Study of Visa Policy

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What do we mean by Visa Policy?

-Visas allows holder to stay in country

Different Types of Travel Requirements
-Need Visa
-Visa unneeded until after certain amount of days
-No visa needed to stay
-No admission at all

Data Collection

Data Collection

- Main Data Source: https://www.passportindex.org
  - Contains comprehensive data for visa policy for 199 countries
- Auxiliary Data Source 1:
  https://www.kaggle.com/datasets/fernandol/countries-of-the-world
  - Contains data for basic information for countries, such as population, GDP, literacy.
- Auxiliary Data Source 2:
  https://www.kaggle.com/datasets/sujaykapadnis/world-freedom-index
  - Contains data for global political rights and civil liberties statistics for 195 countries
- Auxiliary Data Source 3:
  https://www.kaggle.com/datasets/ddosad/global-terrorism-index-2023
 - Contains data for terrorism activities, such as terrorism rank, # of incident, fatalities...

Exploratory Data Analysis

Number of "Outgoing Visa Travel Free Countries"

- Referring to the number of countries each country can travel to without a travel visa

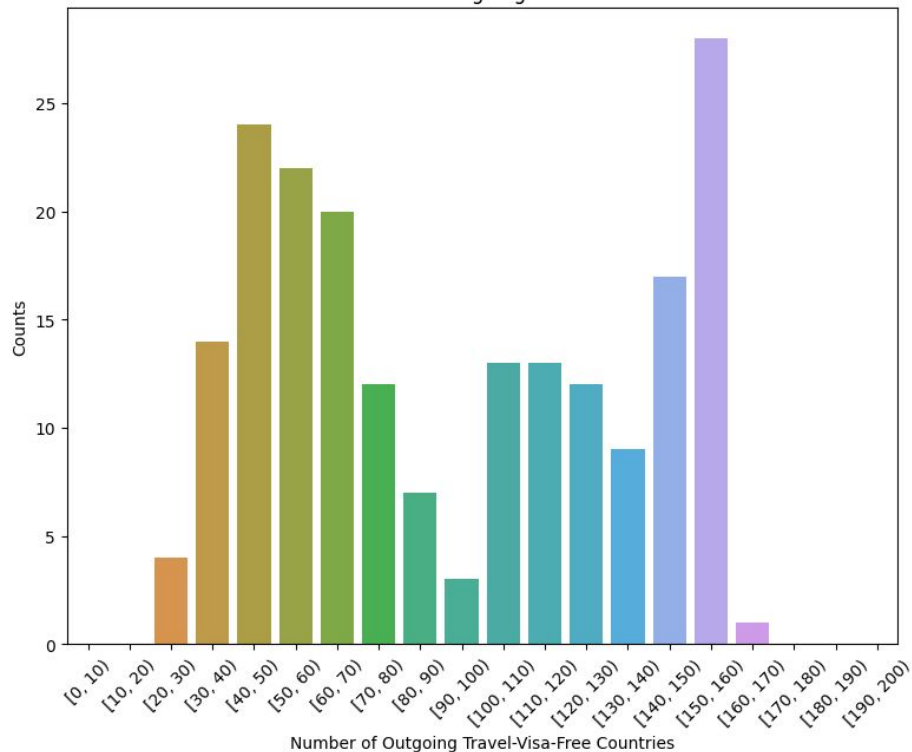Number of "Incoming Visa Travel Free Countries"

- Referring to number of countries from which other countries accept entry without a visa
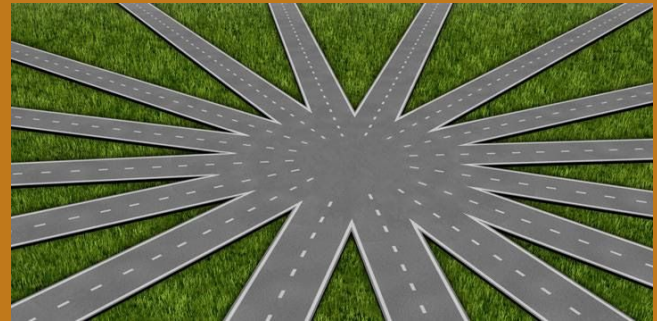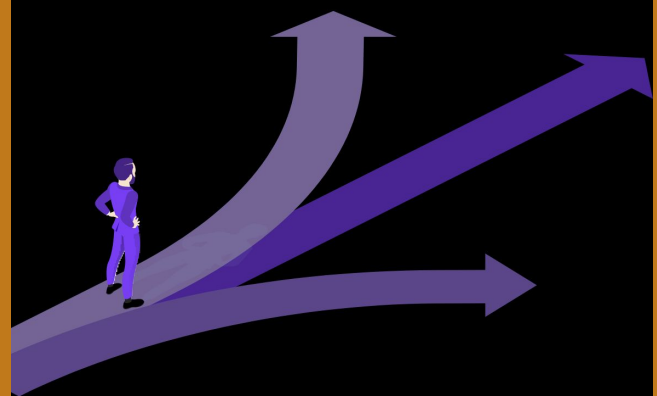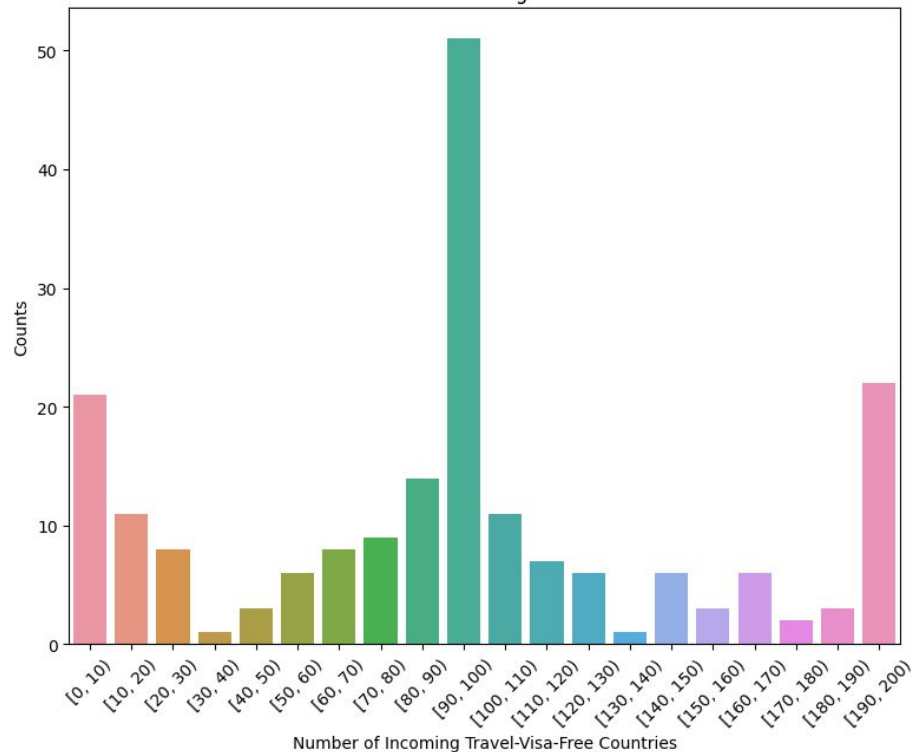
Simple Number Counts

