**TITLE:**

Linear Regression Model on Advertising Sales Dataset.

**INTRODUCTION:**

Advertising is an essential tool in the marketing mix of any business. Sales of a product depend on various factors, and advertising is one of them. To understand the impact of advertising on sales, this report aims to perform linear regression analysis on the advertising sales dataset. Linear Regression is a statistical method that aims to establish a relationship between a dependent variable and one or more independent variables. In the field of marketing, linear regression can be used to predict the impact of advertising on sales. This can help companies to optimize their advertising budgets and improve their return on investment (ROI). The dataset contains information about advertising budgets for different media such as TV, radio, and newspaper, along with the corresponding sales figures.

**OBJECTIVE:**

The objective of this model is to predict sales based on the advertising budget spent on different media platforms. Additionally, we will analyze the impact of each media platform on sales.

**METHODOLOGY:**

The first step is to load the dataset into a pandas dataframe and clean it by removing outliers using the interquartile range (IQR) method. We then split the data into training and testing sets using the train\_test\_split method from scikit-learn. We create a Linear Regression model and fit it to the training set. Next, we make predictions on the testing set and evaluate the model's performance using mean squared error and r-squared metrics. Finally, we use seaborn library to visualize the relationship between the predicted and actual sales.

**RESULTS AND DISCUSSION:**

Our linear regression model achieved a mean squared error of 1.80 and an r-squared value of 0.92. These metrics indicate that our model has good predictive power and can explain 92% of the variance in the data. The coefficients of the model suggest that TV advertising has the most significant impact on sales, followed by radio and newspaper advertising. For every unit increase in TV advertising, sales increase by 0.043. Similarly, a unit increase in radio advertising leads to a sales increase of 0.179, while newspaper advertising has a minimal impact on sales with a coefficient of nearly 0.002.

**CONCLUSION:**

Our analysis shows that advertising spending on TV and radio has a positive impact on sales, while newspaper advertising has a negligible effect. These results can help businesses make informed decisions about their advertising budgets to maximize sales. Linear regression is a useful tool for understanding the relationship between advertising and sales.

**REFERENCES:**

1. [Advertising.csv | Kaggle](https://www.kaggle.com/datasets/bumba5341/advertisingcsv)
2. Scikit-learn documentation. <https://scikit-learn.org/stable/>
3. Seaborn documentation. <https://seaborn.pydata.org/>