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E-waste visualization

This project focuses on analyzing global E-waste (electronic waste) data

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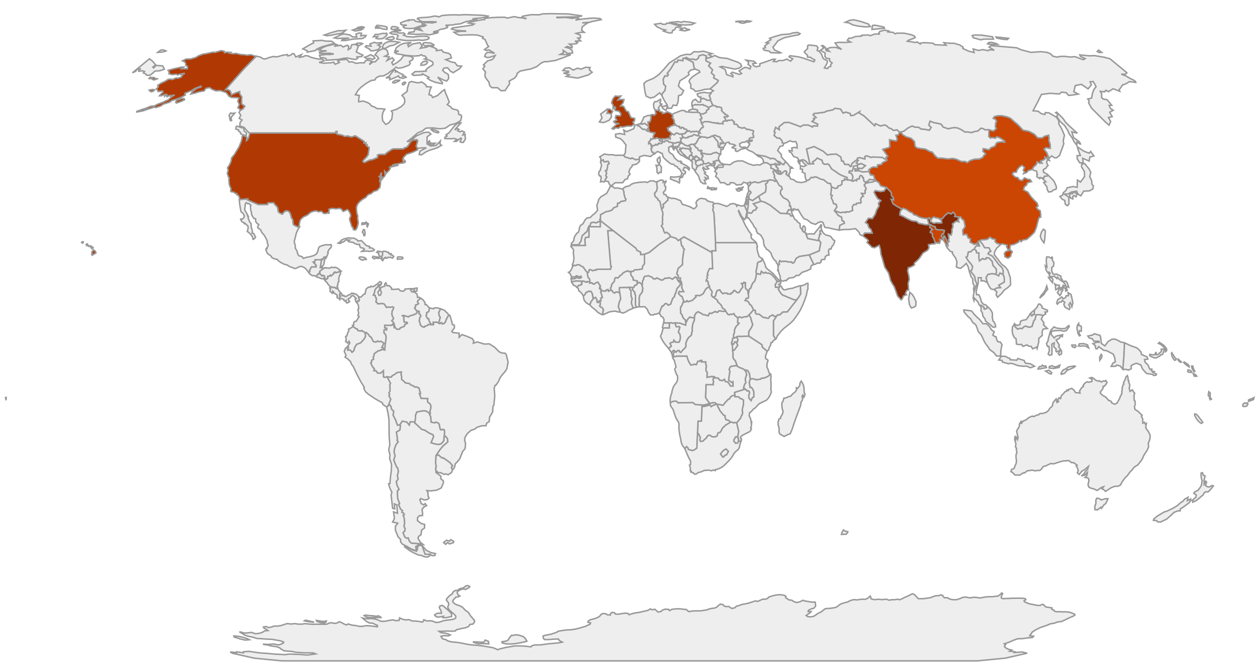
In the age of rapid digital development, e-waste has become one of the major challenges facing the global environment. Every year, thousands of tons of electronic equipment are eliminated, most of which are not properly disposed of, leading to waste of resources and environmental pollution. This visualization project aims to provide users with a more intuitive understanding of the current status, development trends and environmental impact of e-waste through data analysis and interactive visualization.

Here, users can observe the global growth trend of e-waste, analyze the recycling methods of e-waste in different categories and regions, understand its carbon footprint and identify the environmental impact of e-waste. To help the environmental organizations and researchers analyze e-waste trends and study its impact on the ecological environment through data analysis and interactive visualization. On the same time, it also aims to raise the environmental awareness of the public and consumers, and then promote the recycling of e-waste.

Global E-waste Generation and Recycling rate



Hover over a country to see details. Click to view trend over years.

Conclusion:

• India has the highest recycling rate, indicating that its e-waste recycling system may be relatively better or e-waste management is better.

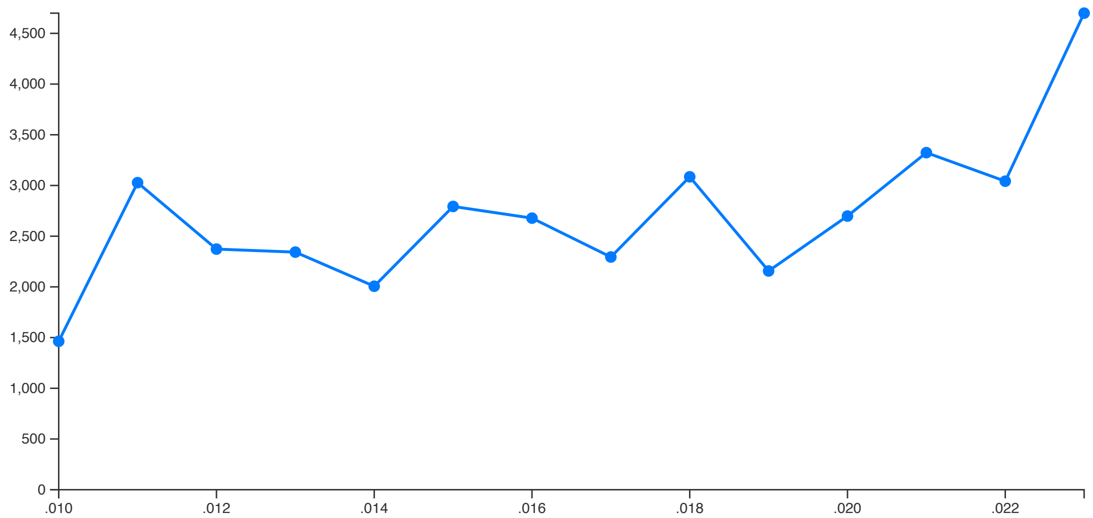
Total E-waste per caption and Recycling rate