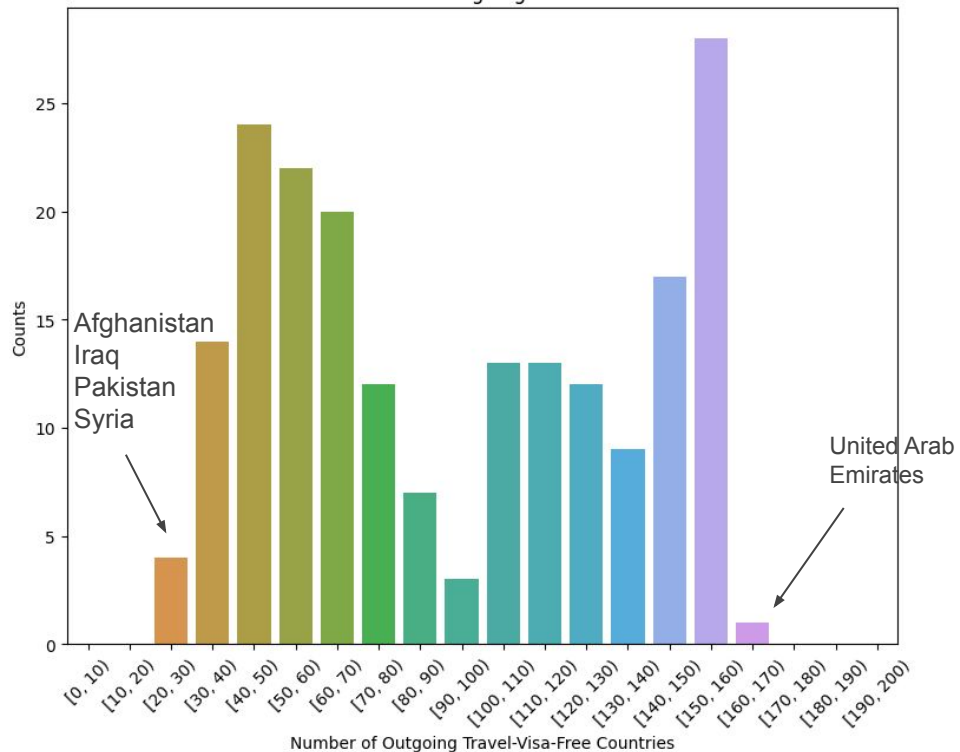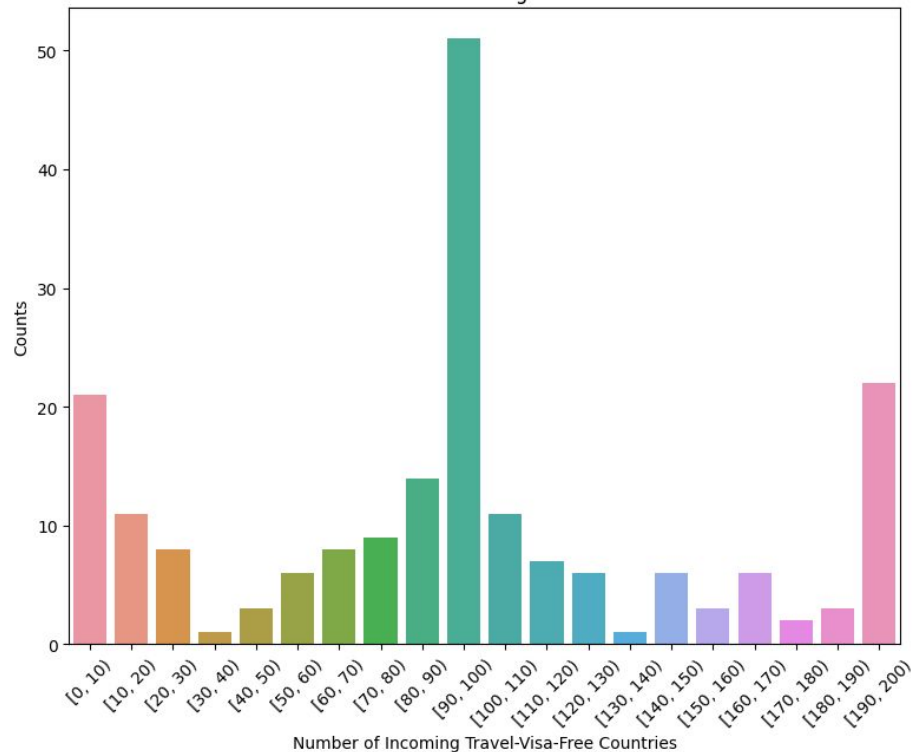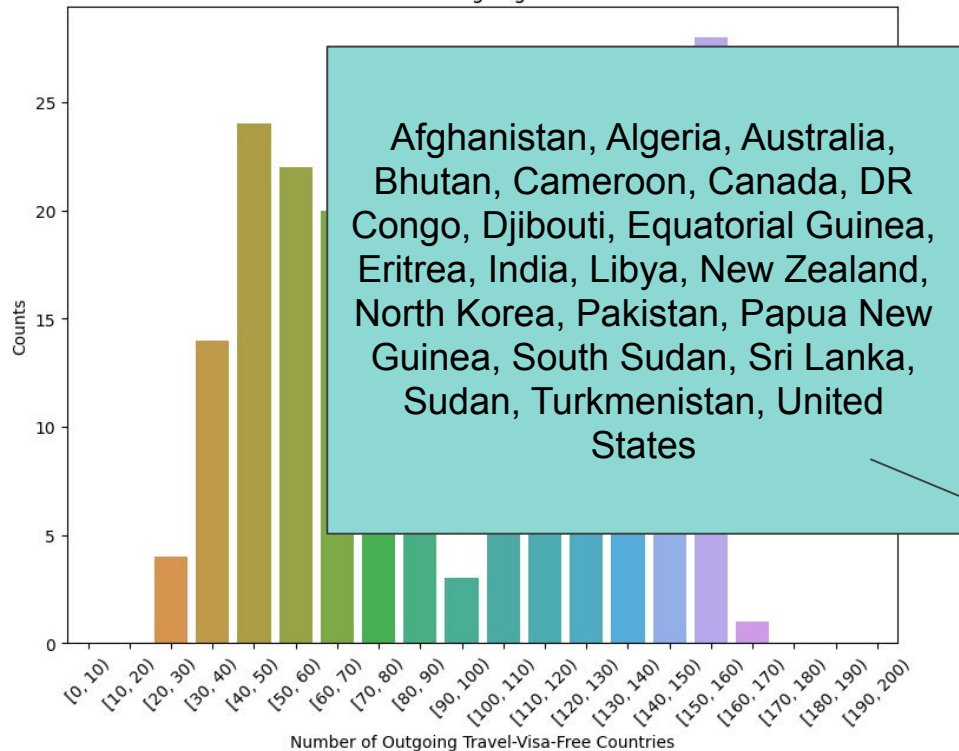Distribution of Number of Outgoing Travel-Visa-Free Countries

Distribution of Number of Incoming Travel-Visa-Free Countries

Simple Number Counts

Distribution of Number of Outgoing Travel-Visa-Free Countries

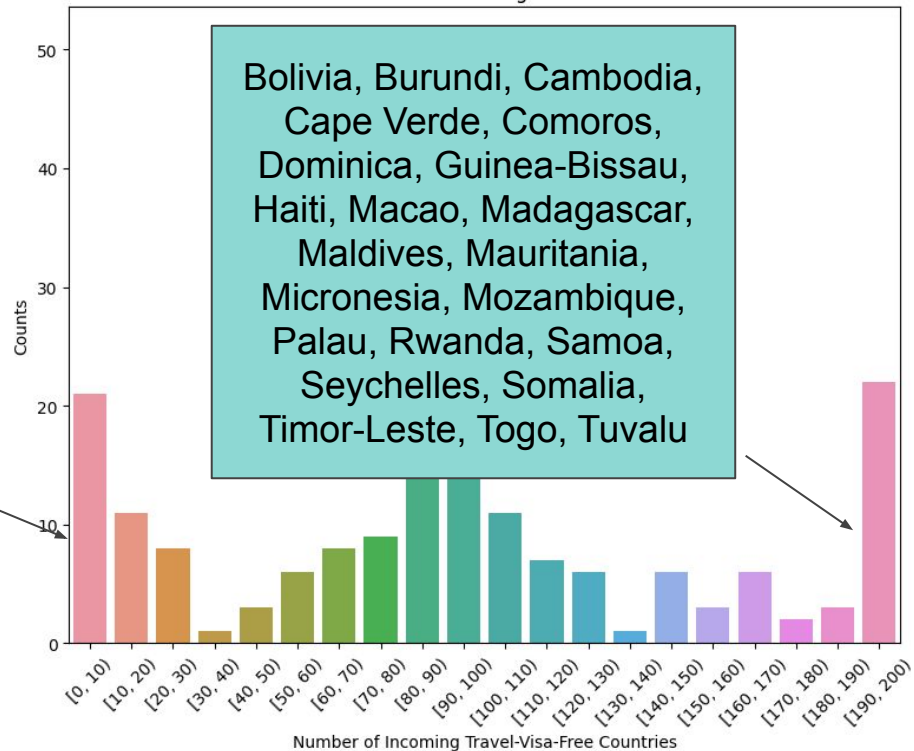Distribution of Number of Incoming Travel-Visa-Free Countries
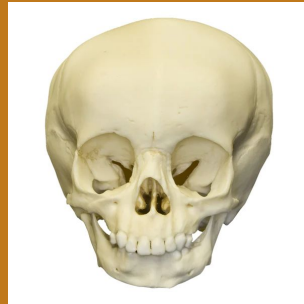
Simple Number Counts

Distribution of Number of Outgoing Travel-Visa-Free Countries

Afghanistan, Algeria, Australia, Bhutan, Cameroon, Canada, DR Congo, Djibouti, Equatorial Guinea, Eritrea, India, Libya, New Zealand, North Korea, Pakistan, Papua New Guinea, South Sudan, Sri Lanka, Sudan, Turkmenistan, United States

Distribution of Number of Incoming Travel-Visa-Free Countries

Bolivia, Burundi, Cambodia, Cape Verde, Comoros, Dominica, Guinea-Bissau, Haiti, Macao, Madagascar, Maldives, Mauritania, Micronesia, Mozambique, Palau, Rwanda, Samoa, Seychelles, Somalia, Timor-Leste, Togo, Tuvalu
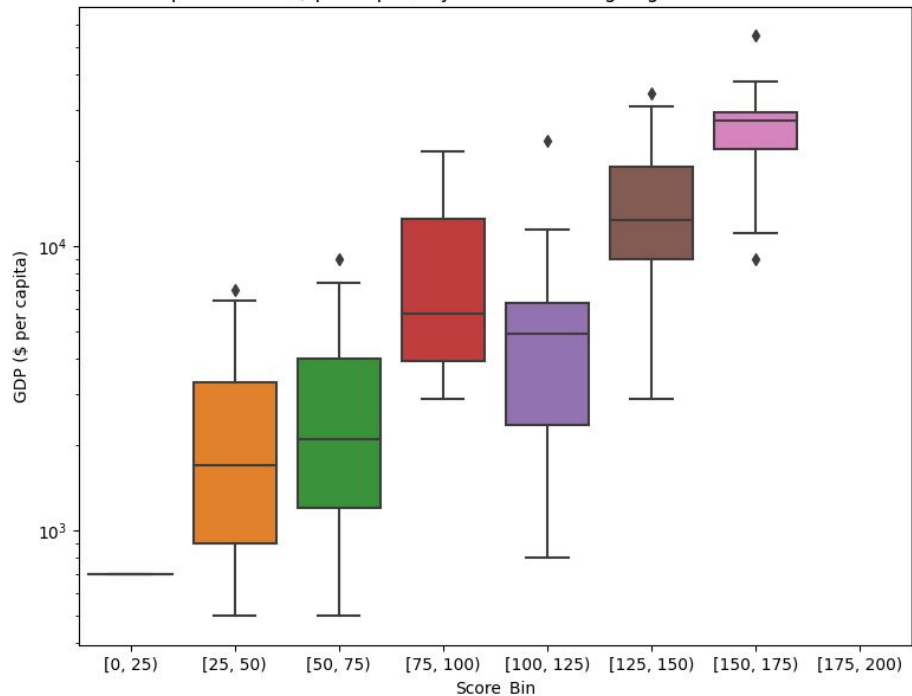
Outgoing and Incoming
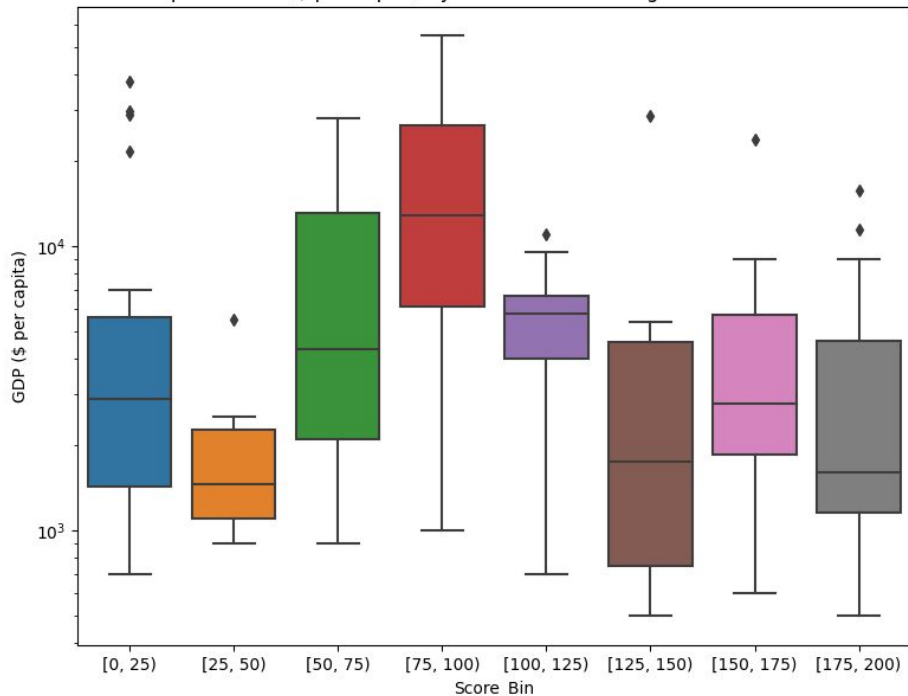## vs.
GDP, Infant Mortality, Literacy, Birth Rates

