ENERGY POVERTY

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Description of Data

The data is obtained from Our World in Data from the article named Energy Poverty.

Energy poverty is one of the world's biggest problems that comes with unavailability of clean fuel which can be used for cooking.

In high-income countries, people use electricity or gas to cook a meal. But 40% of the world do not have access to these clean, modern energy sources for cooking. The poorest households burn wood and other biomass, like crop waste and dried dung. Those who can afford it cook and heat with charcoal or coal.

The dataset contains the details of clean fuel which is available for cooking in terms of percentage of population and the GDP per capita and population is also given for each year.

Access to clean fuels and technologies for cooking is the proportion of total population primarily using clean cooking fuels and technologies for cooking. Under WHO guidelines, kerosene is excluded from clean cooking fuels.

The data is then filtered based on year 2002, 2004, 2006, 2008, 2010, 2012, 2014 and 2016.

Then, we used High Dimensional Data Visualization Techniques to visualize the data in Jupyter Notebook.

After performing the MDS and TSNE techniques, a final dataset of projection values of different countries was obtained, and we used it to create visualizations in Tableau.

Original dataset

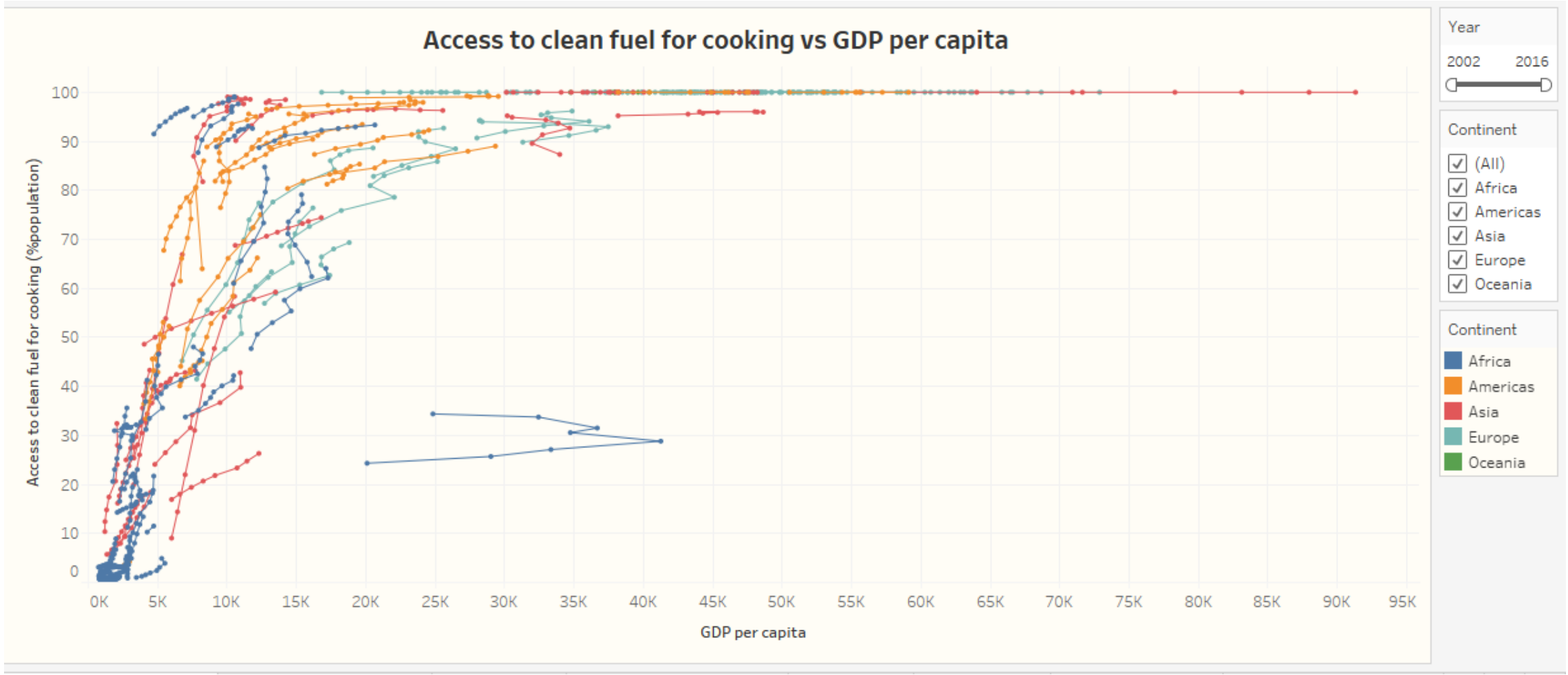
	Country	Code	Year	Access_to_clean_fuel	GDP_per_capita	Population	continent
0	Afghanistan	AFG	2002	10.39	1189.784668	22600774	Asia
1	Afghanistan	AFG	2004	12.43	1200.278013	24726689	Asia
2	Afghanistan	AFG	2006	14.81	1315.789117	26433058	Asia
3	Afghanistan	AFG	2008	17.44	1484.114461	27722281	Asia
4	Afghanistan	AFG	2010	20.68	1957.029070	29185511	Asia
5	Afghanistan	AFG	2012	24.08	2075.491614	31161378	Asia
6	Afghanistan	AFG	2014	27.99	2102.384604	33370803	Asia
7	Afghanistan	AFG	2016	32.44	2057.067978	35383028	Asia
8	Albania	ALB	2002	45.23	6754.536003	3126183	Europe
9	Albania	ALB	2004	50.53	7580.629091	3104893	Europe
10	Albania	ALB	2006	55.57	8569.191113	3063021	Europe
11	Albania	ALB	2008	60.75	9912.577242	3002683	Europe
12	Albania	ALB	2010	65.23	10749.487450	2948029	Europe
13	Albania	ALB	2012	69.96	11227.994490	2914091	Europe
14	Albania	ALB	2014	73.98	11586.863770	2896307	Europe

