Fuel Consumption of Different Car Models

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A non-technical overview of the subject area and the problem statement/opportunity identified

- Investigate fuel consumption across different car brands and models
- Identify the relationship between different car features and fuel consumption and carbon emissions (g/km)
- Assess how technology has evolved from 1995 to 2023 regarding fuel efficiency
- Predict fuel consumption based on car features

An overview of proposed vision for tackling the problem using Data Science

- Data collection
- Data preprocessing/cleaning
- Exploratory data analysis (EDA)
- Feature engineering
- Model selection, training, and validation
- Demand forecasting

An estimate of the potential impact of such a solution

- Showcase the differences in fuel consumption between different car makes, models, and other features
- Show how fuel efficiency has changed over time
- Predicting fuel consumption and CO_2 emissions based on car features and driving conditions/patterns

An introduction to the dataset, including data quality concerns and findings from preliminary EDA

- Data was obtained from Government of Canada (Natural Resources Canada)
  - Compilation of fuel consumption ratings of all car models in Canada from 1995 – 2023
- Data quality: Most columns are clean with no missing values or duplicates
  - Two metrics, CO_2 RATING and SMOG RATING, started being tracked in 2016 and 2017, respectively
  - If possible, values for previous years could be deduced; otherwise, the columns will be deleted

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	YEAR	MAKE	MODEL	VEHICLE CLASS	ENGINE SI	CYLINDER	TRANSMIS	FUEL TYPE	FUEL CONSUMPTION CITY (L/100 km)	FUEL CONSUMPTION HWY (L/100 km)	FUEL CONSUMPTION COMB (L/100 km)	FUEL CONSUMPTION COMB (mpg)	CO2 EMISSIONS (g/km)	CO2 RATING	Smog RATING
2	1995	ACURA	INTEGRA	SUBCOMPACT	1.8	4	A4	X	11.6	8.3	10.1	28	232		
3	1995	ACURA	INTEGRA	SUBCOMPACT	1.8	4	M5	X	11	8.3	9.8	29	225		
4	1995	ACURA	INTEGRA (	SUBCOMPACT	1.8	4	M5	Z	10.8	8.3	9.7	29	223		
5	1995	ACURA	LEGEND	COMPACT	3.2	6	A4	Z	14.2	10.5	12.5	23	288		
6	1995	ACURA	LEGEND C	COMPACT	3.2	6	A4	Z	14.6	11	13	22	299		
7	1995	ACURA	LEGEND C	COMPACT	3.2	6	M6	Z	15	9.9	12.7	22	292		
8	1995	ACURA	NSX	TWO-SEATER	3	6	A4	Z	15.1	10.9	13.2	21	304		
9	1995	ACURA	NSX	TWO-SEATER	3	6	M5	Z	14.5	10.6	12.7	22	292		
10	1995	ALFA ROM	164 LS	COMPACT	3	6	A4	Z	17.4	11.8	14.9	19	343		
11	1995	ALFA ROM	164 LS	COMPACT	3	6	M5	Z	15.4	10.6	13.3	21	306		
12	1995	AUDI	90	COMPACT	2.8	6	A4	Z	14.5	9.7	12.3	23	283		
13	1995	AUDI	90	COMPACT	2.8	6	M5	Z	13.6	9.7	11.9	24	274		
14	1995	AUDI	90 QUATT	COMPACT	2.8	6	M5	Z	13.9	10.1	12.2	23	281		

Next steps in terms of data processing, feature engineering and baseline modeling

- Explore relationships between different car features and fuel consumption
  - Car year and make
  - Vehicle class
  - Transmission
  - Engine size
  - Fuel type
- Identify relationship between fuel type and CO_2 emissions
- Develop models to predict fuel consumption based on car features