Counts Versus Basic Attributes - GDP

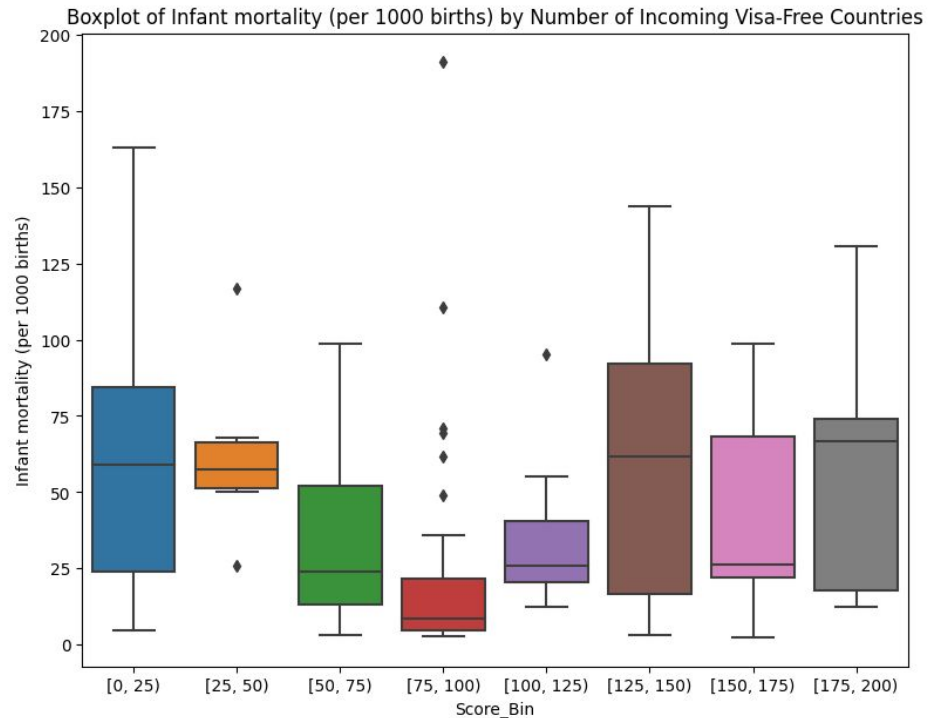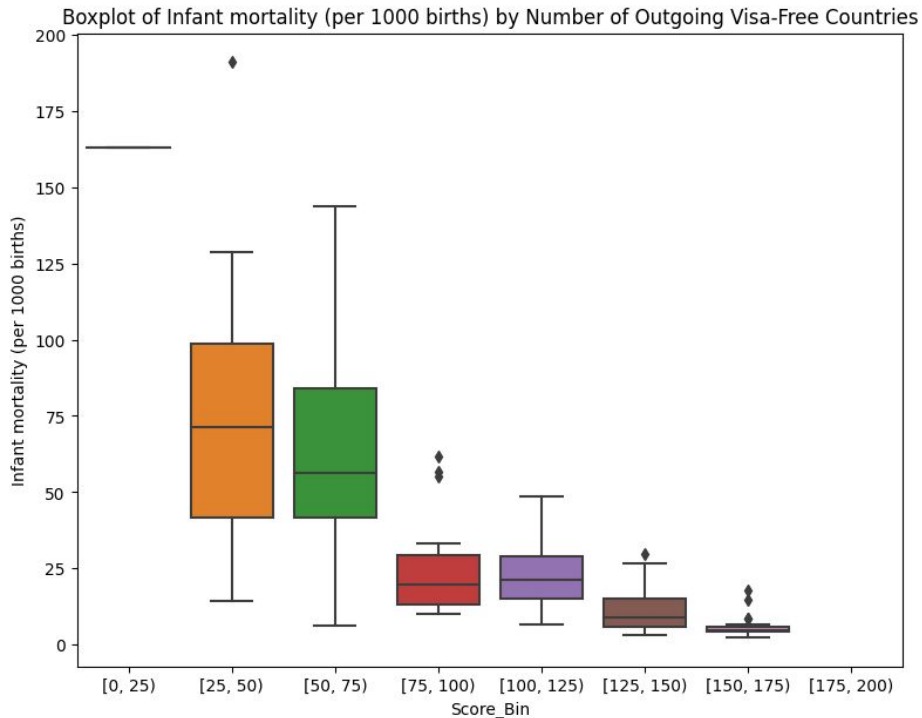Boxplot of GDP ($ per capita) by Number of Outgoing Visa-Free Countries

Boxplot of GDP ($ per capita) by Number of Incoming Visa-Free Countries

Countries that have higher GDP have more travel-visa-free countries.

Counts Versus Basic Attributes - Infant Mortality

Boxplot of Infant mortality (per 1000 births) by Number of Outgoing Visa-Free Countries

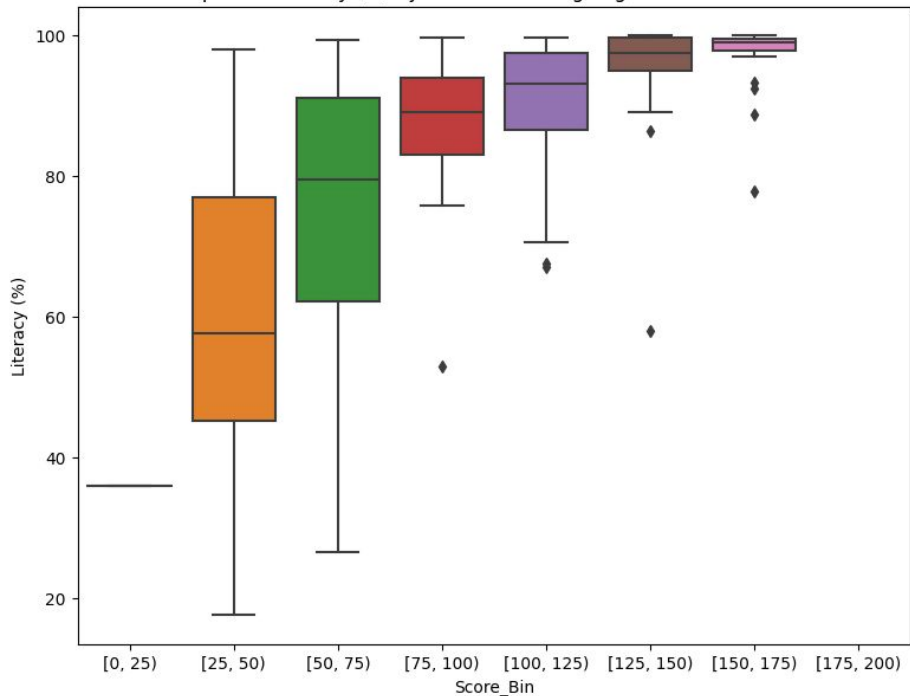Boxplot of Infant mortality (per 1000 births) by Number of Incoming Visa-Free Countries

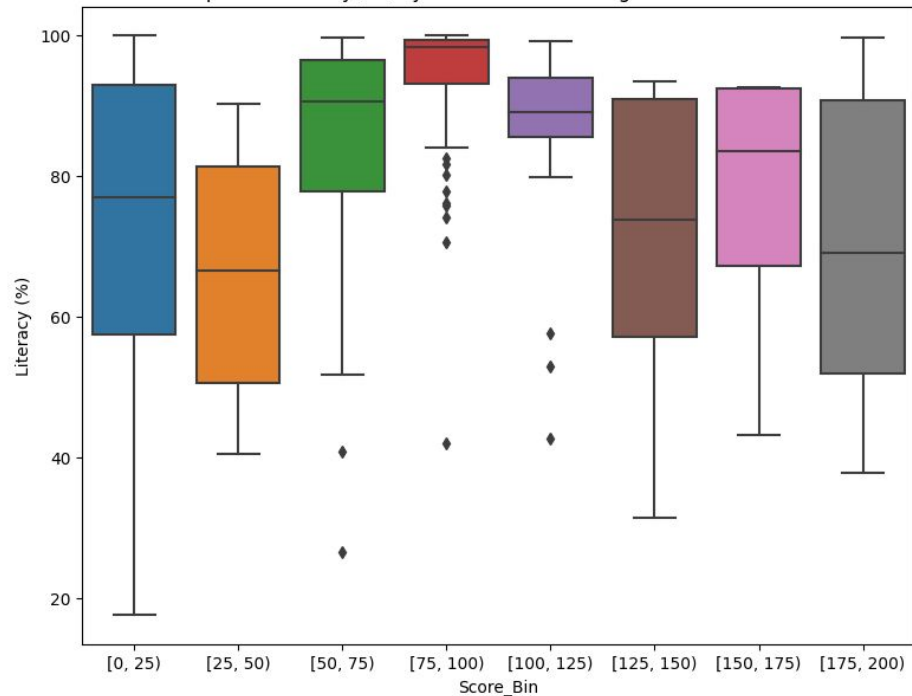Countries that have lower infant mortality have more travel-visa-free countries.

