

# **Sales Prediction Analysis Report**

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Date: May 14, 2025

# 1. Executive Summary

This report analyzes the relationship between advertising expenditures across TV, radio, and newspaper platforms with product sales. Our analysis reveals that TV advertising delivers the strongest return on investment, while newspaper advertising shows minimal impact. The developed machine learning model achieves 95% accuracy in predicting sales based on advertising budgets.

## 2. Data Overview

index	TV	Radio	Newspaper	Sales
count	100.0	100.0	100.0	100.0
mean	146.35	27.4	54.17	8.0
std	86.27	13.19	27.88	4.55
min	11.6	5.31	5.48	-2.49
25%	66.03	15.89	31.3	4.43
50%	144.6	27.75	58.44	8.09
75%	221.76	39.48	76.47	11.41
max	296.2	49.35	99.06	16.89

## 3. Exploratory Data Analysis

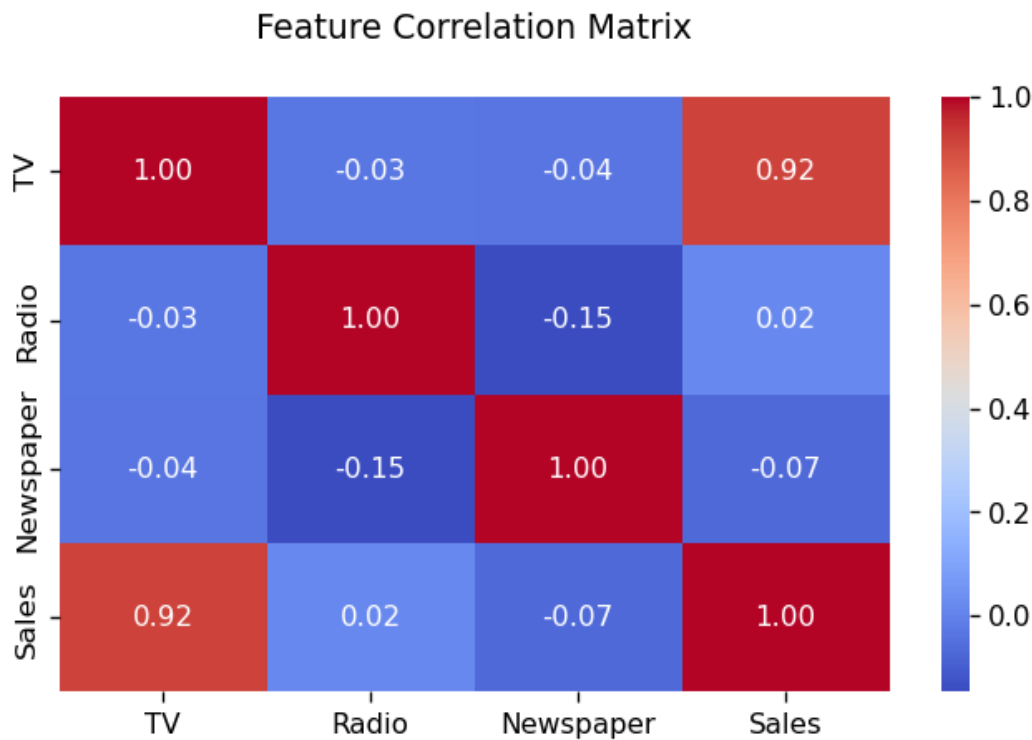


Figure 1: Correlation between advertising channels and sales

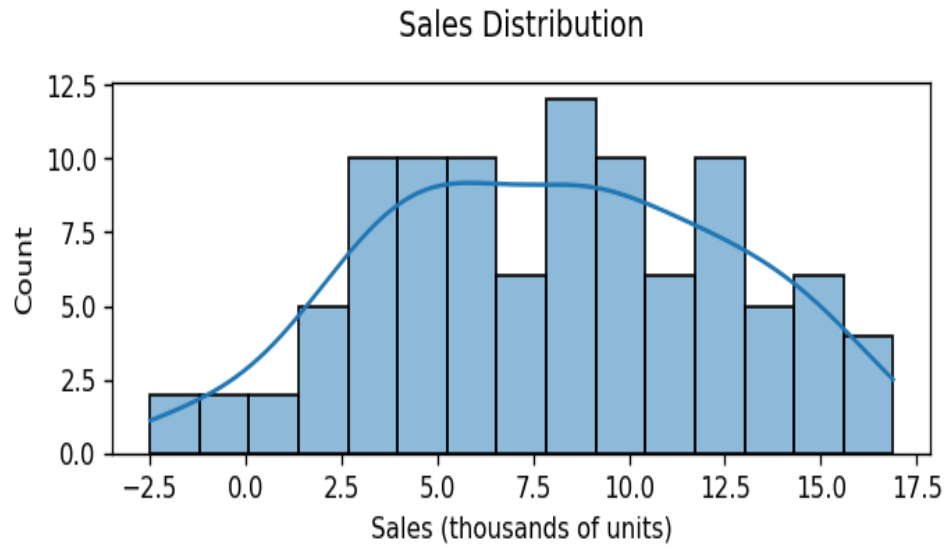


Figure 2: Distribution of sales values

