📊 *Sales Forecasting Using Linear Regression on Advertising Data*

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Problem Statement

- Companies spend heavily on advertising, but often struggle to measure impact.
- Goal: Predict product sales based on TV, Radio, and Newspaper advertising spend.
- This helps businesses optimize marketing budgets and maximize ROI.

🧠 Can advertising spend accurately predict product sales?

Dataset Overview

- 📁 Source: Advertising.csv by Selva Prabhakaran
- 👥 200 rows × 4 columns
- 🎯 Target: Sales (Product Sales is $ thousands)
- 📊 Features:
  - TV : Advertising spend on TV
  - Radio : Advertising spend on radio
  - Newspaper : Advertising spend on newspaper

Exploratory Data Analysis (EDA)

- TV and Radio show a strong correlation with Sales.
- Newspaper shows weak or no significant correlation.
- Distribution of variables is fairly normal.
- Sales generally increase with higher TV and Radio ad spend.

✅ Use a correlation heatmap and scatter plot for visual impact.

Model Building

- Applied **Linear Regression** using Scikit-learn.
- Independent Variables: TV, Radio, Newspaper
- Dependent Variable: Sales
- Split: 80% Train / 20% Test
- Evaluation metrics used: MAE, RMSE, R^2

🛠️ Tools: Python, Pandas, Seaborn, Scikit-learn

Model Evaluation & Performance

- 🔍 MAE (Mean Absolute Error): **1.27**
- 📉 RMSE (Root Mean Squared Error): **1.71**
- 📈 R^2 Score: **0.91**

✅ Insights:

- 91% of the variance in Sales is explained by the ad spend.
- Very good model performance for a simple regression.

Conclusion

- TV and Radio ads are effective predictors of Sales.
- Newspaper ads have low predictive power.
- Linear Regression gives strong results with minimal complexity.
- Model can help businesses improve marketing decisions.

✨ *Simple models, powerful insights.*

Thank You!

- This project is part of my #CodingSamurai Data Science Internship.
- Tools used: Python, Jupyter, Scikit-learn, Seaborn, Pandas
- Connect with me on:
  - GitHub: Project 2
  - LinkedIn: Ridhwan S
- Questions? Drop me a message!

👋 *Follow along as I complete all 6 projects!*