Counts Versus Basic Attributes – Literacy

Boxplot of Literacy (%) by Number of Outgoing Visa-Free Countries

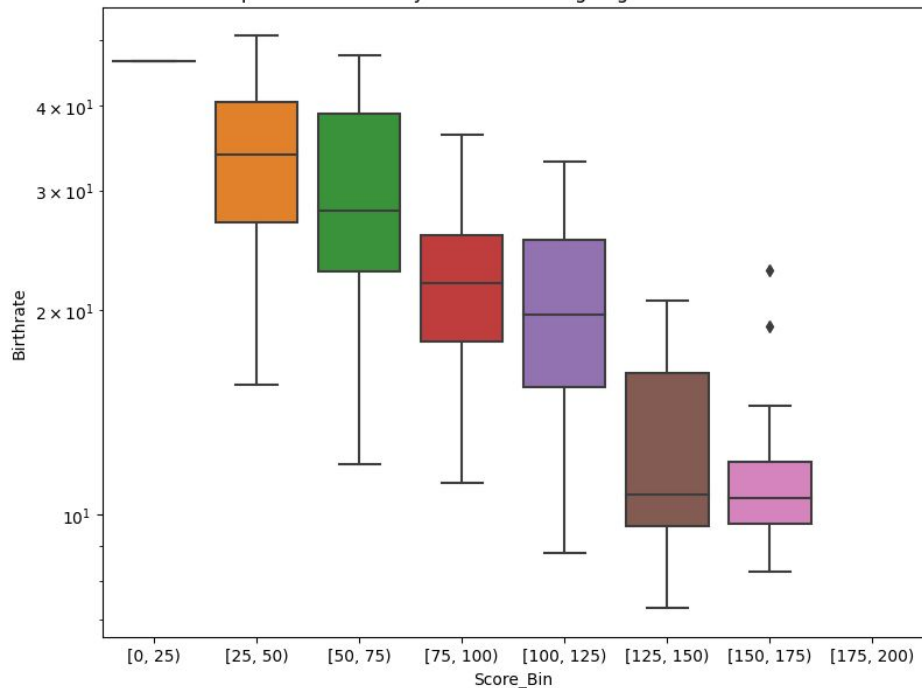Boxplot of Literacy (%) by Number of Incoming Visa-Free Countries

Countries that have higher literacy have more travel-visa-free countries.

Counts Versus Basic Attributes – Birth Rates

Boxplot of Birthrate by Number of Outgoing Visa-Free Countries

Boxplot of Birthrate by Number of Incoming Visa-Free Countries
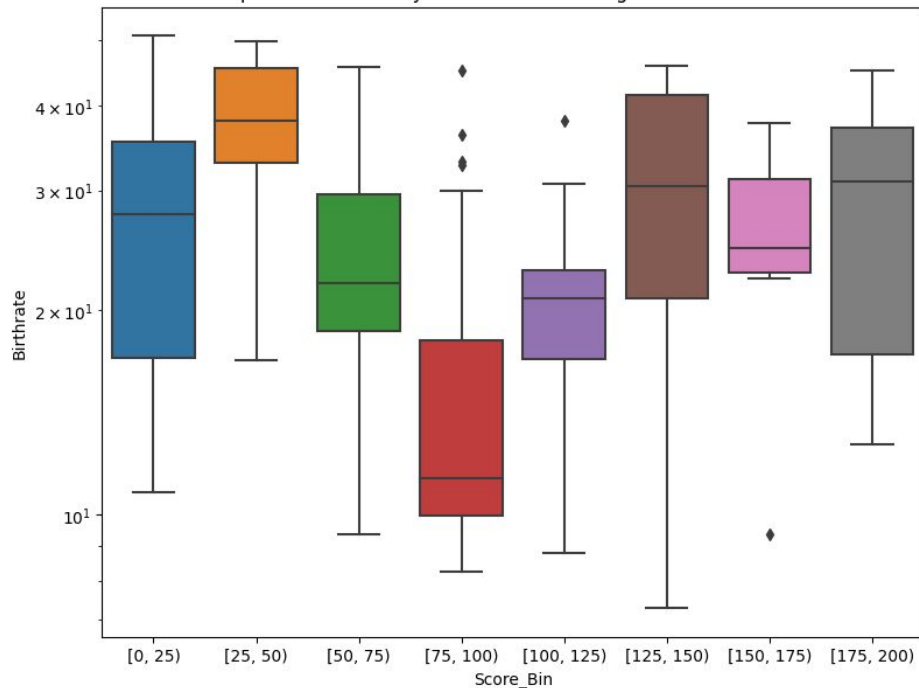
Countries that have lower birth rate have more travel-visa-free countries.

Key Findings

- Countries that have more access to other countries without travel visa also have...
    - Higher GDP
    - Lower infant mortality
    - Higher literacy
    - Lower birth rate
- Countries that are more welcome to tourists have...
    - ??? No trend found

Migration, Political Freedom

Migration
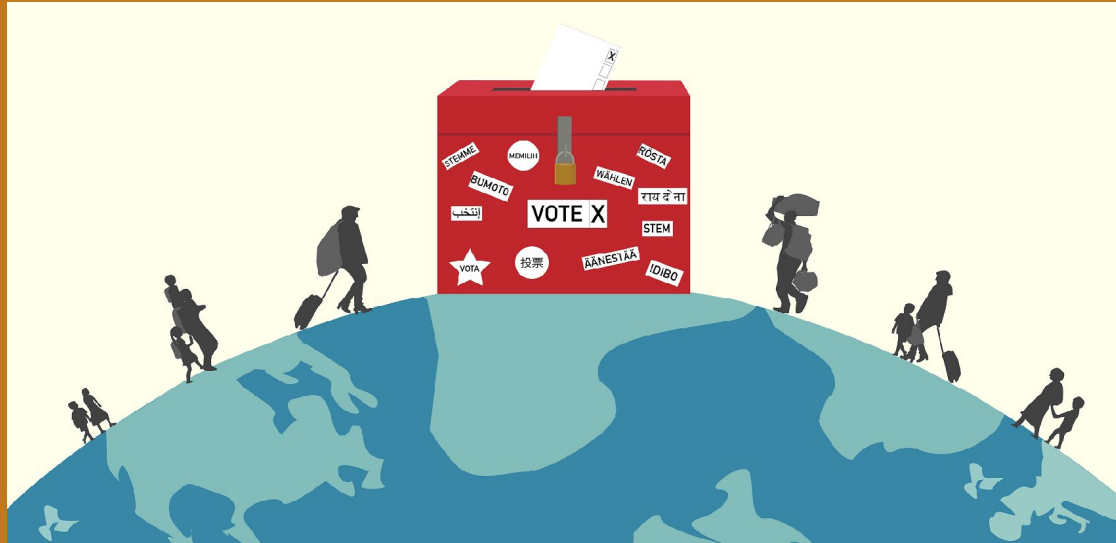
Does migration lead to a country achieving travel-visa-free status?

- Heatmaps and contour plots reveals a notable absence of significant correlation between migration and travel-visa-free scores.
- Visualizations suggest that migration factors do not prominently influence the travel-visa-free scores for countries.

Correlation Heatmap: Net Migration vs. Visa-Free Score

Contour Plot: Net Migration vs Outgoing Visa-Free Score

Contour Plot: Net Migration vs Incoming Visa-Free Score
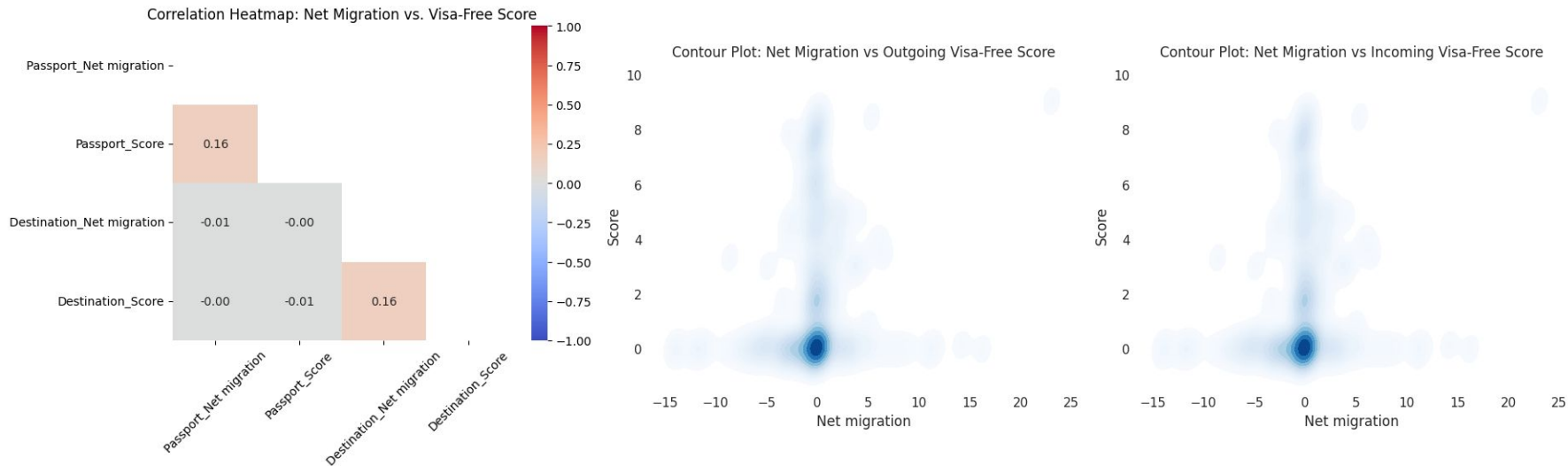
Political Freedom

Does political freedom lead to a country achieving travel-visa-free status?