Access to clean fuel for cooking_Projections

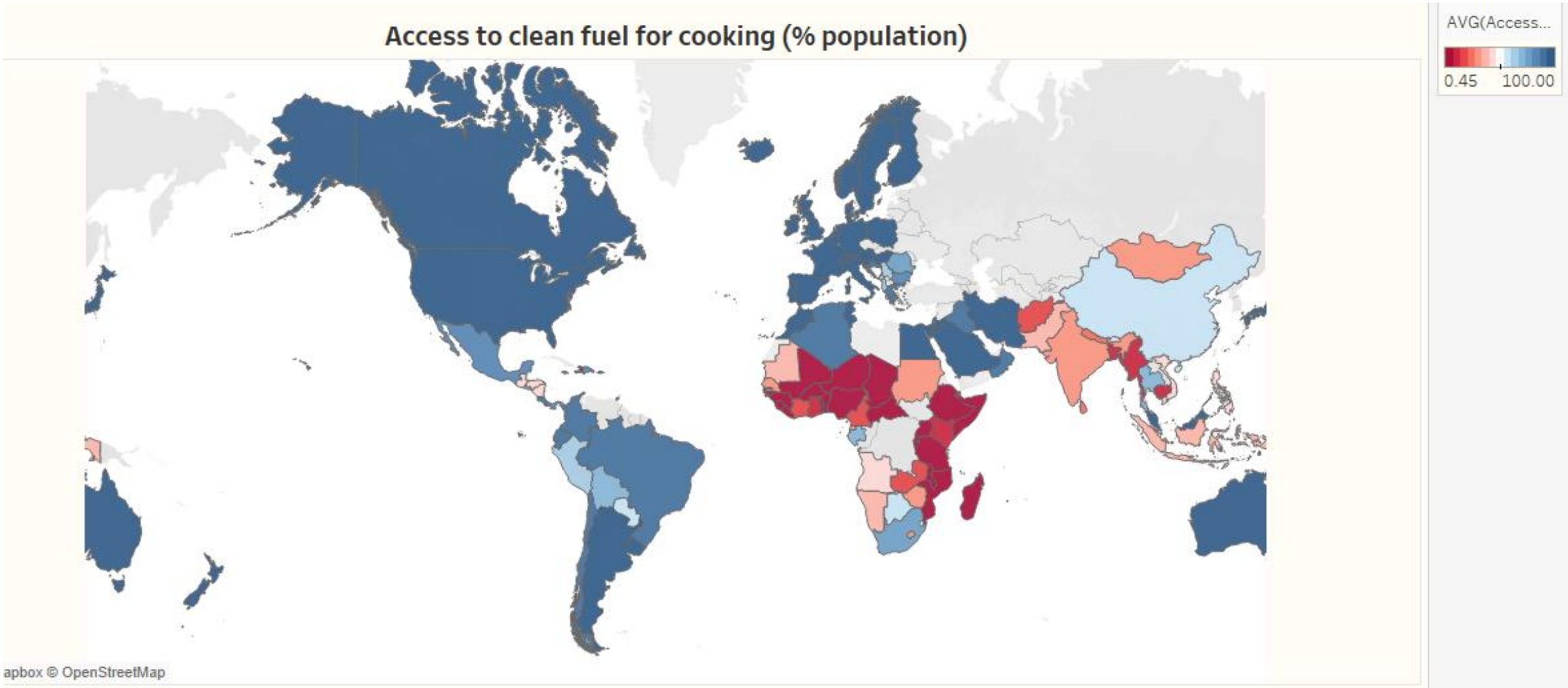
	MDS_x	MDS_y	Country	Code	continent	tsne_x	tsne_y	scluster6	kmeans6
0	-365.210955	576.349555	Afghanistan	AFG	Asia	4.286556	-2.076135	3	5
8	-362.234082	575.079958	Albania	ALB	Europe	-0.042302	1.239344	0	2
16	-360.816307	573.557767	Algeria	DZA	Africa	-2.548380	2.391397	2	3
24	-363.400642	575.893502	Angola	AGO	Africa	1.936904	-0.027148	0	2
32	-359.252553	574.285234	Argentina	ARG	Americas	-3.438405	4.218204	2	3
40	-356.273774	576.270864	Australia	AUS	Oceania	-5.838468	7.450801	1	4
48	-355.344885	576.703579	Austria	AUT	Europe	-6.422225	7.969107	1	4
56	-355.894769	576.244419	Bahrain	BHR	Asia	-6.551042	7.210396	1	4
64	-365.388316	576.974618	Bangladesh	BGD	Asia	5.356049	-2.719009	3	5
72	-355.854480	576.423190	Belgium	BEL	Europe	-6.529946	7.333363	1	4

