

Advertising Impact on sales & prediction for the next 2 years

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Introduction

This report aims to find the impact of different advertising on sales and profits. Trying to find which advertise has the most impact on the revenue. We have 6 different types of advertising (TV Ads , Billboards Ads , Google Ads , Social media Ads , Influencers Marketing & Affiliate Marketing).

Every type of this ads has the cost and an impact on the total revenue. So, we will figure out every 1 \$ we will spent for each one of this type of advertising how much we can get revenue back.

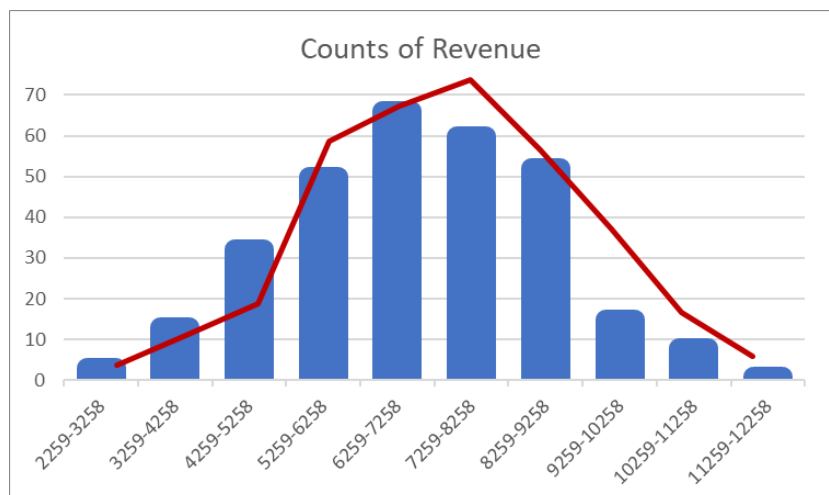
Also we will forecasting Sales for the years using Python(Jupyter) , Excel & SPSS .

Descriptive Analysis

For the Revenue

- We can see the distribution of the revenue for each Advertising campaign During the time.
- We can see that the average of the revenue is 7032 \$
- The Range of the revenue is between 2259 \$ - 12227 \$
- The total revenue is 2,109,457 \$
- Data distributed around the mean for that there is no outliers and no skewness for the revenue.

Product_Sold	
Mean	7031.523333
Standard Error	98.35825508
Median	7051
Mode	7383
Standard Deviation	1703.614951
Sample Variance	2902303.902
Kurtosis	-0.080514898
Skewness	-0.047675955
Range	9968
Minimum	2259
Maximum	12227
Sum	2109457
Count	300
Confidence Level(95.0%)	193.5621284



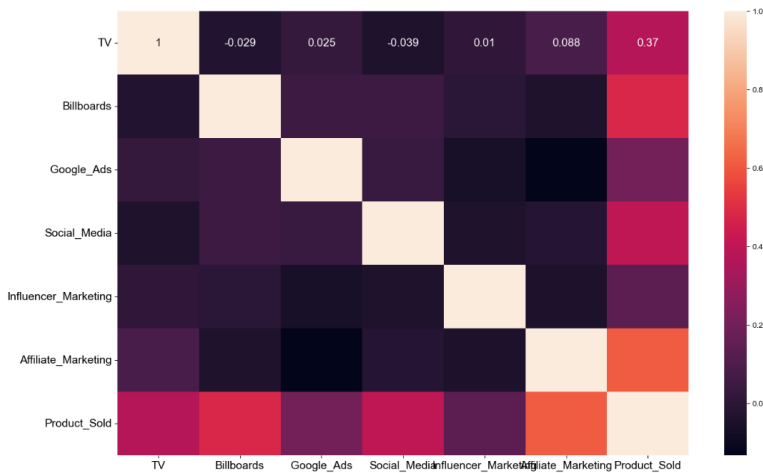
Find the most influence type of advertising

- First, we will get the correlation matrix to know if there's a relation between variables or not. then, we will use the multiple regression analysis to know the type of this relation and most effective type of advertising.

