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        #Task-3: Creating a suitable plot highlighting relationship between battery capacity and range and providing insight.


import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

#Step-1: First we will load the dataset and show only the columns in which we have to show relationship

data=pd.read_excel("FEV-data-Excel.xlsx")
data[['Battery capacity [kWh]', 'Range (WLTP) [km]']]
```

Out[ ]:

	Battery capacity [kWh]	Range (WLTP) [km]
0	95.0	438
1	71.0	340
2	95.0	364
3	71.0	346
4	95.0	447
5	95.0	369
6	42.2	359
7	42.2	345
8	80.0	460
9	50.0	350
10	50.0	320
11	35.5	222
12	35.5	222
13	38.3	311
14	39.2	289
15	64.0	449
16	90.0	470
17	39.2	289
18	64.0	455
19	39.2	276
20	64.0	452
21	35.5	200

	Battery capacity [kWh]	Range (WLTP) [km]
22	80.0	414
23	28.9	234
24	40.0	270
25	62.0	385
26	50.0	337
27	50.0	324
28	50.0	340
29	50.0	320
30	79.2	407
31	93.4	463
32	93.4	450
33	93.4	412
34	52.0	395
35	52.0	395
36	36.8	260
37	17.6	154
38	17.6	148
39	54.0	430
40	75.0	580
41	75.0	567
42	100.0	652
43	100.0	639

	Battery capacity [kWh]	Range (WLTP) [km]
44	100.0	561
45	100.0	548
46	32.3	258
47	58.0	425
48	77.0	549
49	77.0	500
50	50.0	230
51	90.0	356
52	40.0	200

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#Step-2: (a) Plot to Visualize Relationship

#We used a scatter plot to visualize the relationship between Battery capacity [kWh] and Range (WLTP) [km].
#Since both are numerical variables, a scatter plot is the best choice to observe correlation.



sns.scatterplot(x="Battery capacity [kWh]", y='Range (WLTP) [km]', data=data)
plt.title('Battery Capacity vs Range')
plt.xlabel('Battery Capacity [kWh]')
plt.ylabel('Range (WLTP) [km]')
plt.show()
```

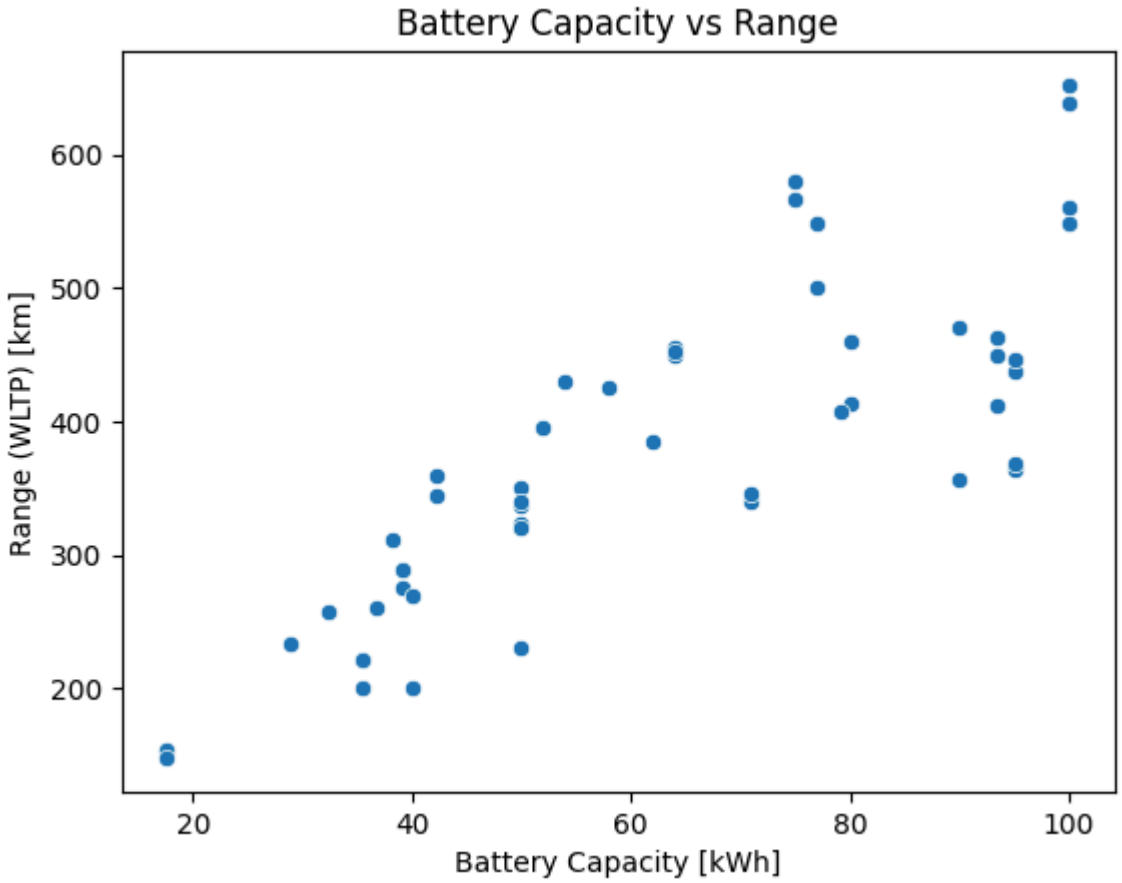

b) Insights from the Plot

1. Positive Relationship:

- As battery capacity increases, the range also increases.
- The trend is roughly upward-sloping, suggesting a strong positive correlation.

2. Some Variability:

- For the same battery capacity, there is some variation in range.
- This could be due to:
  - Engine power

- Permissable gross weight
- Energy consumption etc.

3. Clusters Around Common Capacities:

- Several cars are clustered around common battery sizes like 50, 60, 75, and 100 kWh.
- At each of these, range varies slightly, indicating model-specific efficiency differences.

4. Outliers:

- One or two vehicles with lower range despite high battery capacity may be less efficient.

Conclusion:

There is a strong positive correlation between battery capacity and range. This confirms the expected behavior — larger batteries typically provide more range — though other factors also contribute to real-world results.

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