisons with relevant metrics.
 - Enhance linear scale visualization for regional comparisons.
- These methods aim to create an improved, interactive visualization of global happiness levels, offering better insights and user engagement.

III. FINDINGS

i. New World Map

ii. Happiness Score By World Region

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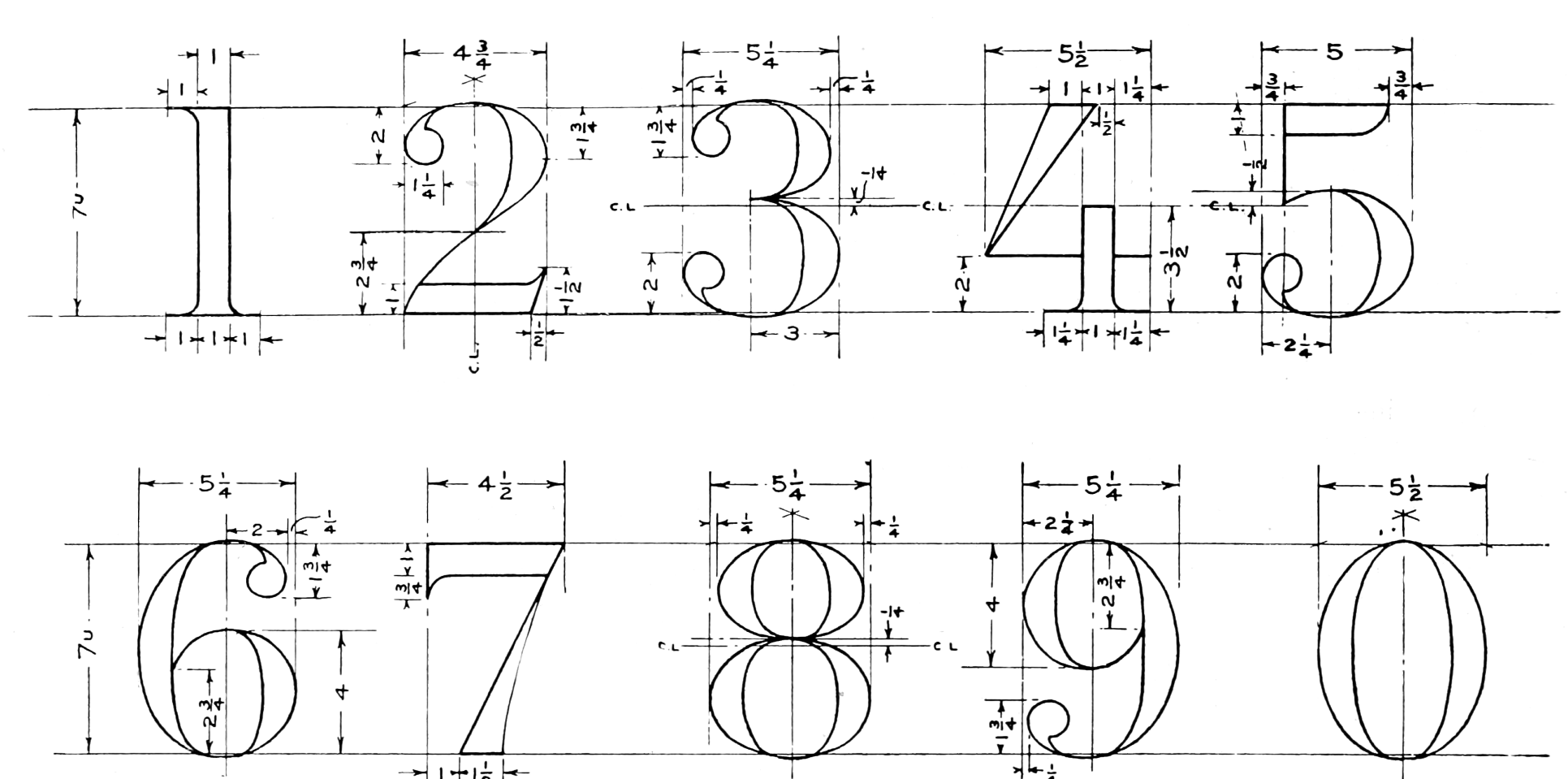


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IV. FINDINGS

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V. CONCLUSION

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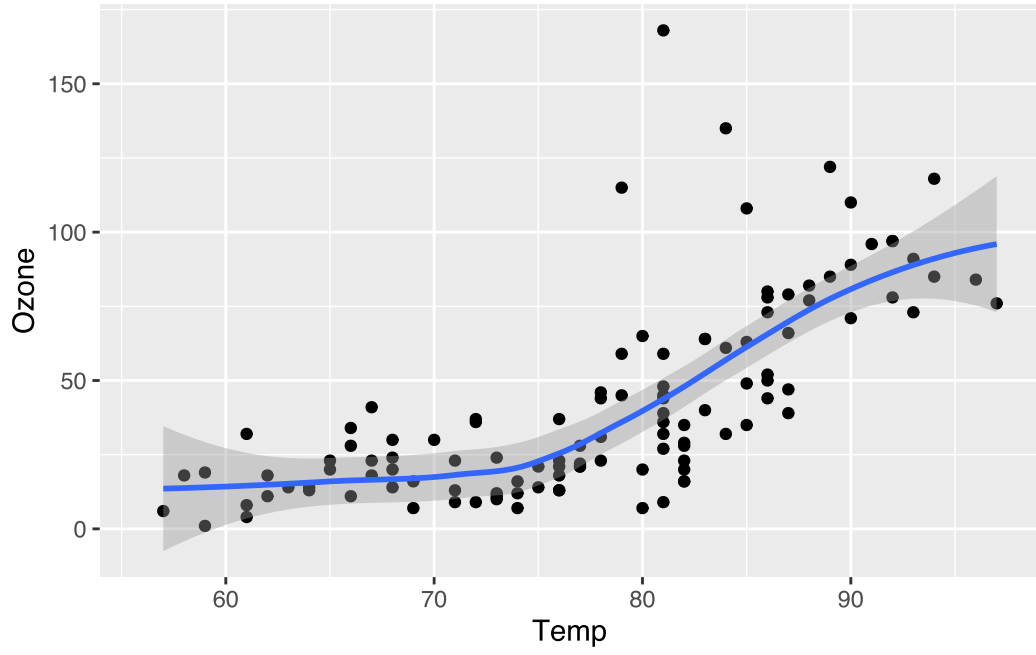


Figure 3: Temperature and ozone level

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$$\sum_{(k=1)}^n k = \frac{n(n+1)}{2} = \frac{n^2+n}{2}$$

(2)

VI. ACKNOWLEDGEMENT

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