Carbon Emission Analyzing Class Project

By: Thiri Shin Thant : st126018 & Aphisit Jaemyaem : st126130

Problem statement and datasets

Topic: Equity and Trends in Global CO_2 Emissions per Capita

Scope: Compare big population countries and Small population countries (around 10 countries each)

1. Problem

We have been noticing carbon emissions problem and tried to reduce with a lot of projects like EV car, waste management, renewable energy and other green projects. Still countries around the world are emitting different levels of carbon dioxide and there are different carbon emission amounts between developing countries and developed countries. We will find out which countries are emitting a lot of carbon and from that information, we will see carbon emissions are related to country development level or not. This will display who has more responsibility for reducing carbon emissions.

Possible Users:

- **Policy makers**: Using these insights by comparing carbon emissions amount for further climate negotiations
- **Public**: To be aware of some small but wealthy countries emit more CO2 than larger developing ones.

Impact: Purpose for global awareness about carbon emission result and creating powerful projects and target discussion for the responsible countries from this evidence and analysis.

2. Dataset description for Dataset

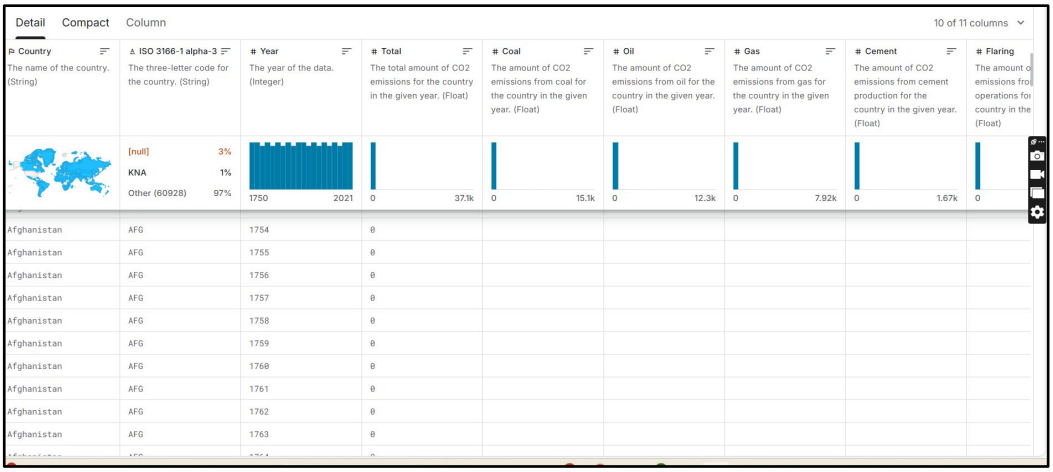
2.1 Data on CO_2 and Greenhouse Gas Emissions – Our World in Data

- About: Annual country-level CO_2 emissions (total & per capita) from 1750–2023.
- Features: 17 features, including Country, Year, Population, GDP, Total CO_2, CO_2 per capita, cumulative emission data and sectoral breakdown (cement, oil, gas, coal, flaring, land-use change, etc.).
- Records: 50,191 rows
- **Source:** https://github.com/owid/co2-data/blob/master/owid-co2-codebook.csv