• Bangladesh has the lowest recycling rates, which could mean that there is room for improvement in the country's e-waste treatment and recycling systems.
• China has the lowest total amount of e-waste, but the recycling rate is not the highest, which may have problems with the efficiency of e-waste management.
Overall, recycling rates in all countries are between 32% and 34%, showing that there is still much room for improvement in e-waste recycling.

Country	Total E-waste (kg)	Recycled Amount	Total Items	Recycling Rate (%)
Germany	39238.72	504	1532	32.89
Bangladesh	38087.31	501	1550	32.32
England	39403.03	501	1481	33.82
India	41661.63	521	1530	34.05
USA	39217.21	497	1471	33.78
China	37985.04	476	1424	33.42

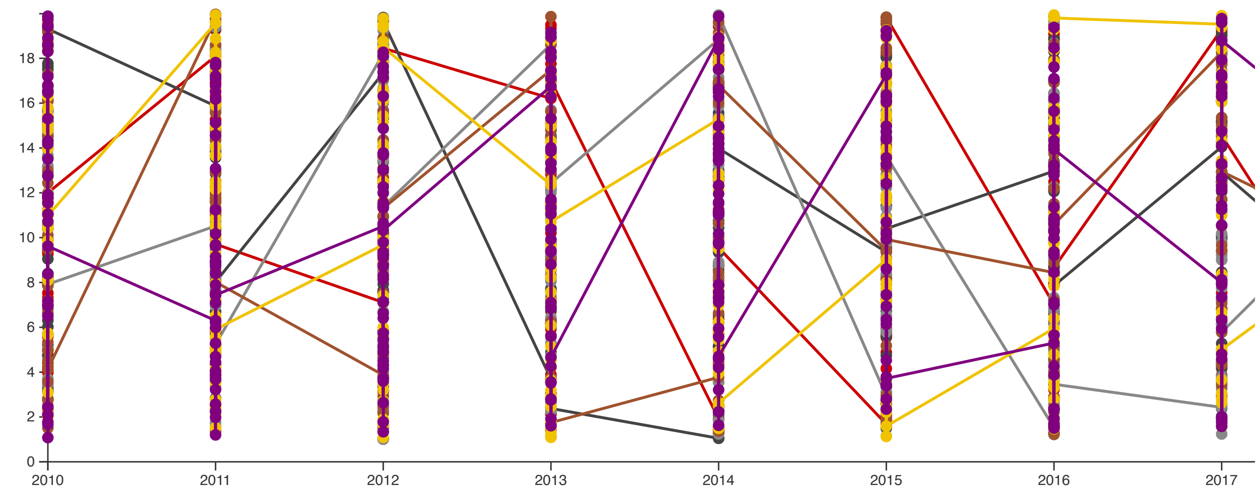
E-waste Generation Trend

Here are the changes in e-waste generation from 2010 to 2023.



Carbon Footprint Trend by Purchase Year

Select Region: All Year Range: 2023



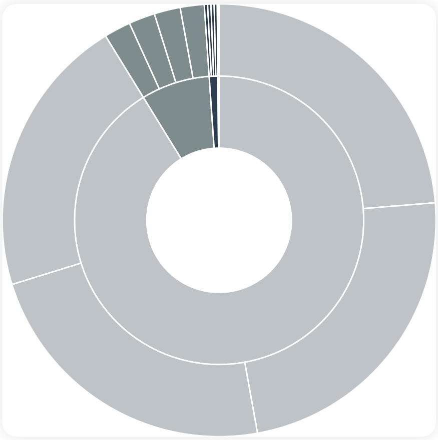
This chart shows the trend of the Carbon Footprint of different regions in the year of purchase of electronic equipment between 2010 and 2017.