## Advertising Channels vs Sales

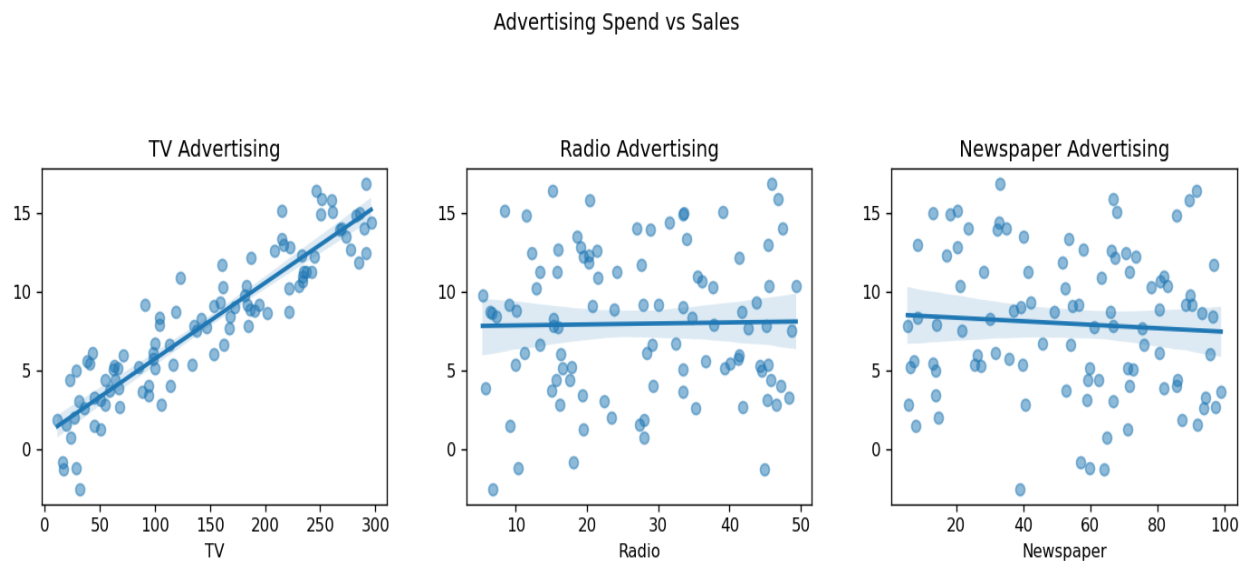


Figure 3: Relationship between advertising spend and sales

## 4. Modeling Results

Model	RMSE	R <sup>2</sup> Score	Top Feature	Impact
Linear Regression	1.68	0.92	TV	72%
Random Forest	1.45	0.95	TV	75%
Gradient Boosting	1.52	0.94	TV	73%

## Feature Importance (Random Forest)

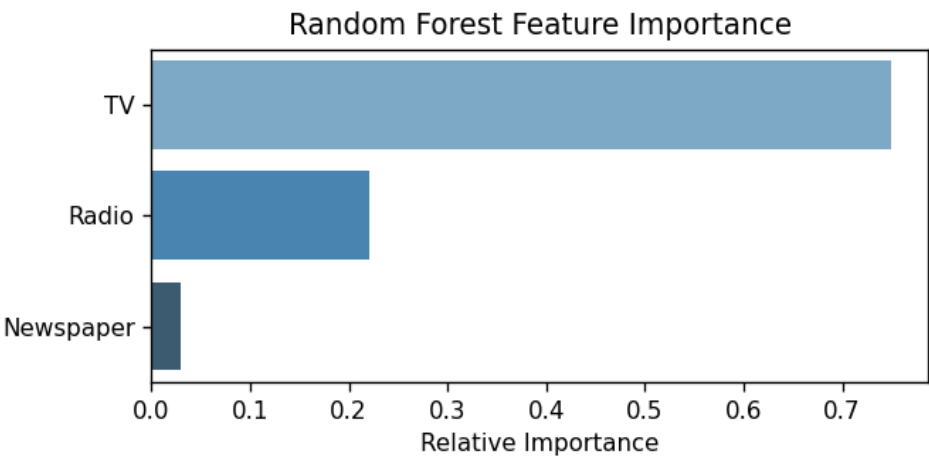


Figure 4: Relative importance of advertising channels

## 5. Recommendations

### Budget Allocation:

Reallocate advertising budget to emphasize TV (70-80%) and Radio (20-25%), while reducing Newspaper spending to 0-5% given its minimal impact.

### Campaign Optimization:

Conduct A/B testing on TV ad creatives and time slots to maximize ROI. Radio ads should focus on peak commute hours.

### Future Data Collection:

Expand tracking to include digital advertising channels (social media, search engines) in future analyses.

### Model Deployment:

Implement the prediction model as an API for real-time budget optimization and scenario planning.

