Predict Total Spends On Advertising

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Problem Statement

How do investments in television, radio, and newspaper advertising influence sales outcomes? Our objective is to create a model that predicts future sales figures based on the spending patterns across these different advertising channels

Data Validation

Column Name	Dtypes	Missing value	Outliers	Typing errors
Sr. No	Float64	0	No	No
Tv	Float64	0	No	No
Radio	Float64	0	No	No
Newspaper	Float64	0	No	No
Sales	Float64	0	No	No

No Missing values ,outliers and Typing errors are found.

Data Analysis

Hyperlink report

Report Result

```
import pandas as pd
from ydata_profiling import ProfileReport
import warnings
warnings.filterwarnings("ignore")
```

```
report=ProfileReport(data)
report.to_file("C:\int 24\my report")
```

Summarize dataset: 100% 39/39 [00:03<00:00, 12.49it/s, Completed]

Generate report structure: 100% 1/1 [00:01<00:00, 1.93s/it]

Render HTML: 100% 1/1 [00:01<00:00, 1.05s/it]

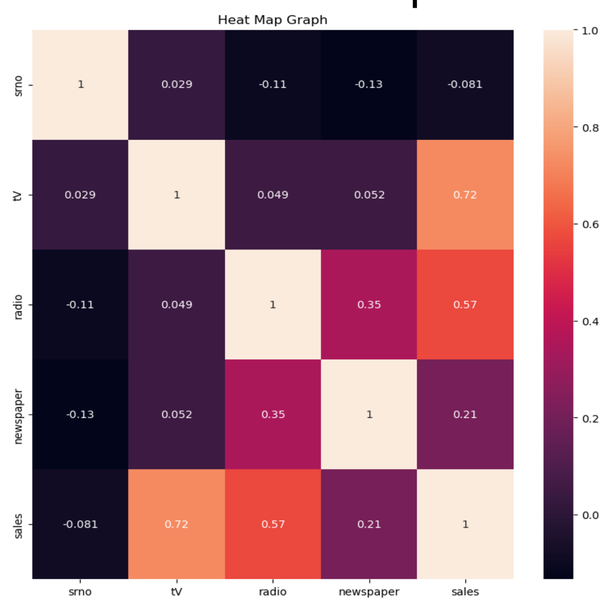
Export report to file: 100% 1/1 [00:00<00:00, 18.55it/s]

Libraries Used

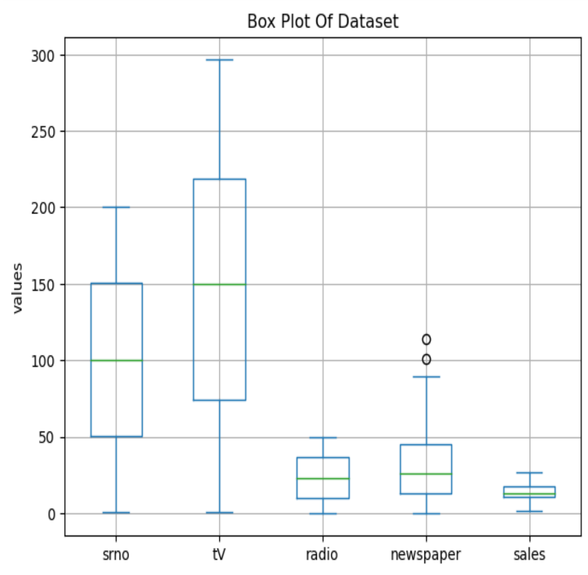
- Pandas
- Numpy
- Sklearn
- Matplotlib
- Seaborn

Data Visualization

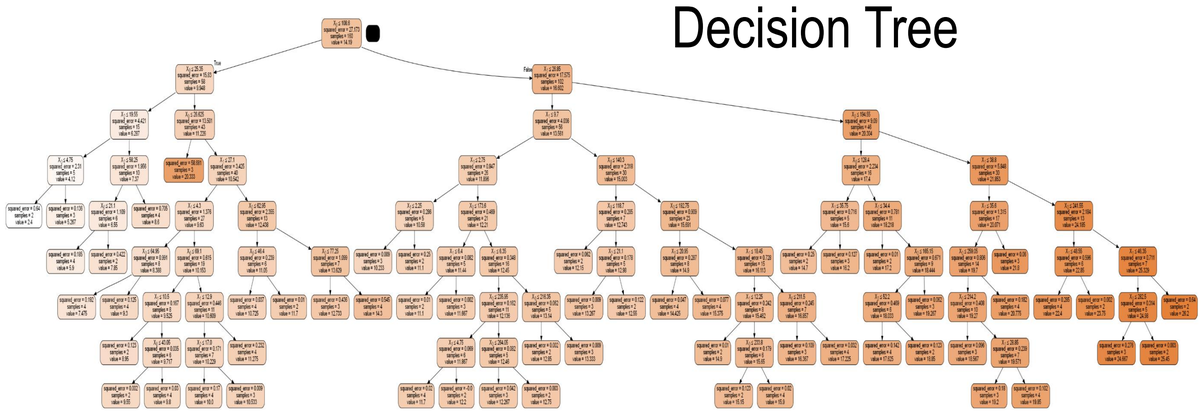
Heatmap



Box plot



Decision Tree



Model Development Equation

- Linear regression: $y = mx + c$ where, c=constant
- Decision tree regressor& Random forest regressor:

→ Entropy: (D)=∑ pi $\log_2$(pi)

→Gini index: $Gini = 1 - \sum_{i=1}^{n} (p_i)^2$

→ Information Gain: Entropy(Parent)−Weighted Average Entropy(Children)

Comparison And Conclusion

```
result=[my_rmse,my_r_square,adj_r2_square_value]
result
```

```
[[1.4983414997969908, 1.1177280403668064, 1.1696855086352065],
 [0.9091048238828131, 0.959460390751816, 0.9495586167430304],
 [0.9015302258730475, 0.956082089981134, 0.945355168138283]]
```

```
a=pd.DataFrame(data=result,columns=["LinearRegression","DecisionTree","RandomForest"],index=["my_rmse","my_r_square","adj_r2
a
```

	LinearRegression	DecisionTree	RandomForest
my_rmse	1.498341	1.117728	1.169686
my_r_square	0.909105	0.959460	0.949559
adj_r2_square_value	0.901530	0.956082	0.945355

The Decision Tree model has the lowest RMSE(1.117728), highest R^2 value (0.959460) and highest Adjusted R^2 value (0.956082)

The **Decision Tree** model appears to be the best-performing model among the three, based on all three evaluation metrics (RMSE, R^2, and Adj. R^2).

Deployment url

Github url: https://github.com/Djdjsjsjndnznsmsmm-Regression

Streamlit url: https:// /Djdjsjsjndnznsmsmm.streamlit.app/