Correlation Matrix Heatmap: Political Freedom vs. Visa-Free Score
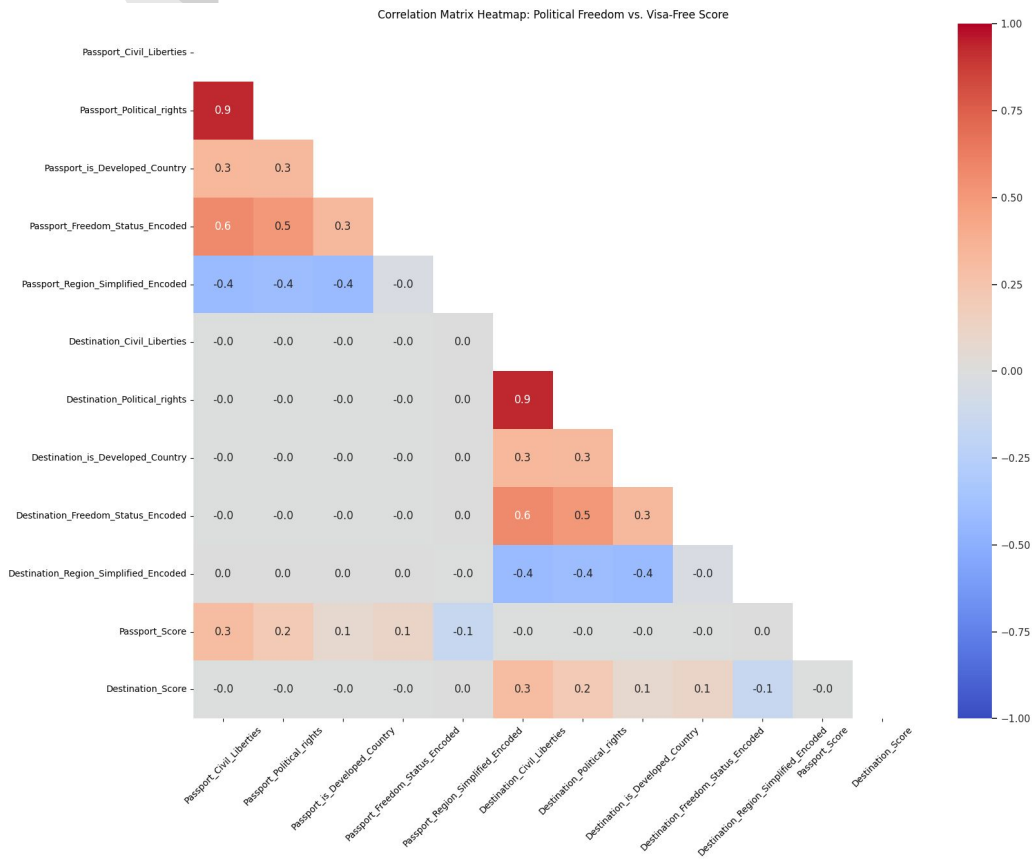
- A weak positive correlation between the indicators of political freedom and the score of travel-visa-free.

Region, Freedom Status and Development vs. Travel-Visa-Free Scores

- Regional Trends: Europe consistently leads in visa-free scores, followed by the Americas, Oceania, Asia, and Africa.
- Freedom Classification: "Free" countries display the highest visa-free scores, followed by "Partially Free," and "Not Free," indicating a positive correlation between freedom status and visa-free scores.
- Development Impact: Developed countries generally boast higher visa-free scores, showing a positive correlation between a country's development level and its visa-free access.

Civil Liberties and Political Rights vs. Travel-Visa-Free Scores

Civil Liberties vs. Visa-Free Score

Political rights vs. Visa-Free Score
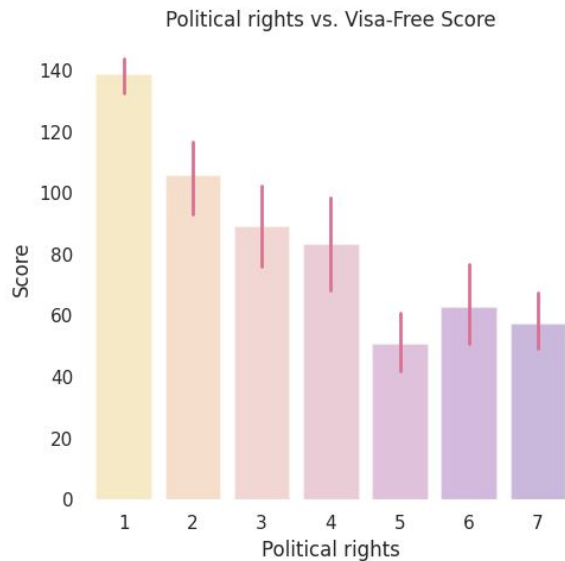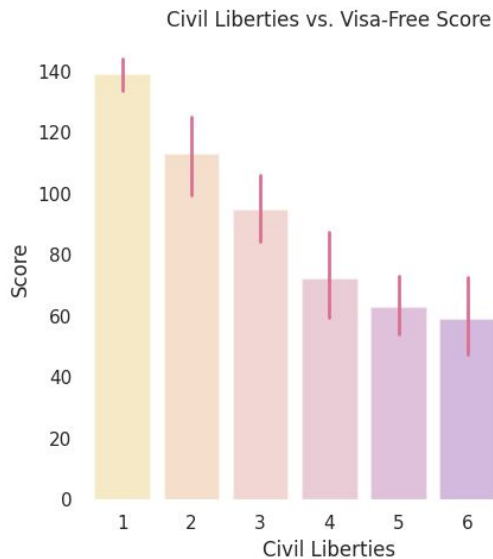
- Civil Liberties: Higher civil liberties in a country correspond to higher visa-free scores.
- Political Rights: Stronger political rights align with higher visa-free scores

OLS Regression Results

OLS Regression Results

Dep. Variable:	Score	R-squared:	0.634
Model:	OLS	Adj. R-squared:	0.629
Method:	Least Squares	F-statistic:	107.6
Date:	Sun, 26 Nov 2023	Prob (F-statistic):	1.96e-40
Time:	21:30:47	Log-Likelihood:	-887.00
No. Observations:	190	AIC:	1782.
Df Residuals:	186	BIC:	1795.
Df Model:	3		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	148.1959	3.886	38.138	0.000	140.530	155.862
Civil_Liberties	-12.2266	2.838	-4.308	0.000	-17.826	-6.627
Political_rights	-1.6468	2.445	-0.674	0.501	-6.470	3.176
is_Developed_Country	-32.0292	4.684	-6.838	0.000	-41.270	-22.789

Omnibus:	1.878	Durbin-Watson:	1.875
Prob(Omnibus):	0.391	Jarque-Bera (JB):	1.652
Skew:	-0.020	Prob(JB):	0.438
Kurtosis:	3.455	Cond. No.	14.4

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Regression Insights:
- R-squared: 0.634
- p-value very small, indicating overall model significance

Variable Impact:
- 'Civil_Liberties' and 'is_Developed_Country' significantly affect 'Score.'
- 'Political_rights' lacks a significant relationship with 'Score.'
- Reduced freedom or non-developed status correlates with lower 'Score.'

Political Freedom

Key Findings:

- Weak positive correlation between political freedom indicators and visa freedom scores.

- European and other 'free' and developed nations tend to have higher visa-free scores

- Positive correlation between civil liberties and visa-free scores, and stronger political rights tends to align with higher visa-free scores.

- Regression analysis confirms that trends in travel-visa-free scores are influenced by civil liberties and development status

Terrorism & GDP Vs Visa-free

Correlation Matrix Heatmap — 2020

Correlation Matrix Heatmap — 2022
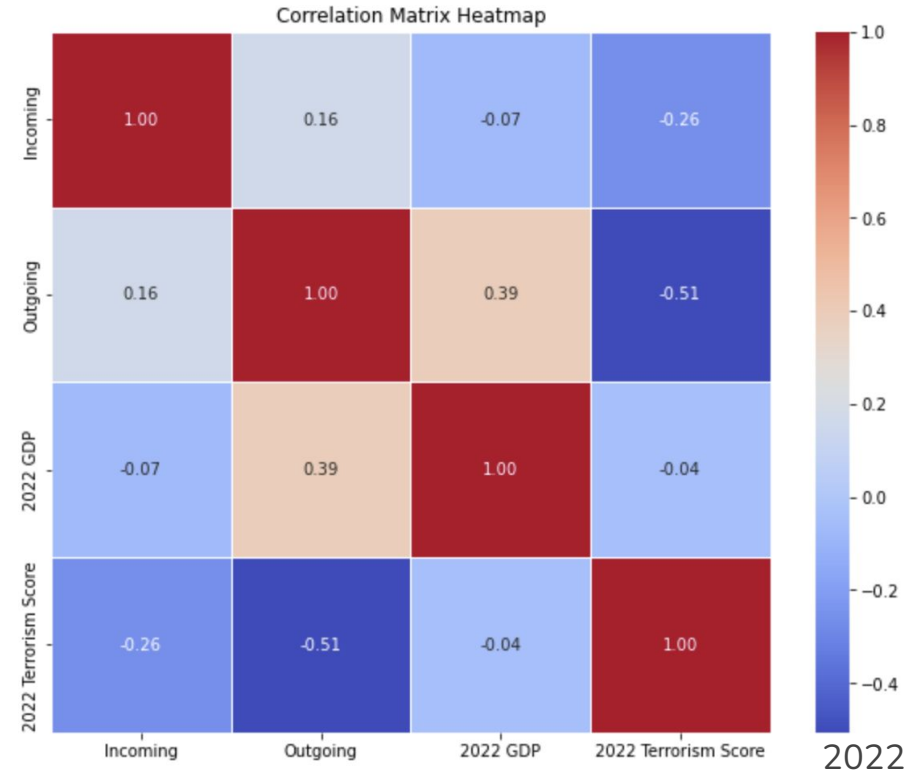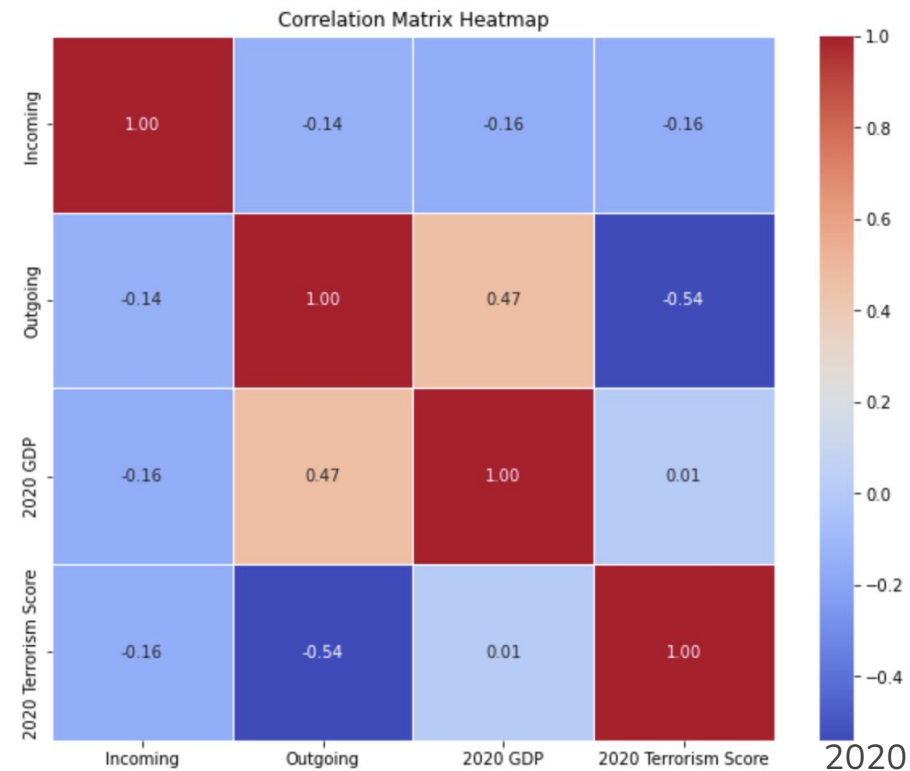
- Strong negative correlation between Terrorism score and Outgoing VISA.
- Terrorism Scores and Incoming VISA is also negatively correlated.
- There is a strong positive correlation between GDP and Outgoing VISA.
- There is a weak negative correlation between GDP and Incoming VISA.