Access to clean fuel for cooking vs GDP per capita

The visualization is a connected scatterplot which shows the access to clean fuel for cooking (%population) vs GDP per capita in every two years from 2002 to 2016.
We can see that the poorer African countries have the lowest percentage of population which have access to clean fuel, and these are the countries with the lowest GDP as well.
Also, most American, Oceanic and European countries have highest GDP as well as almost all the people have access to clean fuel.

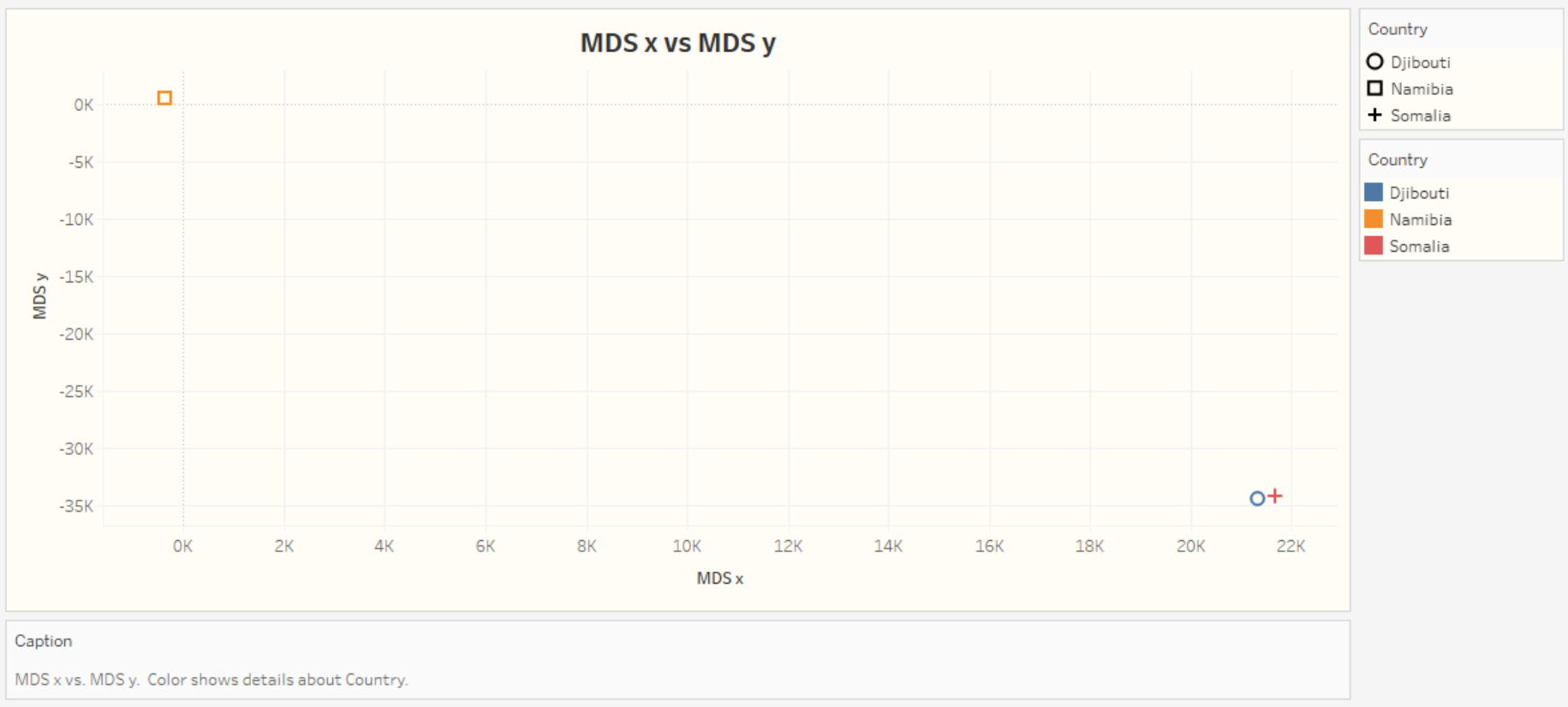


Access to clean fuel for cooking (%population)