Summary of regional carbon footprint changes

As can be seen from the chart, different regions have different performance in terms of carbon footprint. Some regions have significantly decreased in recent years, which may be due to the impact of energy-saving policies or equipment renewal. In some areas, there is a rebound or fluctuation phenomenon, which deserves further attention.
By analyzing carbon footprint data on a regional and annual basis, we found that the following three cities have experienced the most dramatic changes in carbon emissions over the past few years:

- **London**: The carbon footprint fluctuates the most, reflecting frequent equipment turnover or large differences in recycling.
- **Shanghai**: Changes in carbon emissions rank second, possibly related to rapid urbanization and growth in electronic consumption.
- **Dhaka**:There are also significant fluctuations, or subject to the diversity of ways in which resources are allocated and recycled

Hazardous Material Composition & Impact Explorer



Appliance - Top Hazardous Components

Toxic Component	Total Weight (kg)	Hazard Index
Cadmium	18415.63	10.67
Lead	18216.01	10.50
None	17892.32	10.18
Mercury	16326.65	10.70

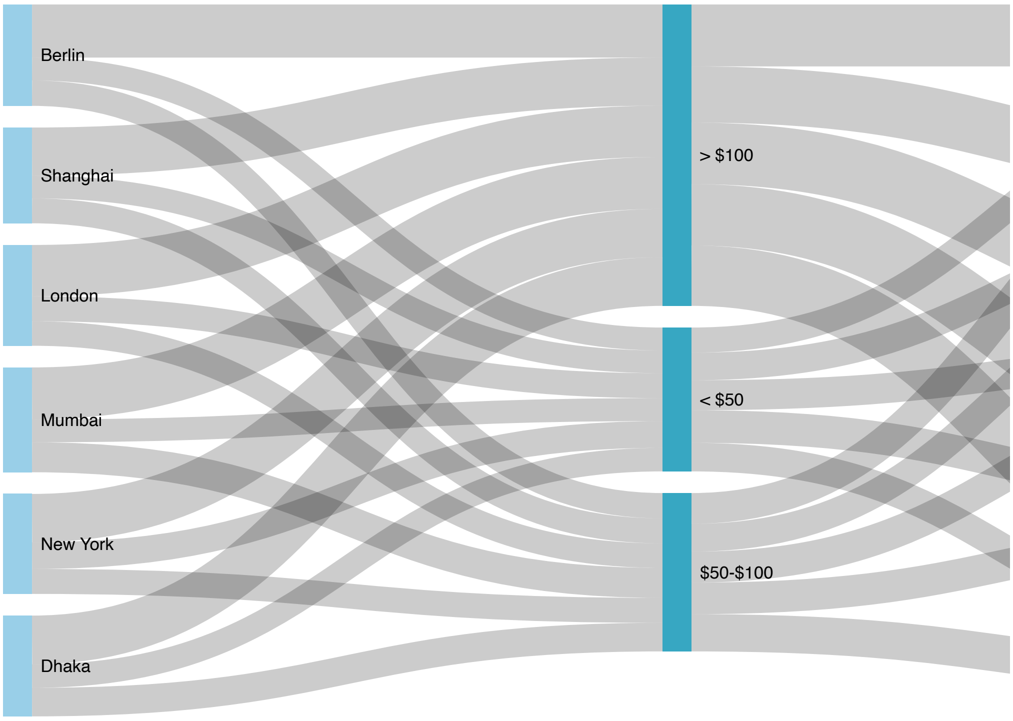
Hazard Index (HI) It is a comprehensive index to measure the impact of harmful substances in electronic waste on the environment. The higher the value, the stronger the environmental toxicity or pollution potential of the substance.
Summary Analysis:
From the sunburst chart and interactive tables, we observe that:

- **Cadmium** and **Lead** are dominant in large appliances, posing serious environmental risks.
- **Mercury** appears across all categories, suggesting widespread use and consistent hazard.
- **Mobile devices**, though lighter in weight, show relatively high Hazard Index values, highlighting their concentrated toxicity.

These findings highlight the importance of managing hazardous substances across different product categories and prioritizing safer materials in design and production.

Explore e-waste transport routes and recycling prices

Here you can explore the recycling companies under the different transport routes, the recycling methods and the end use of this e-waste.



The Conclusion

The core objective of the project is to increase user awareness of e-waste issues through data visualization, and drive environmental awareness and policy improvement. We will continue to optimize our data analysis and visualization methods to provide a more intuitive and understandable presentation of information to provide valuable insights to diverse audiences.

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Team Organization

You can click here to see our progress log in the wiki on GitHub.

And then you can see how we work together:
We communicate through offline group discussions and online Zoom meetings, and we document our important decisions and project progress on a wiki

Data sources

The source code and raw data are available on github and you can find all the information and details of our datasets in this Jupyter notebook.

Related Work