Correlation between Outgoing and GDP for Different Years

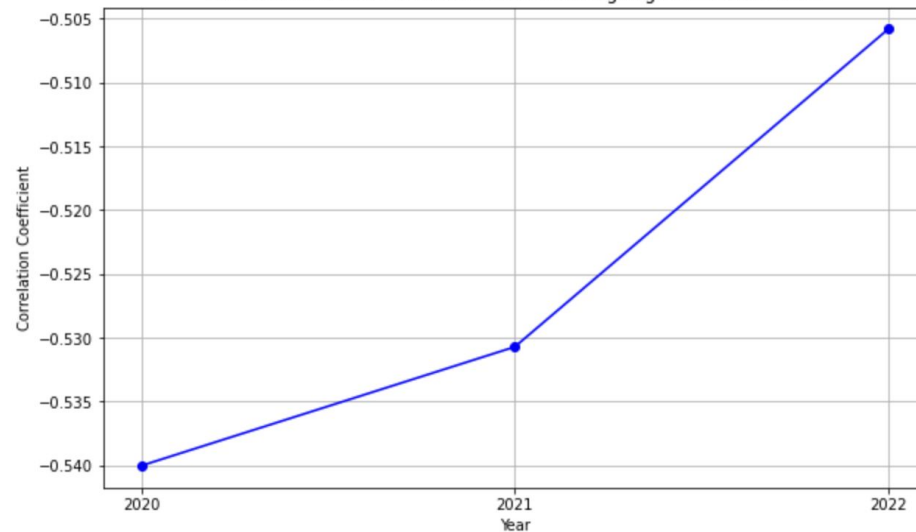Correlation between Terrorism Score and GDP for Different Years
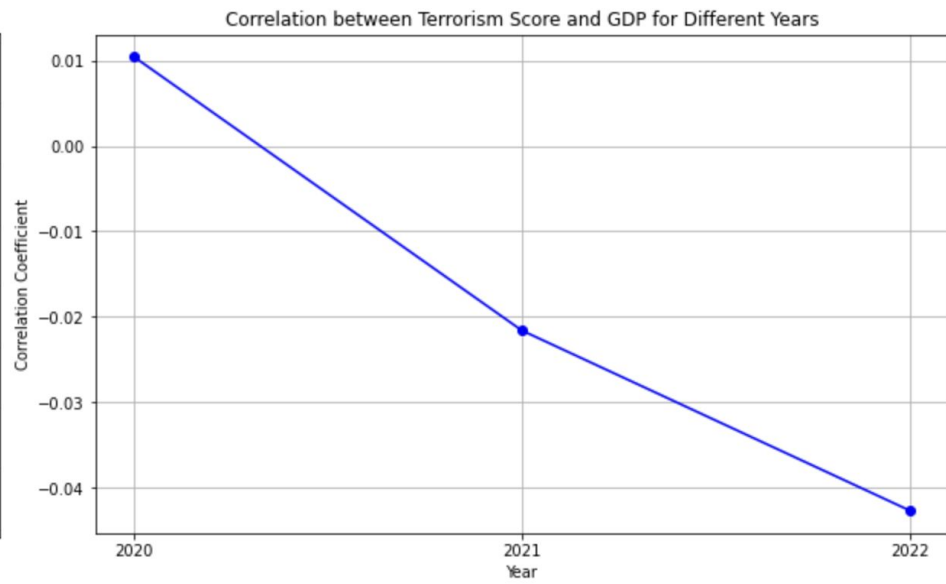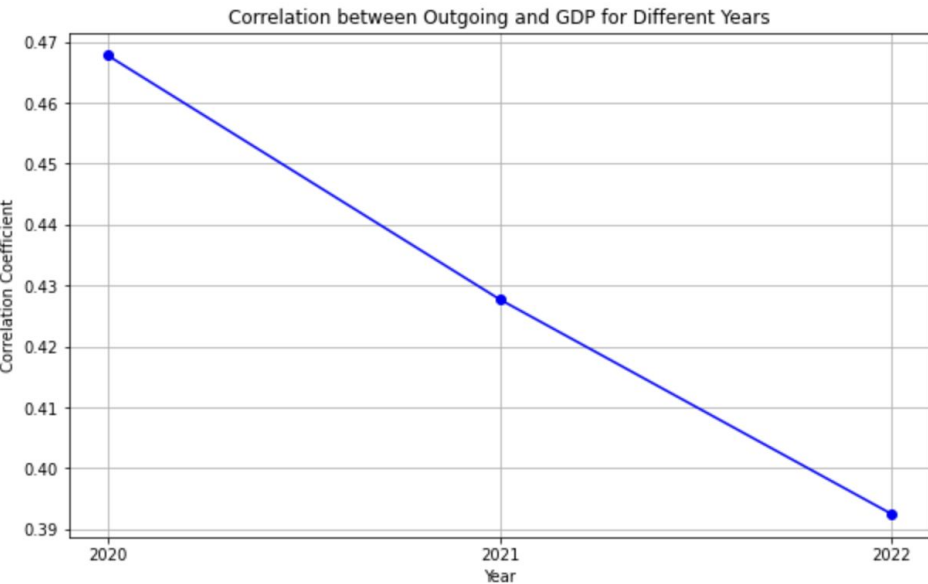
- Strong positive correlation between GDP and Outgoing VISA. Both GDP and Outgoing VISA increase over the years.
- The correlation between Terrorism Score and GDP drops from a positive correlation to a negative correlation over the years. GDP increases while Terrorism score decreases over the years.
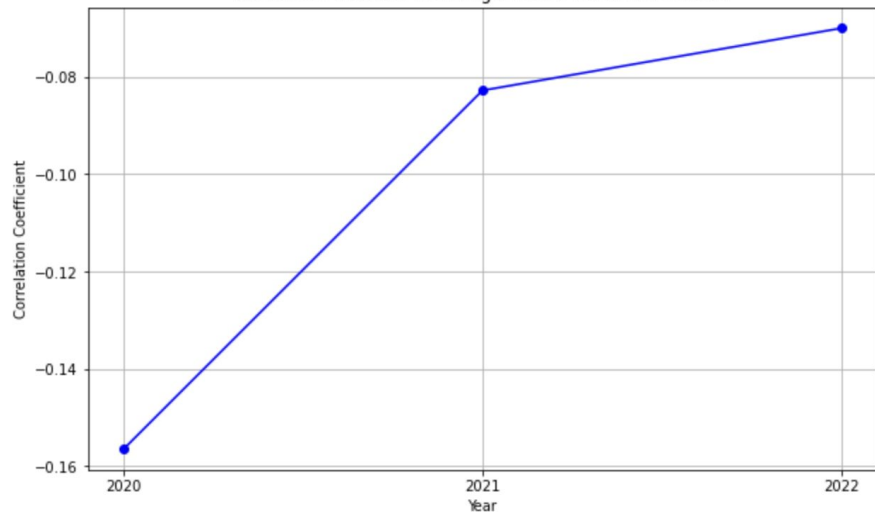
- The negative correlation between Terrorism Score and Incoming VISA becomes stronger over the years.
- The negative correlation between Terrorism Score and Outgoing VISA becomes weaker over the years.
- The negative correlation between Incoming VISA and GDP becomes weaker over the years.