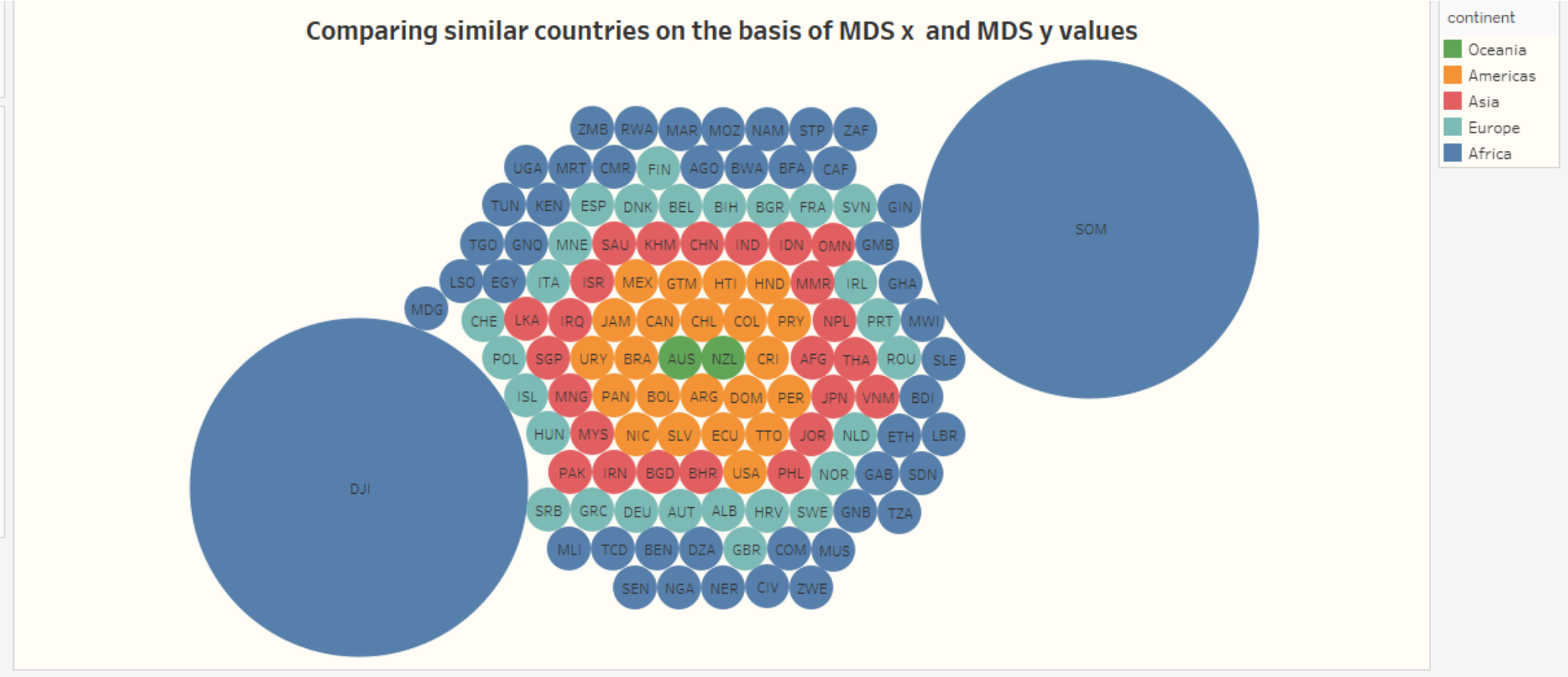
MDS_x vs MDS_y values

Multidimensional scaling (MDS) is a popular approach for graphically representing relationships between objects in multidimensional space. Dimension reduction via MDS is achieved by taking the original set of samples and calculating a dissimilarity (distance) measure for each pairwise comparison of samples.
When we plot the graph of MDS_x vs MDS_y, we find out that only 3 