Photo by Maxim Tolchinskiy on Unsplash

When factoring heat generation required for the manufacturing and transportation of products, *Greenhouse gas emissions attributable to products, from food to sneakers to appliances, make up more than 75% of global emissions.* (`Source: The Carbon Catalogue https://www.nature.com/articles/s41597-022-01178-9`)

Our data, which is publicly available on nature.com, contains product carbon footprints (PCFs) for various companies. PCFs are the greenhouse gas emissions attributable to a given product, measured in CO_2 (carbon dioxide equivalent).

This data is stored in a PostgreSQL database containing one table, `product_emissions`, which looks at PCFs by product as well as the stage of production that these emissions occurred. Here's a snapshot of what `product_emissions` contains in each column:

`product_emissions`

field	data type
`id`	`VARCHAR`
`year`	`INT`
`product_name`	`VARCHAR`
`company`	`VARCHAR`
`country`	`VARCHAR`
`industry_group`	`VARCHAR`
`weight_kg`	`NUMERIC`
`carbon_footprint_pcf`	`NUMERIC`
`upstream_percent_total_pcf`	`VARCHAR`
`operations_percent_total_pcf`	`VARCHAR`
`downstream_percent_total_pcf`	`VARCHAR`

You'll use this data to examine the carbon footprint of each industry in the dataset!

Objectives

1. Find Number of unique companies
2. Their total carbon footprint PCF for each industry group
3. Filter by most recent year
4. Sort highest to lowest
5. Total footprint round to 1 decimal place

Projects Data DataFrame as `carbon_emissions_by_industry`

```sql
-- Update your query here
SELECT industry_group,
    COUNT(DISTINCT company) AS num_companies,
    ROUND(SUM(carbon_footprint_pcf),1) AS total_industry_footprint
FROM product_emissions
GROUP BY industry_group, year
ORDER BY year DESC,total_industry_footprint DESC
LIMIT 6;
```

index	industry_group	num_companies	total_industry_footprint
0	Materials	3	107129
1	Capital Goods	2	94942.7
2	Technology Hardware & Equipment	4	21865.1
3	Food, Beverage & Tobacco	1	3161.5
4	Commercial & Professional Services	1	740.6
5	Software & Services	1	690

Rows: 6 Expand

Projects Data DataFrame as `df2`

```
--- Test Area
SELECT *
FROM product_emissions
ORDER BY year DESC
```

	id		product_name	company	country	industry_group	weight_kg
0	394-10-2017	2017	HON-DASHI(R)	Ajinomoto Co.Inc.	Japan	Food, Beverage & Tobacco	
1	9792-2-2017	2017	Three-way Catalyst for gasoline-powered pa...	Johnson Matthey	United Kingdom	Materials	
2	13889-7-2017	2017	Automotive Relay	OMRON Corporation	Japan	Technology Hardware & Equipment	
3	6860-7-2017	2017	H825cdw	Fuji Xerox Co., Ltd.	Japan	Technology Hardware & Equipment	
4	394-6-2017	2017	Aspartame	Ajinomoto Co.Inc.	Japan	Food, Beverage & Tobacco	
5	13889-8-2017	2017	Blood Pressure Monitor	OMRON Corporation	Japan	Technology Hardware & Equipment	
6	394-11-2017	2017	Knorr(R) Cup Soup Tsubu Tappuri Corn Cream	Ajinomoto Co.Inc.	Japan	Food, Beverage & Tobacco	
7	394-9-2017	2017	Di-sodium 5'-Inosinate	Ajinomoto Co.Inc.	Japan	Food, Beverage & Tobacco	
8	6874-3-2017	2017	Server	Fujitsu Ltd.	Japan	Software & Services	
9	12289-1-2017	2017	Zinc Oxide	Mitsui Mining & Smelting Co., Ltd.	Japan	Capital Goods	
10	394-1-2017	2017	L-Lysine Monohydrochloride(For Feed)	Ajinomoto Co.Inc.	Japan	Food, Beverage & Tobacco	
11	394-12-2017	2017	L-Arginine	Ajinomoto Co.Inc.	Japan	Food, Beverage & Tobacco	
12	10261-3-2017	2017	Multifunction Printers	Konica Minolta, Inc.	Japan	Technology Hardware & Equipment	
13	12134-6-2017	2017	Super-pure hydrogen peroxide	Mitsubishi Gas Chemical Company, Inc.	Japan	Materials	
14	19238-3-2017	2017	GL film packages	Toppan Printing Co., Ltd.	Japan	Commercial & Professional Services	

Rows: 866 Expand

Projects Data DataFrame as `df1`

```
--- Test Area
SELECT industry_group,
    COUNT(DISTINCT company) AS num_companies,
    ROUND(SUM(carbon_footprint_pcf),1) AS total_industry_footprint
FROM product_emissions
GROUP BY year,industry_group
ORDER BY year,ROUND(SUM(carbon_footprint_pcf),1) DESC
```

index	industry_group	num_companies	total_industry_footprint
0	Materials	15	194465
1	Automobiles & Components	2	130189
2	Technology Hardware & Equipment	18	60537.3
3	Capital Goods	9	60116.7
4	Pharmaceuticals, Biotechnology & Life Sciences	1	32271
5	Media	2	9644.9
6	Food, Beverage & Tobacco	12	4311.2
7	Consumer Durables & Apparel	6	2860.2
8	Commercial & Professional Services	2	816.3
9	Energy	1	750
10	Utilities	1	60.6
11	Telecommunication Services	1	52.2
12	Software & Services	1	3.6
13	Household & Personal Products	1	0.3
14	Automobiles & Components	4	230014.4
15	Technology Hardware & Equipment	12	101155.9

Rows: 69 Expand

Projects Data DataFrame as `d`

```sql
-- Test Area 2
SELECT DISTINCT industry_group
FROM product_emissions
```

	industry_group
0	Consumer Durables & Apparel
1	Media
2	Semiconductors & Semiconductor Equipment
3	Mining - Iron, Aluminum, Other Metals
4	Tobacco
5	Textiles, Apparel, Footwear and Luxury Goods
6	Technology Hardware & Equipment
7	Gas Utilities
8	Tires
9	Retailing
10	Chemicals
11	Electrical Equipment and Machinery
12	Semiconductors & Semiconductors Equipment
13	Telecommunication Services
14	Software & Services
15	Trading Companies & Distributors and Com…

Rows: 30

Expand