COVID & Outgoing VISA

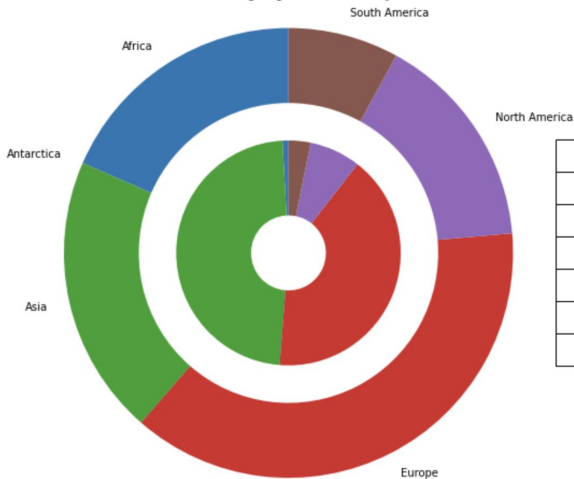**COVID Cases (Inner) vs Outgoing Visas (Outer) by Continent (2020)**
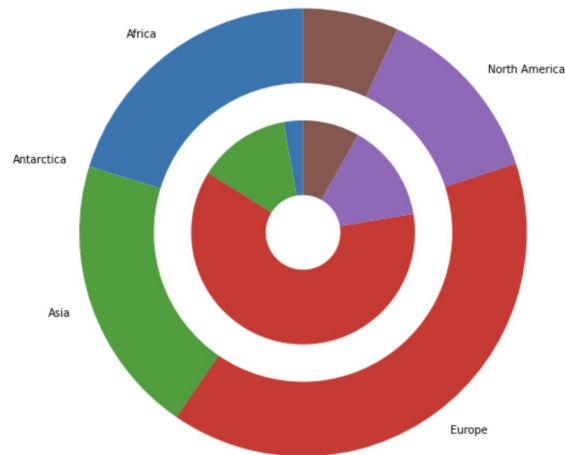
Continent	Outgoing %	COVID %
Africa	20.25803349627374	2.7944456576948844
Antarctica	0.0	0.0
Asia	20.17789887010177	13.313539629530572
Europe	39.53041109063226	61.553184128066896
North America	13.110024841734113	14.158321821086183
South America	6.923631701258113	8.180508763621463

**COVID Cases (Inner) vs Outgoing Visas (Outer) by Continent (2021)**
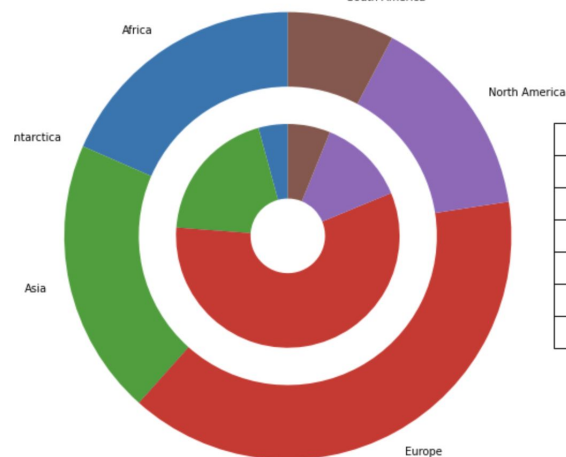
Continent	Outgoing %	COVID %
Africa	18.450684150513112	4.240702143770775
Antarctica	0.0	0.0
Asia	19.954389965792473	19.574291790962913
Europe	39.03933865450399	57.42645265524472
North America	14.830387685290763	12.614220307086724
South America	7.725199543899658	6.144333102934865

COVID Cases (Inner) vs Outgoing Visas (Outer) by Continent (2022)

Continent	Outgoing %	COVID %
Africa	18.456642800318217	0.8549490424526166
Antarctica	0.0	0.0
Asia	20.15176549782755	47.88325103433833
Europe	37.78226546722967	40.721290226434256
North America	15.647757175203475	7.371801584289693
South America	7.9615690594210875	3.168708112485113

**COVID Cases (Inner) vs Outgoing Visas (Outer) by Continent (2023)**
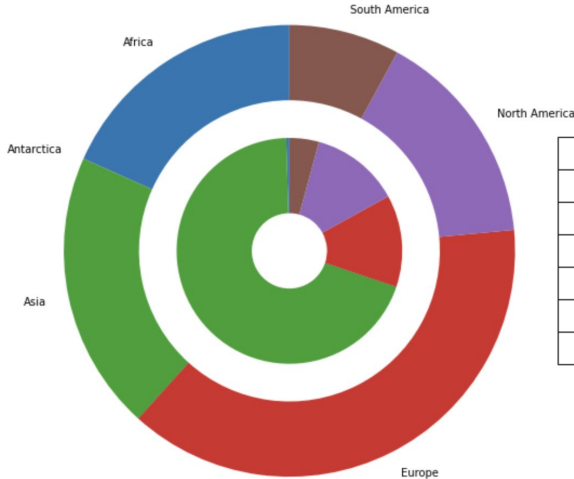
| Continent	Outgoing %	COVID %
Africa	18.30985915492958	0.4526648962897369
Antarctica	0.0	0.0
Asia	20.008462793930967	69.38284405192833
Europe	38.161155775856855	13.176057683323888
North America	15.58967539140422	12.76868625165559
South America	7.930846883878377	4.219747116802453

COVID & Incoming VISA

## COVID Cases (Inner) vs Incoming Visas (Outer) by Continent (2020)
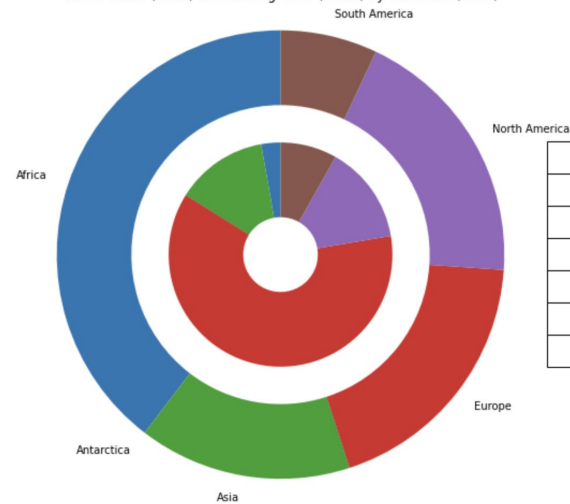
Continent	Incoming %	COVID %
Africa	39.61402946828956	2.7944456576948844
Antarctica	0.0	0.0
Asia	15.38276745675849	13.313539629530572
Europe	18.914157591287637	61.553184128066896
North America	19.07431133888533	14.158321821086183
South America	7.014734144778988	8.180508763621463

## COVID Cases (Inner) vs Incoming Visas (Outer) by Continent (2021)
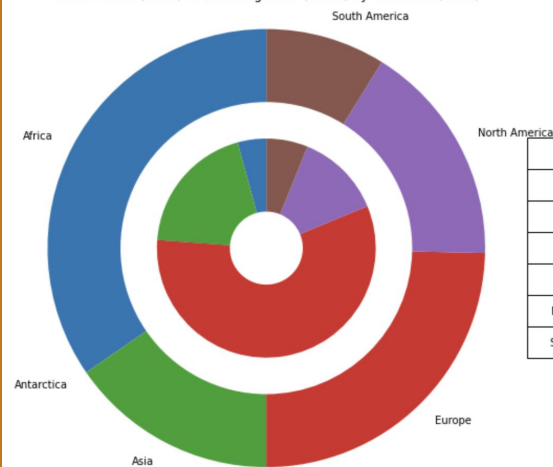
Continent	Incoming %	COVID %
Africa	34.61113413454897	4.240702143770775
Antarctica	0.0	0.0
Asia	15.388865865451029	19.574291790962913
Europe	24.637380853709075	57.42645265524472
North America	16.50780494543445	12.614220307086724
South America	8.854814200856472	6.144333102934865

COVID Cases (Inner) vs Incoming Visas (Outer) by Continent (2022)
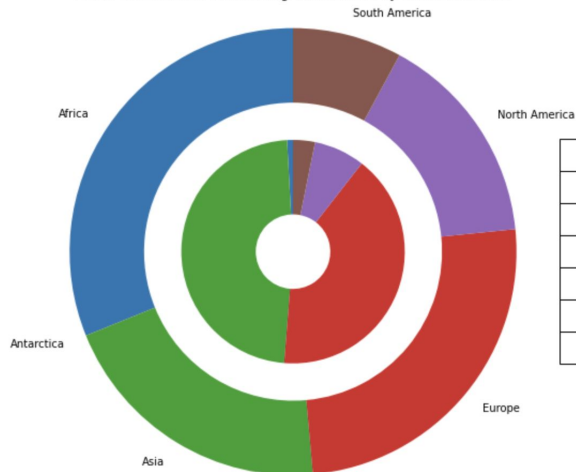
Continent	Incoming %	COVID %
Africa	31.12676056338028	0.8549490424526166
Antarctica	0.0	0.0
Asia	20.293937538273116	47.88325103433833
Europe	25.186772810777708	40.721290226434256
North America	15.480710349050828	7.371801584289693
South America	7.911818738518065	3.168708112485113

COVID Cases (Inner) vs Incoming Visas (Outer) by Continent (2023)
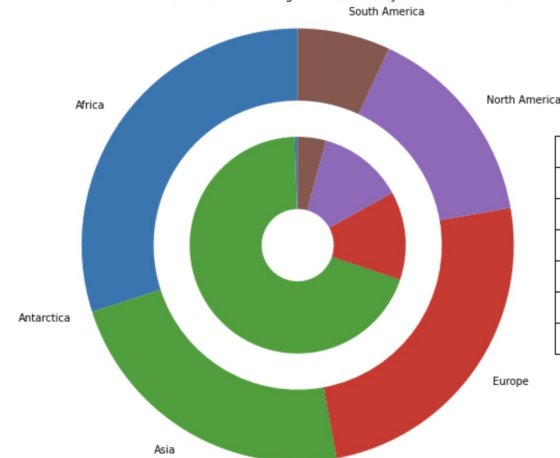
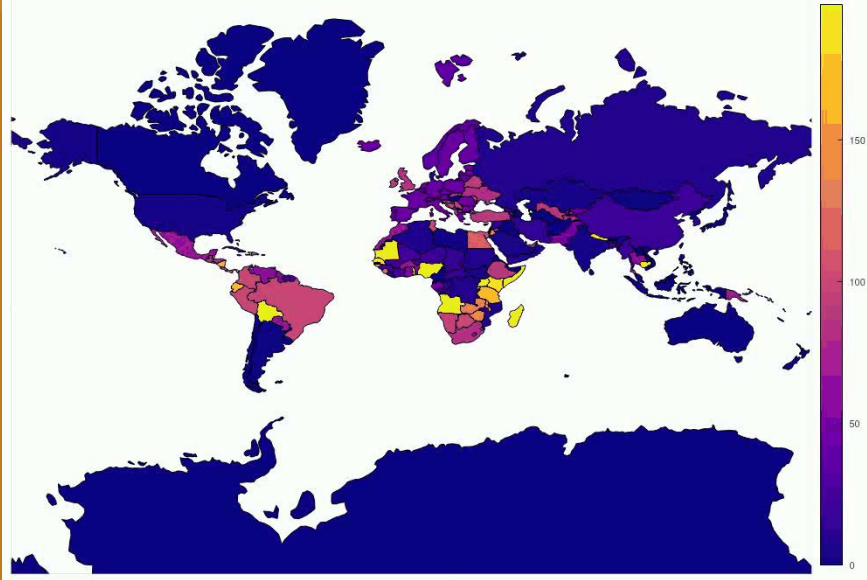| Continent	Incoming %	COVID %
Africa	29.985443959243085	0.4526648962897369
Antarctica	0.0	0.0
Asia	22.907569141193594	69.38284405192833
Europe	24.860504609412907	13.176057683323888
North America	15.302037845705968	12.76868625165559
South America	6.944444444444445	4.219747116802453