countries i.e., Djibouti, Namibia and Somalia are visible at first. This is because they have either a very large negative or large positive MDS_y values. The other countries have a somewhat similar MDS value and therefore not shown in this visualization.

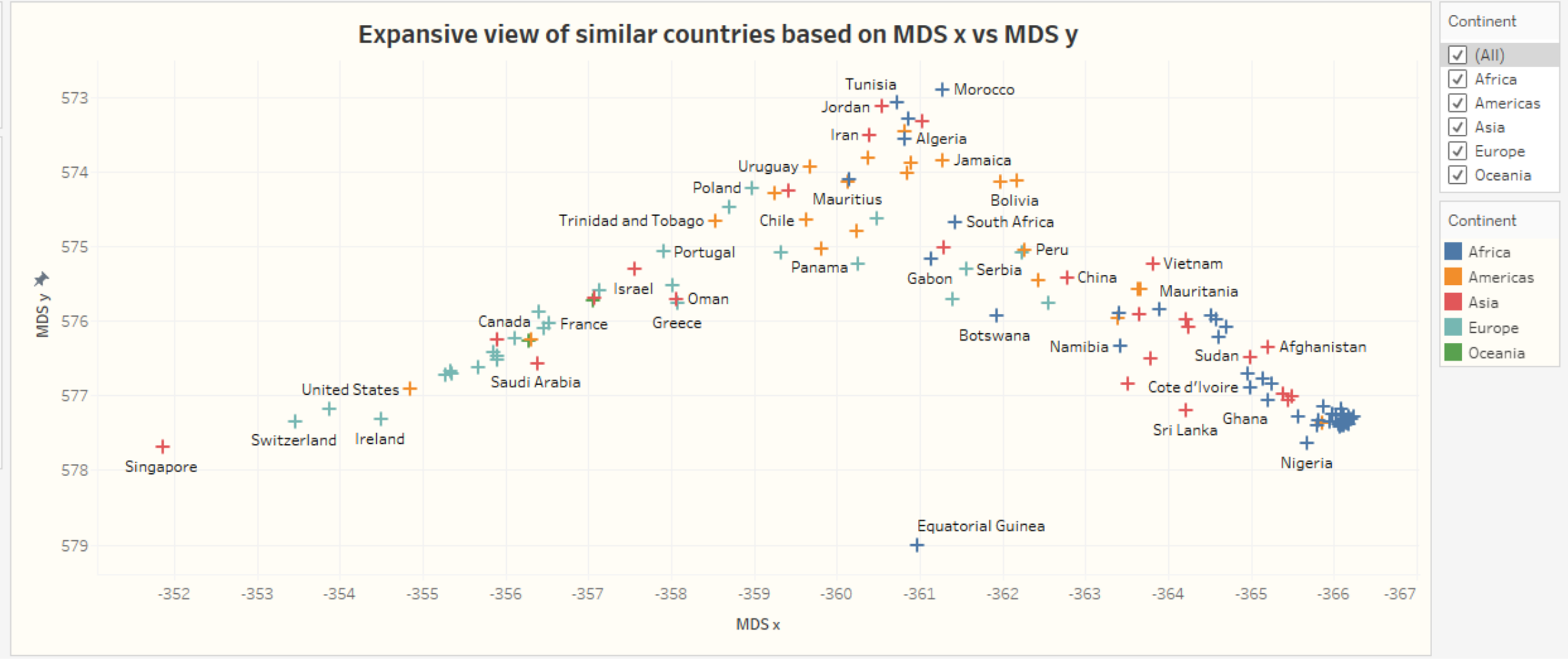


The findings are a bit clear from bubble chart. Here we can see that 2 countries i.e., Somalia and Djibouti have a very large MDS_y value.