[33]:

	TV	Billboards	Google_Ads	Social_Media	Influencer_Marketing	Affiliate_Marketing	Product_Sold
TV	1.000000	-0.028851	0.025265	-0.038993	0.009970	0.087524	0.374228
Billboards	-0.028851	1.000000	0.052991	0.048722	-0.005815	-0.041060	0.480593
Google_Ads	0.025265	0.052991	1.000000	0.040265	-0.059243	-0.131834	0.203678
Social_Media	-0.038993	0.048722	0.040265	1.000000	-0.042679	-0.019522	0.401088
Influencer_Marketing	0.009970	-0.005815	-0.059243	-0.042679	1.000000	-0.047093	0.140844
Affiliate_Marketing	0.087524	-0.041060	-0.131834	-0.019522	-0.047093	1.000000	0.611603
Product_Sold	0.374228	0.480593	0.203678	0.401088	0.140844	0.611603	1.000000

- We can see in the last line that there's positive relation between all advertising and sold products.



- In this part we figure out which the most influenced type of advertising. We use multiple regression to get the relation between variables.

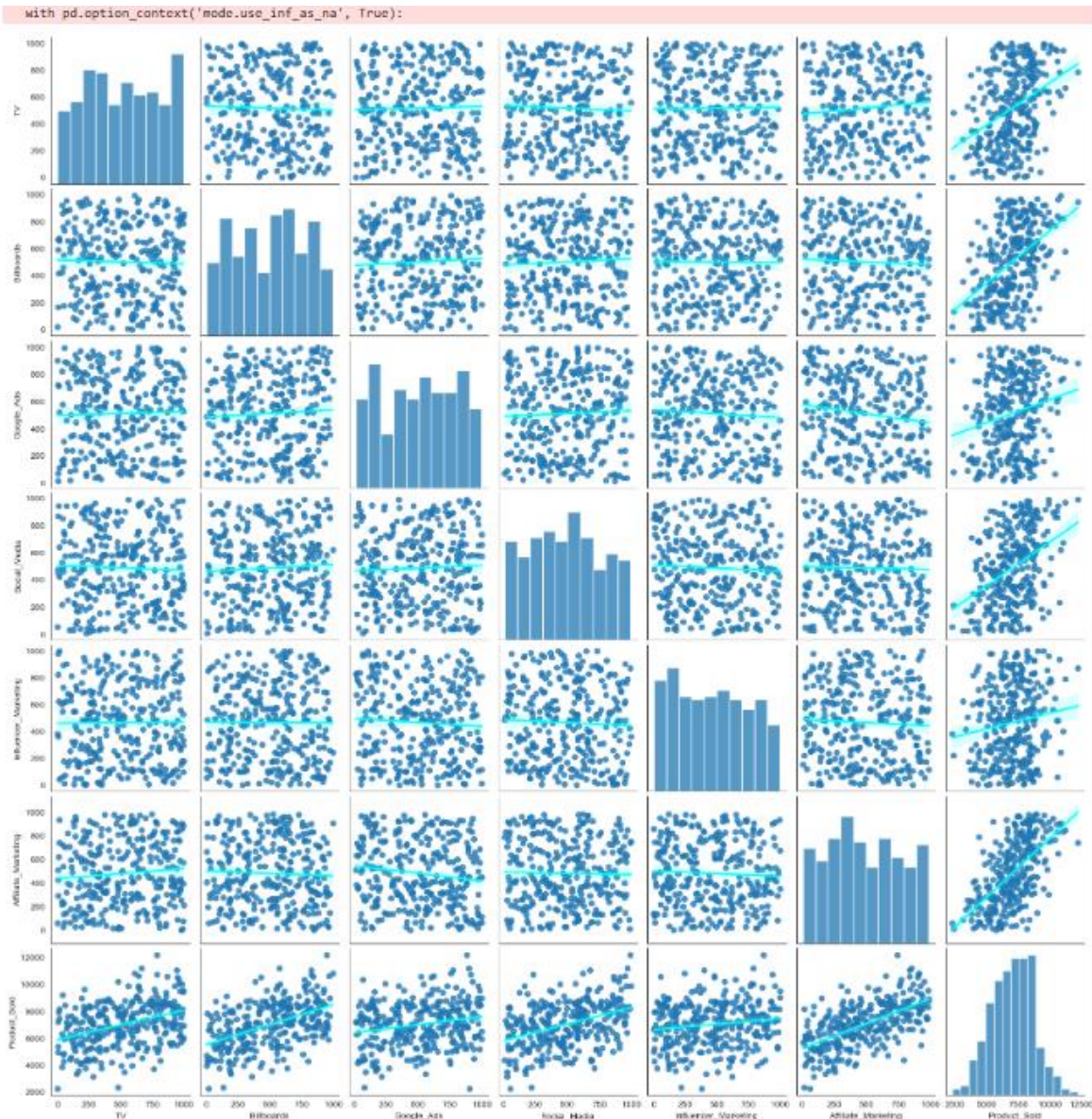
		Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta				Lower Bound	Upper Bound
1	(Constant)	.089	2.723		.033	.974	-5.270	5.447
	TV	2.001	.002	.338	956.708	.000	1.997	2.005
	Billboards	2.998	.002	.485	1375.489	.000	2.994	3.002
	Google_Ads	1.500	.002	.251	704.836	.000	1.496	1.504
	Social_Media	2.500	.002	.402	1138.719	.000	2.496	2.504
	Influencer_Marketing	1.200	.002	.203	574.871	.000	1.196	1.204
	Affiliate_Marketing	3.999	.002	.652	1827.081	.000	3.995	4.003