Visa Free Travel Animation and Tool

Animation

Incoming visa free travel
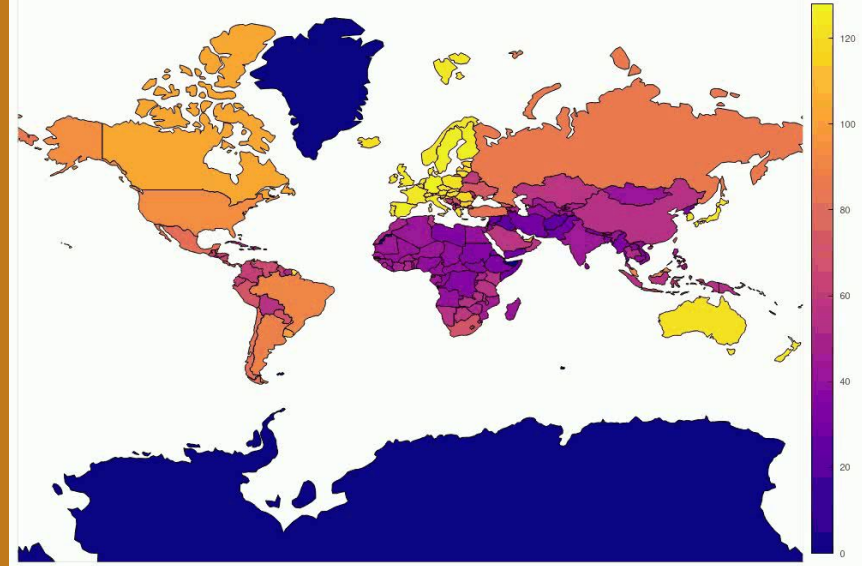
Outgoing visa free travel
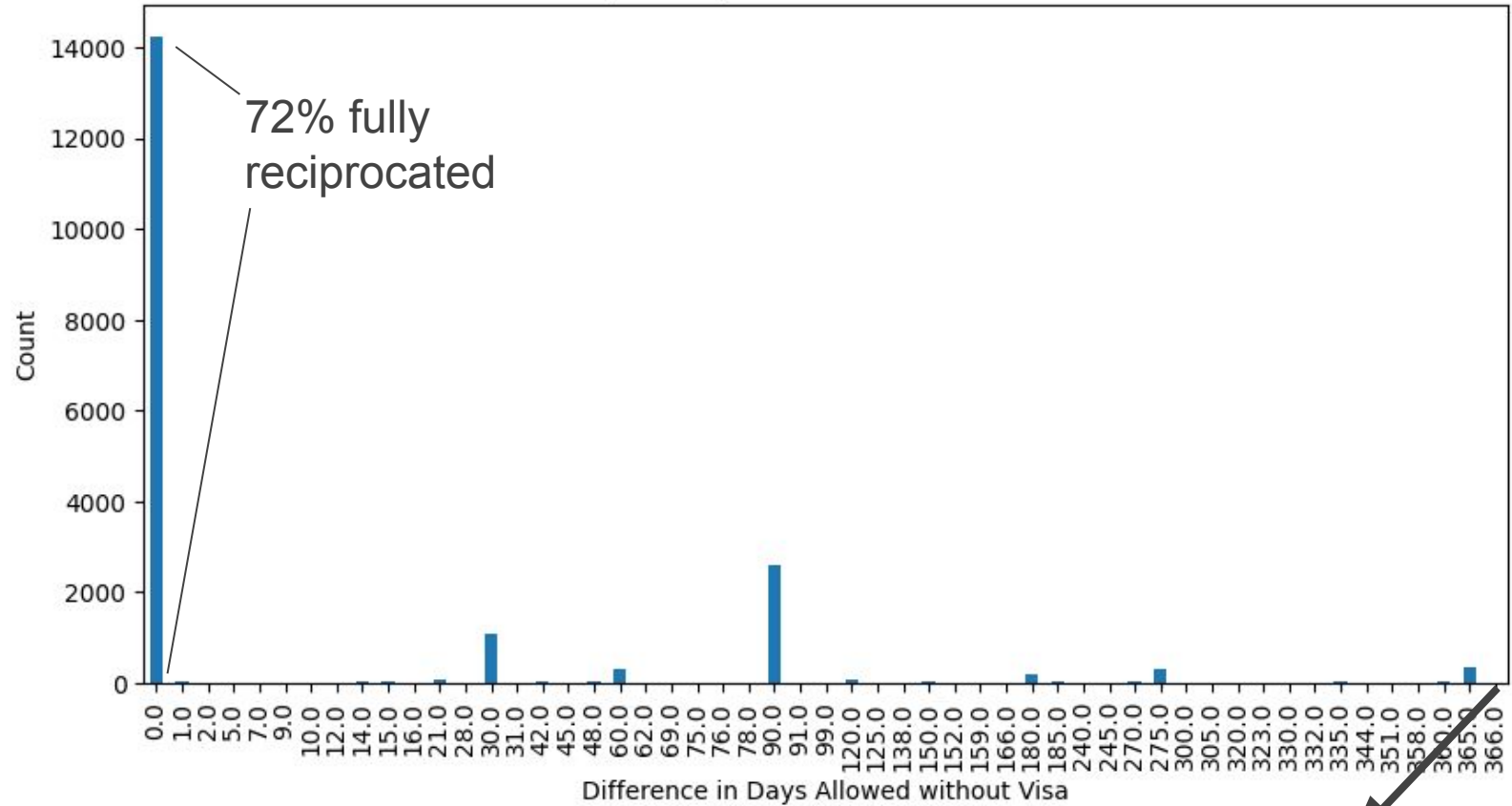
Interactive Tool
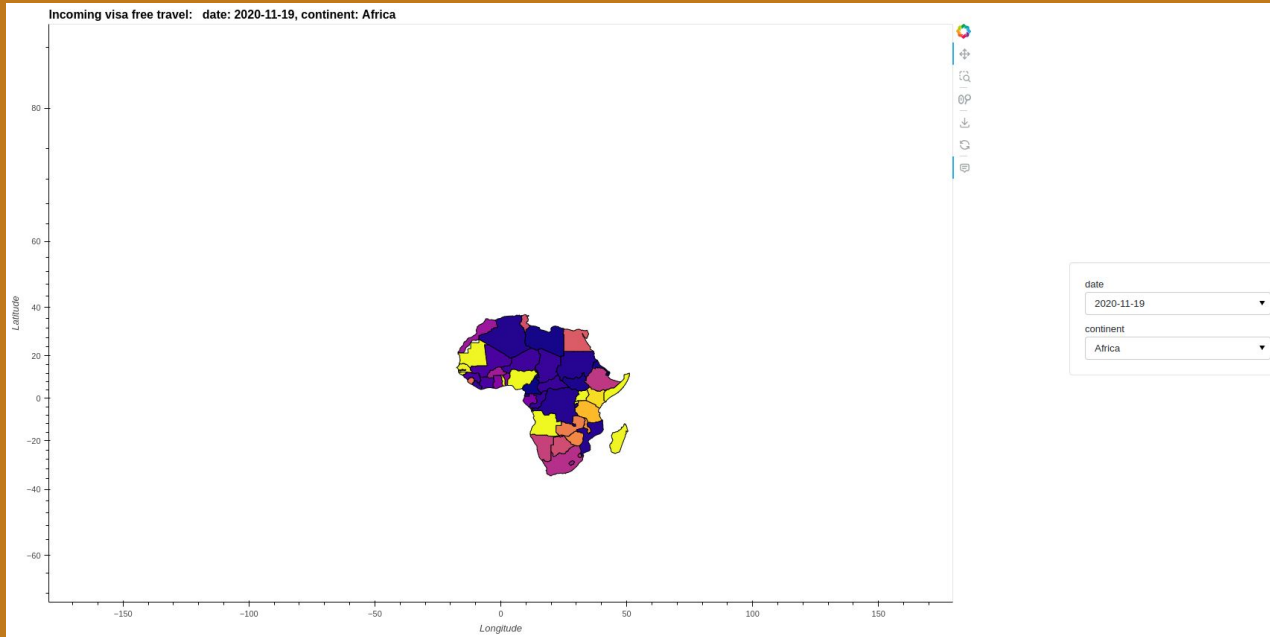
- Outgoing tool:
  https://drive.google.com/file/d/1UcG4pLZXdpk9_n-Tq-ERNAZhHjkP4cHx/view?usp=sharing
- Incoming tool:
  https://drive.google.com/file/d/1vrRGlNlUfJzATFSJAkNcE3GX02yeYSw7/view?usp=drive_link

Reciprocity and Asymmetry

Asymmetry Between Two Countries

72% fully reciprocated

Syria no admission to Palestine, Palestine visa-free for Syria
Kyrgyzstan no admission to Tajikistan, Tajikistan visa-free for Kyrgyzstan

Conclusion

Questions?