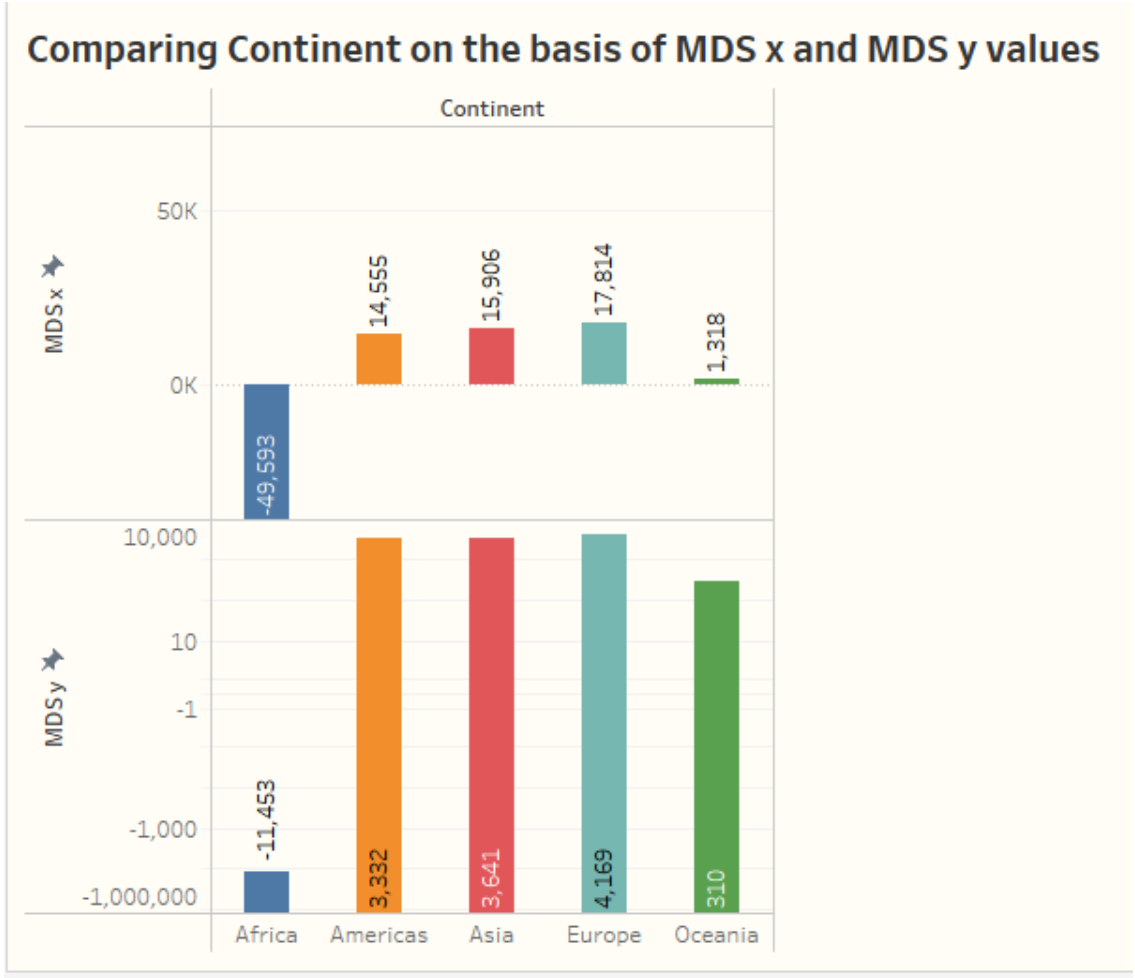
Since in MDS, the samples are usually represented graphically in two dimensions such that the distance between points on the plot approximates their multivariate dissimilarity as closely as possible.
From here, we can also see a clear distinction in the continents. Poorer countries mostly in the African region appear together which indicates that they are similar in a way such that most of them lack clean fuel for cooking.

