

Task-5 & 6: Inferential Statistics – Hypothesis Testing using Python & Project Video

Explanation

Objective: Test whether there is a significant difference in the average Engine power [KM] between Tesla and Audi using a two-sample t-test.

Define Hypotheses:

Null Hypothesis (H_0): There is no significant difference in the mean engine power between Tesla and Audi vehicles. **$H_0: \mu_{\text{Tesla}} = \mu_{\text{Audi}}$**

Alternative Hypothesis (H_1): There is a significant difference in the mean engine power between Tesla and Audi vehicles. **$H_1: \mu_{\text{Tesla}} \neq \mu_{\text{Audi}}$**

In [1]: *#Step-1 Load the important libraries*

```
import pandas as pd
from scipy.stats import ttest_ind
```

In [28]: *#Step-2 Load the dataset and filtering the data according to tesla and audi*

```
df=pd.read_excel("FEV-data-Excel.xlsx")
tesla_data = df[df["Make"]== "Tesla"]["Engine power [KM]"].dropna()
audi_data = df[df["Make"]== "Audi"]["Engine power [KM]"].dropna()

print("tesla_data\n",tesla_data)
print("audi_data\n",audi_data)
```

```
tesla_data
39    285
40    372
41    480
42    525
43    772
44    525
45    772
Name: Engine power [KM], dtype: int64
audi_data
0     360
1     313
2     503
3     313
4     360
5     503
Name: Engine power [KM], dtype: int64
```

```
In [10]: #Step-3 Conducting a two sample T test
```

```
t_stats, p_val = ttest_ind(tesla_data, audi_data, equal_var= False)
```

```
In [11]: #Step-4 Showing up the result
```

```
print("T- Stats:",t_stats)
print("P Value",p_val)
```

```
T- Stats: 1.7939951827297178
P Value 0.10684105068839565
```

```
In [12]: #Step-5 Insight and interpretation
```

```
alpha = 0.05 # 95% confidence level

if p_val < alpha:
    print("Result: Significant difference in average engine power between Tesla and Audi.")
else:
    print("Result: No significant difference in average engine power between Tesla and Audi.")
```

```
Result: No significant difference in average engine power between Tesla and Audi.
```

The p-value (0.107) is greater than 0.05, the typical threshold for statistical significance. Therefore, we fail to reject the null hypothesis.

Conclusion:

There is no statistically significant difference in the average engine power of vehicles manufactured by Tesla and Audi at a 95% confidence level. This suggests that the two manufacturers produce vehicles with comparable engine power.

Recommendations & Actionable Insights:

Since there's no significant power difference between Tesla and Audi, marketing or product decisions shouldn't rely on engine power differentiation.

Companies should focus on other differentiating factors such as:

1.Battery range 2.Maximum DC charging power [kW] 3.Minimal price (gross) [PLN] 4.Design or tech features

Task-6: Project Video Explanation

Video link: <https://drive.google.com/file/d/1OYMi7Mn8TbLET41kQJJ9mUAvoYykvGtd/view?usp=sharing>