

# Report on U.S. Foreign Aid Visualization Project

## Introduction

This project is a dynamic visualization tool for U.S. foreign aid for the year 2022 (because this is the only latest dataset available publicly), developed using D3.js. It provides an interactive way to visualize global trends in American foreign aid spending with respect to various metrics such as the Human Development Index (HDI), democracy index, happiness index, and more.

## Tools and Technologies

The primary tool used for this project is **D3.js**, a **JavaScript library** for producing dynamic, interactive data visualizations in web browsers. Additional technologies include:

- **HTML/CSS**: For structuring and styling the web page.
- **JavaScript**: For implementing the interactive features.
- **TopoJSON**: For handling geographical data.
- **Bootstrap**: For responsive design and layout.

## Data Pre-processing

The data was pre-processed using Python to clean and merge datasets from various sources. Created the own dataset from a different source for this project.

<https://www.kaggle.com/datasets/ybarot/u-s-a-foreign-aid/data>

The datasets were then converted into a format suitable for D3.js to consume.

## Dataset

### General Description

The dataset comprises multiple sources:

- **HDI**: Human Development Index data from the UN.
- **Happiness Index**: World Happiness Report data.
- **Democracy Index**: Data from the Economist Intelligence Unit.
- **Foreign Aid**: Data from the U.S. government.

### Detailed Analysis

- **Attribute Types**: The dataset includes numerical attributes (e.g., aid amounts, HDI scores) and categorical attributes (e.g., government type).
- **Derived Attributes**: Metrics such as the top ten aid recipients were derived from the raw data.
- **Complexity**: The dataset's complexity necessitates visualization due to the large number of countries and the multiple metrics involved, making it more difficult to analyze using traditional methods.

## Visualization Tasks

The visualization supports several tasks:

1. Viewing Aid Distribution: Users can see that which countries receive aid and the amount.

2. Filtering Data: Users can filter countries based on aid amounts and other metrics.
3. Detailed Analysis: Users can hover on the different countries to see detailed information and mini bar charts.

### **Encoding Channels and Idioms**

- Color: Used to represent the amount of aid received by each country on the map.
- Thickness: Flow lines' thickness represents the amount of aid received by the top ten recipient countries.
- Position: Countries are positioned according to their geographical location.

### **Interactive Operations**

- Hover: Displays detailed information about each country.
- Click: Zooms in on the selected country.
- Radio Buttons: Allow users to switch between different metrics.

### **Justification**

The chosen encodings effectively convey the data's complexity. For intuitive understanding of aid distribution I have chosen Color gradients and line thickness, while interactive elements enhance user engagement and understandability.

### **Novelty and Complexity**

The visualization is novel due to its combination of multiple metrics and interactive features. The implementation is complex because it involves integrating data from various sources, handling geographical data.

### **Critical Analysis**

#### **Strengths**

- Interactivity: Engages users and allows for detailed exploration of the data.
- Multiple Metrics: Provides a comprehensive view of foreign aid distribution.
- Visual Appeal: The use of color and flow lines makes the visualization visually appealing.

#### **Weaknesses**

- Scalability: The visualization may become cluttered with too many metrics.
- Performance: Real-time interactivity can be slow if there are large datasets.

### **Conclusion**

This project visualizes U.S. foreign aid distribution using D3.js successfully. It provides the interactive and comprehensive view of the dataset also supporting various analytical tasks. Although there is some limitations, the visualization makes it a valuable tool for understanding global trends in foreign aid from USA.

### **References**

- UN HDI dataset: <http://hdr.undp.org/en/data>
- World Happiness Report: <http://worldhappiness.report/ed/2016/>
- Economist Intelligence Unit:  
[http://www.eiu.com/public/thankyou\\_download.aspx?activity=download&campaignid=DemocracyIndex2016](http://www.eiu.com/public/thankyou_download.aspx?activity=download&campaignid=DemocracyIndex2016)
- U.S. government dataset: <https://explorer.usaid.gov/data.html>

# U.S.A. Foreign Aid Recipients

Instructions: Click To Zoom, Hover for Details, Select Metric to Display Below

☒ Foreign Aid ☐ Democracy Index ☐ Happiness Index ☐ Human Development Index ☐ Government Type

Filter Foreign Aid Recipients by Amount (USD):

Lower Bound

Upper Bound

Set Filter