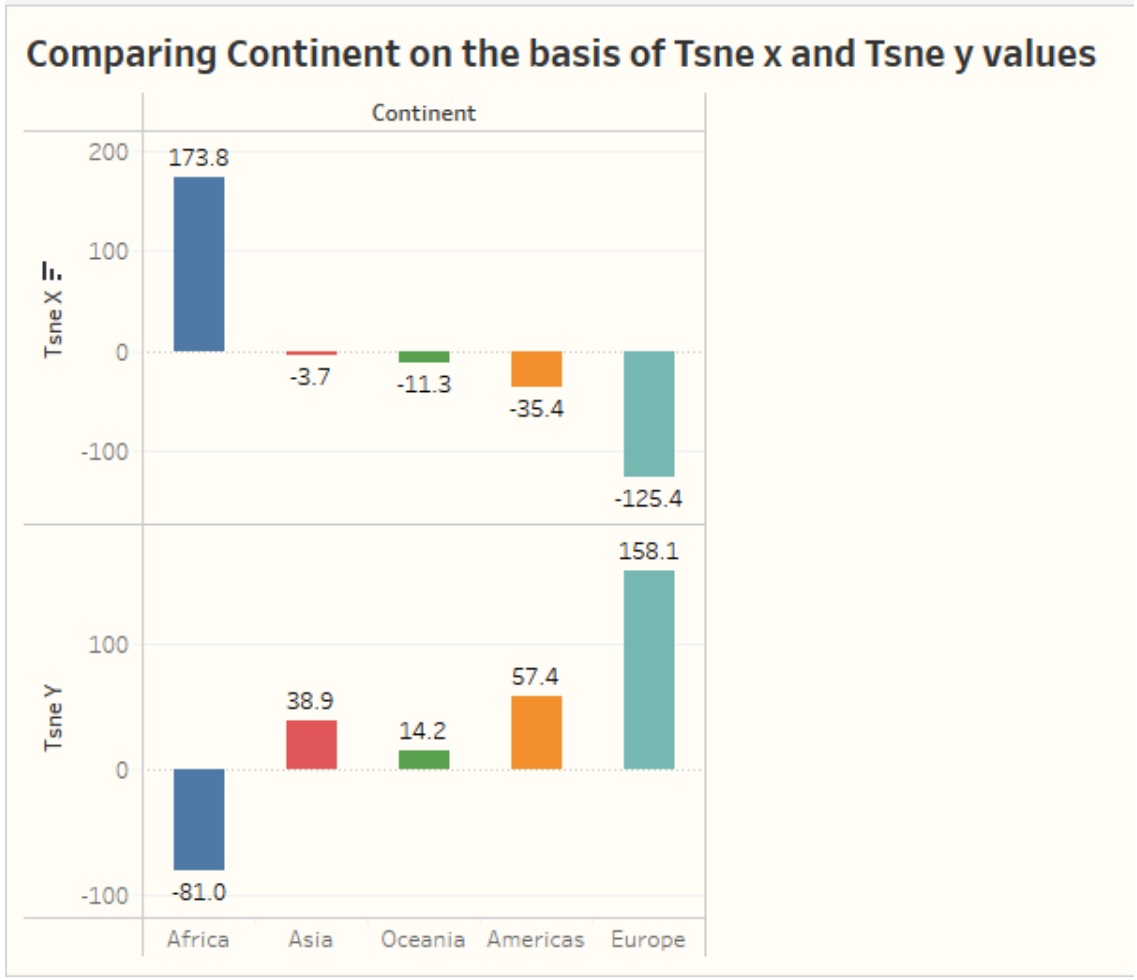


For comparing the other countries which are closer to each other, we make a scatterplot and find that poorer countries mostly in the African region appear together which indicated that they are similar in a way such that most of them lack clean fuel for cooking.
While we see that many American and Oceanic countries are appearing together which shows that they are similar in the form that they have access to cleaner fuel for cooking.
On the other hand, we can also notice that African and Oceanic and American countries are farther from each other, which mean they are dissimilar in the same manner.



Comparison of MDS and TSNE values continent wise





TSNE_x vs TSNE_y

TSNE is mostly used to understand high-dimensional data and project it into low-dimensional space.
When we plot a TSNE_x vs TSNE_y plot, we find out that the African countries are on the right side below side. Also, most of them are clustered there, so we can say that they are similar in terms of access of clean fuel for cooking, i.e., they lack it.
Similarly, the countries like Singapore and United states and some European countries are on the opposite side which clearly shows the distinction between them.