VED ML Data Loading & Preprocessing

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Battery Power, Fuel Consumption Rate (FCR), and Battery SOC

The table below shows the mean values of HV Battery Power, Air Conditioning Power, Heater Power, HV Battery SOC, and FCR, grouped by OAT_Category and Vehicle Type.

	OAT_Category	Vehicle Type	HV Battery Power[Watts]	Air Conditioning Power[Watts]	Heater Power[W
4	Cool	EV	-6335.4807	381.598	311.8
12	Mild	EV	-4438.8881	36.93	121.8
0	Cold	EV	-6722.1193	553.0809	1153
18	Warm	PHEV	-5595.3097	790.4995	N
11	Hot	PHEV	-4126.7231	746	N
9	Extremely Cold	PHEV	-1956.2951	0	N
3	Cold	PHEV	-3935.7218	4.6517	N
15	Mild	PHEV	-4173.0677	262.5092	N
7	Cool	PHEV	-3655.9489	19.3998	N
1	Cold	HEV	None	None	N

Comment: The dataframe above provides a summary of key power and consumption metrics by OAT_Category and Vehicle Type.

Battery Power and Fuel Consumption Rate (FCR) by Trip and Vehicle Type

The table below summarizes the mean values of key features such as Battery Power, Fuel Consumption Rate (FCR), Air Conditioning Power, Heater Power, and other relevant metrics, grouped by Trip and Vehicle Type. This allows for comparison of energy consumption and operational characteristics across different trips and vehicle types.

	Trip	Vehicle Type	Latitude[deg]	Longitude[deg]	Air Conditioning Power[Watts]	Heater Power[Wa
2967	1565	PHEV	42.2944	-83.7926	None	N
375	315	PHEV	42.2681	-83.7193	0	N
810	548	PHEV	42.287	-83.7257	None	N
815	550	PHEV	42.2871	-83.7255	None	N
1011	644	PHEV	42.3168	-83.6995	None	N
717	499	PHEV	42.285	-83.735	None	N
310	276	PHEV	42.2969	-83.6933	None	N
680	485	PHEV	42.26	-83.7294	None	N
423	340	PHEV	42.2953	-83.7221	None	N
1009	643	PHEV	42.2719	-83.7056	0	N

Comments:
The table above displays the top 10 trip and vehicle type combinations with the highest Fuel Consumption Rate (FCR) and Battery Power usage.
This helps identify trips and vehicle types with the most energy-intensive operation, supporting further analysis of efficiency and performance.

Battery Power and Fuel Consumption Rate (FCR) by Month and Vehicle Type

This table summarizes the mean values of key features such as Battery Power, Fuel Consumption Rate (FCR), Air Conditioning Power, Heater Power, and other relevant metrics, grouped by **Month** and **Vehicle Type**.
It allows for the analysis of trends and operational characteristics over time and across different vehicle types.

	Date	Vehicle Type	Latitude[deg]	Longitude[deg]	Air Conditioning Power[Watts]	Heater Power[V
1	2017-11	HEV	42.2708	-83.7305	None	
2	2017-11	ICE	42.2721	-83.7292	None	
3	2017-11	PHEV	42.2751	-83.7255	104.0507	
0	2017-11	EV	42.2719	-83.7306	414.9545	336
5	2017-12	HEV	42.2706	-83.729	None	
6	2017-12	ICE	42.271	-83.7296	None	
7	2017-12	PHEV	42.2729	-83.7247	4.7119	
4	2017-12	EV	42.2701	-83.7195	403.6274	573
9	2018-01	HEV	42.273	-83.7308	None	
10	2018-01	ICE	42.2712	-83.7295	None	

Comment:
The table above provides a summary of energy consumption and operational metrics by month and vehicle type, supporting the identification of seasonal or temporal trends in vehicle performance and efficiency.

Battery Power and Fuel Consumption Rate (FCR) by Date and Vehicle Type

This table summarizes the mean values of key features such as Battery Power, Fuel Consumption Rate (FCR), Air Conditioning Power, Heater Power, and other relevant metrics, grouped by **Date** and **Vehicle Type**.
It allows for the analysis of daily trends and operational characteristics across different vehicle types.

	Date	Vehicle Type	Latitude[deg]	Longitude[deg]	Air Conditioning Power[Watts]	Heater Powe
3	2017-11-01	PHEV	42.2783	-83.7321	426.1479	
0	2017-11-01	EV	42.2781	-83.7581	55.0388	2(
1	2017-11-01	HEV	42.2717	-83.7355	None	
2	2017-11-01	ICE	42.2753	-83.7357	None	
7	2017-11-02	PHEV	42.2683	-83.7256	46.0551	
6	2017-11-02	ICE	42.2736	-83.7306	None	
4	2017-11-02	EV	42.2831	-83.7432	24.3446	1:
5	2017-11-02	HEV	42.2685	-83.718	None	
10	2017-11-03	PHEV	42.2731	-83.7247	2.007	
8	2017-11-03	HEV	42.2718	-83.7335	None	

Comment:
The table above provides a summary of energy consumption and operational metrics by date and vehicle type, supporting the identification of daily trends in vehicle performance and efficiency.

Battery Power and Fuel Consumption Rate (FCR) by Location and Vehicle Type

This table summarizes the mean values of key features such as Vehicle Speed, Absolute Load, Engine RPM, Outside Air Temperature (OAT), Generalized Weight, Fuel Consumption Rate (FCR), and HV Battery Power, grouped by **Latitude**, **Longitude**, and **Vehicle Type**. It enables spatial analysis of vehicle operational characteristics and energy consumption patterns across different locations and vehicle types.

	Latitude[deg]	Longitude[deg]	Vehicle Type	Vehicle Speed[km/h]	Absolute Load[%]	Engine RPM[I
78881	42.2372	-83.7303	PHEV	121.9531	None	4(
178231	42.2495	-83.6839	PHEV	134	None	3405.
80339	42.2373	-83.7268	PHEV	120	None	3(
80766	42.2373	-83.7256	PHEV	119.1344	None	3(
797285	42.2896	-83.8035	PHEV	112.4809	None	3175.
767446	42.2877	-83.6827	PHEV	63.3219	None	3(
640605	42.2816	-83.7842	PHEV	68.2344	None	
81358	42.2373	-83.7244	PHEV	118.4563	None	3(
553844	42.2776	-83.7842	PHEV	109.1667	None	
799727	42.2899	-83.8003	PHEV	102.8531	None	

Comment:
The table above provides a spatial summary of energy consumption and operational metrics by location and vehicle type, supporting the identification of geographic trends in vehicle performance and efficiency.