country	year	iso_code	population	gdp	cement_co2	cement_co2_per_cap	co2	co2_growth_abs	co2_growth_prct	co2_per_capita	co2_per_gdp	co2_per_unit_energy	coal_co2
Afghanistan	2000	AFG	20130334	11283793920	0.01	0.001	1.047	-0.045	-4.078	0.052	0.093	0.177	0.004
Afghanistan	2001	AFG	20284303	11021273088	0.007	0	1.069	0.022	2.098	0.053	0.097	0.229	0.07
Afghanistan	2002	AFG	21378123	18804871168	0.011	0.001	1.341	0.272	25.432	0.063	0.071	0.303	0.055
Afghanistan	2003	AFG	22733054	21074343936	0.01	0	1.56	0.219	16.302	0.069	0.074	0.299	0.092
Afghanistan	2004	AFG	23560656	22332569600	0.01	0	1.237	-0.322	-20.669	0.053	0.055	0.257	0.092
Afghanistan	2005	AFG	24404574	25397686272	0.006	0	1.89	0.652	52.719	0.077	0.074	0.307	0.106
Afghanistan	2006	AFG	25424100	28704399360	0.012	0	2.159	0.27	14.279	0.085	0.075	0.279	0.161
Afghanistan	2007	AFG	25909852	34507530240	0.012	0	2.8	0.641	29.666	0.108	0.081	0.305	0.747
Afghanistan	2008	AFG	26482629	36561043456	0.015	0.001	4.254	1.455	51.951	0.161	0.116	0.265	1.078
Afghanistan	2009	AFG	27466101	44358721536	0.013	0	6.392	2.137	50.239	0.233	0.144	0.239	1.514
Afghanistan	2010	AFG	28284088	47399424000	0.015	0.001	8.365	1.973	30.866	0.296	0.176	0.251	2.246
Afghanistan	2011	AFG	29347709	53326336000	0.015	0	11.838	3.474	41.525	0.403	0.222	0.282	4.181
Afghanistan	2012	AFG	30560036	59166900224	0.029	0.001	10.035	-1.803	-15.23	0.328	0.17	0.249	3.125
Afghanistan	2013	AFG	31622708	62993698816	0.036	0.001	9.229	-0.807	-8.04	0.292	0.146	0.276	3.303
Afghanistan	2014	AFG	32792527	64346107904	0.029	0.001	9.086	-0.142	-1.544	0.277	0.141	0.32	3.621
Afghanistan	2015	AFG	33831765	62783393792	0.041	0.001	9.67	0.584	6.429	0.286	0.154	0.295	2.722
Afghanistan	2016	AFG	34700614	64372215808	0.076	0.002	8.906	-0.764	-7.899	0.257	0.138	0.298	2.718
Afghanistan	2017	AFG	35688942	65169281024	0.045	0.001	9.677	0.771	8.657	0.271	0.148	0.327	3.257
Afghanistan	2018	AFG	36743040	65996738560	0.057	0.002	10.602	0.924	9.553	0.289	0.161	0.313	3.633
Afghanistan	2019	AFG	37856126	73085706240	0.038	0.001	10.825	0.223	2.106	0.286	0.148	0.357	3.701
Afghanistan	2020	AFG	39068978	71417708544	0.061	0.002	11.606	0.781	7.213	0.297	0.163	0.424	4.116
Afghanistan	2021	AFG	40000411	56638849024	0.016	0	10.272	-1.334	-11.495	0.257	0.181	0.379	3.397
Afghanistan	2022	AFG	40578846	53303472128	0.016	0	10.558	0.286	2.784	0.26	0.198		3.531
Afghanistan	2023	AFG	41454762		0.016	0	11.02	0.462	4.38	0.266			3.843
Africa	2000		830582806		30.897	0.037	930.851	30.972	3.442	1.122	0.429	0.285	370.01
Africa	2001		851690329		32.412	0.038	920.602	-10.249	-1.101	1.082	0.398	0.272	371.74
Africa	2002		873411364		34.928	0.04	899.996	-20.606	-2.238	1.032	0.364	0.262	360.666
Africa	2003		895734453		35.273	0.039	989.645	89.649	9.961	1.106	0.374	0.275	390.582
Africa	2004		918778450		38.021	0.041	1045.726	56.081	5.667	1.14	0.367	0.274	417.392
Africa	2005		942546623		41.903	0.045	1059.372	13.647	1.305	1.126	0.345	0.273	412.225
Africa	2006		966932346		45.735	0.047	1091.176	31.803	3.002	1.13	0.329	0.276	418.61
Africa	2007		992055831		49.202	0.05	1116.9	25.724	2.357	1.127	0.31	0.275	429.852
Africa	2008		1018065513		51.817	0.051	1174.755	57.855	5.18	1.156	0.301	0.27	455.481
Africa	2009		1044777740		58.049	0.056	1168.25	-6.505	-0.554	1.12	0.283	0.27	425.296
Africa	2010		1072216718		59.657	0.056	1216.669	48.419	4.145	1.136	0.271	0.269	431.407
Africa	2011		1100148882		58.925	0.054	1257.421	40.752	3.349	1.145	0.272	0.27	424.838
Africa	2012		1128843697		63.744	0.057	1268.948	11.527	0.917	1.126	0.259	0.263	430.713
Africa	2013		1158780551		65.686	0.057	1282.542	13.594	1.071	1.108	0.253	0.255	431.819
Africa	2014		1189220573		70.034	0.059	1357.349	74.807	5.833	1.143	0.257	0.26	445.595

2.2 Data on CO_2 emission per capita from different countries– Kaggle

- About: Annual country-level CO_2 emissions (total & per capita) from 1750–2021
- Features: 11 features, including Country, Year, Population, Total CO_2, CO_2 per capita, and sectoral breakdown (cement, oil, gas, coal, flaring, land-use change, etc.).
- Records: 63105 rows
- **Source:** https://www.kaggle.com/datasets/thedevastator/global-fossil-co2-emissions-by-country-2002-2022/data



3. Justification

We are trying to analyze carbon emission from each citizen from different countries and how do they related to developing level and population size of the country. In our dataset, we will focus more on the carbon emission by sectors per capita. For the sectors, we have different sectors like cement, oil, gas, coal, flaring and so on and the emission is shown in both capita and cumulation. Based on the total carbon emission, we will figure out the result and relationship and point out the counties that are responsible for this issue.