a. Dependent Variable: Product_Sold

- In this model we can see that the function will be

$\text{Sold products} = 0.089 + 2.001 (\text{TV}) + 2.998 (\text{Billboards}) + 1.50(\text{Google Ads}) + 2.5(\text{Social Media}) + 1.2 (\text{Influencer Marketing}) + 3.99(\text{Affiliate Marketing})$

- All methods are significant in our model and impact in sold products
- Affiliation Marketing is the most influencing method in sold products then Billboards. In every 1 \$ we pay in Affiliation Marketing we can get around 4 \$ for sold products . For Billboards if we pay 1 \$, We will get 3 \$ for sold products.



- In the last line we can see the relation.
- As we can see Affiliation Marketing & Billboards have the higher slope.
- Affiliation Marketing & Billboards are the most effective types of advertising in the sales products.

Forecasting Sales

Forecasting Sales Using Python(Jupyter) :

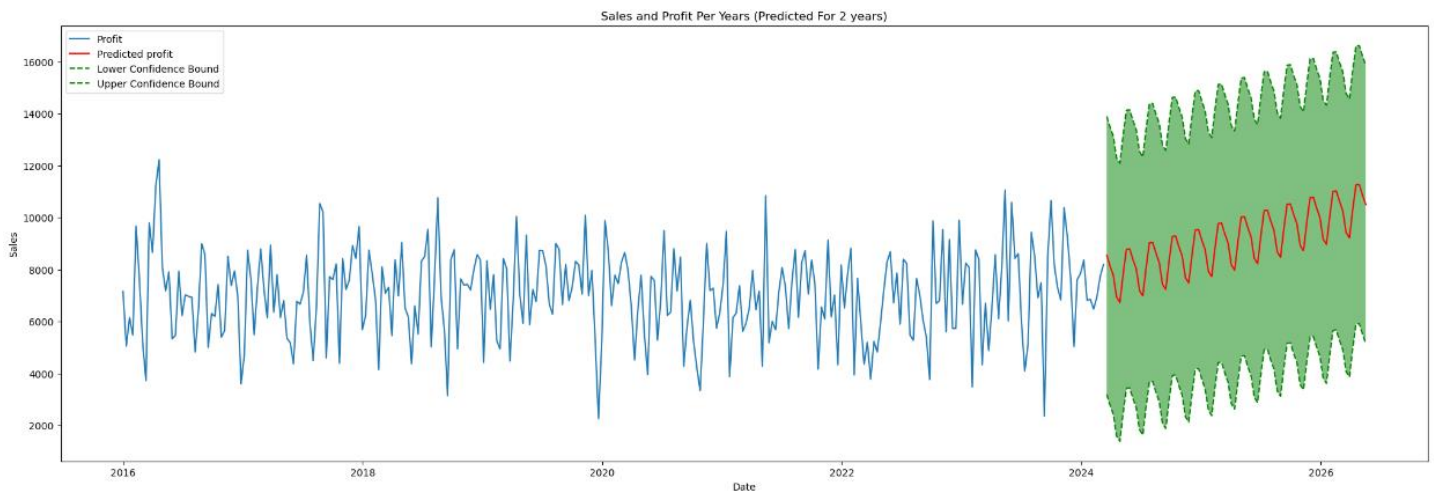
```
ADF Statistic: -3.169384580206534
p-value: 0.021826632701785857
Critical Values:
1%: -3.4535872903895797
5%: -2.871771355211212
10%: -2.5722217283277127
```

- First , We will test if this data is Stationary or not . to make sure that we can predict the average of sales. To do that we will use Augmented Dickey Fuller Test (ADF Statistic Test) .
- We see in this output that P-value < 0.05 , We reject the Null Hypothesis. We can see that this data is stationary.
- We can see also that ADF statistic is less than the critical value Which confirm our evidence.

```
[137]: pred_df
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	lower_CI	predictions	Upper_CI
2024-03-19	3194.798425	8547.445033	13900.091641
2024-03-29	2782.792929	8135.439537	13488.086145
2024-04-08	2425.395369	7778.041977	13130.688584
2024-04-18	1588.166731	6940.813339	12293.459947
2024-04-28	1386.472027	6739.118635	12091.765243
...
2026-04-08	4950.153090	10302.799698	15655.446306
2026-04-18	5903.322744	11255.969352	16608.615960
2026-04-28	5920.697558	11273.344166	16625.990774
2026-05-08	5508.692063	10861.338670	16213.985278
2026-05-18	5151.294502	10503.941110	15856.587718

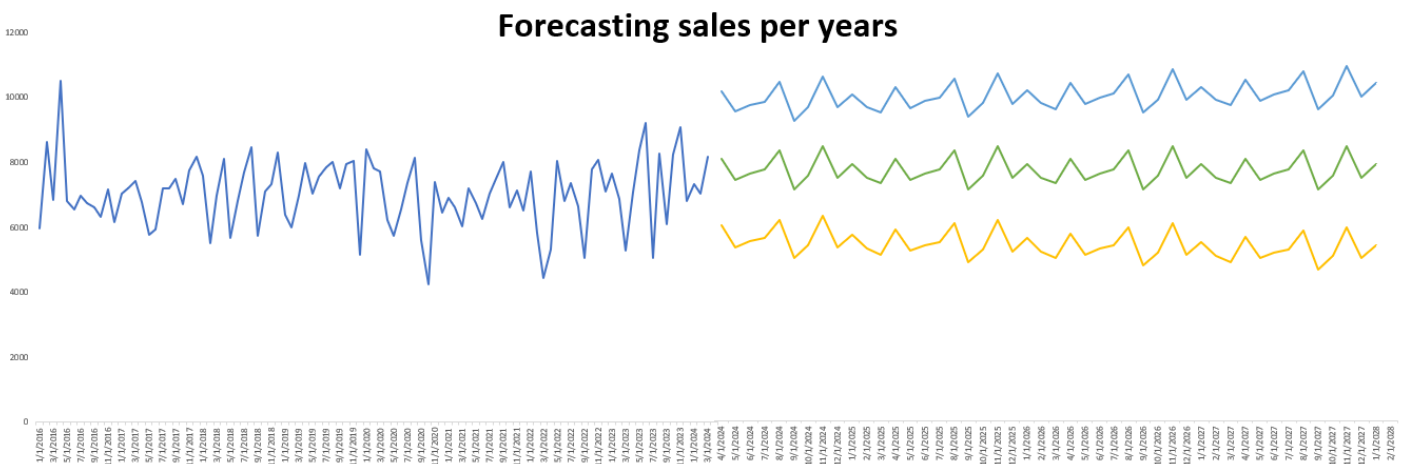
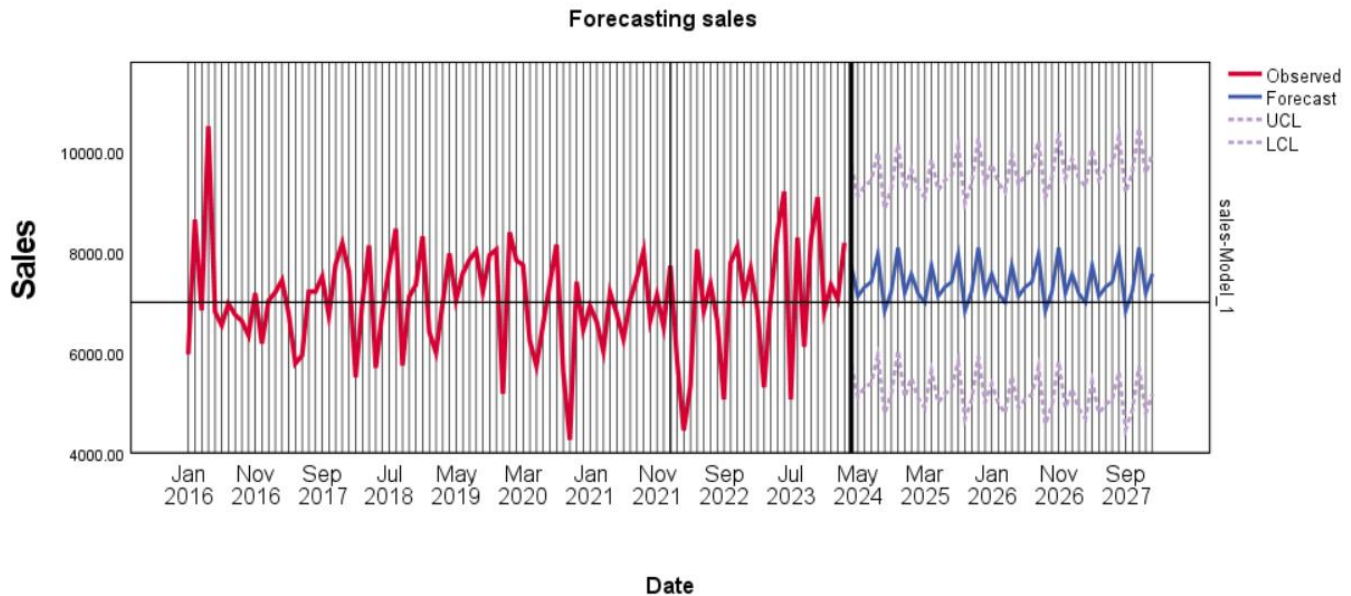
- In this model, The sales profit prediction for every 10 days during the next 2 years.
- As we can see on April 08, 2026. The prediction of the revenue will be 10,302 \$.with 95% of Confidence it will be between 4,950 \$ and 15,655 \$.



Forecasting Sales Using SPSS & Excel :

		Forecast													
Model		Apr 2024	May 2024	Jun 2024	Jul 2024	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025
sales-Model_1	Forecast	7739.70	7118.41	7303.16	7404.74	7963.28	6824.91	7216.31	8093.37	7180.33	7565.40	7177.54	6995.86	7739.70	7118.41
	UCL	9728.12	9116.70	9311.27	9422.63	9990.90	8862.21	9263.25	10149.90	9246.41	9640.99	9262.58	9090.32	9843.54	9231.58
	LCL	5751.29	5120.12	5295.05	5386.85	5935.66	4787.61	5169.38	6036.83	5114.26	5489.82	5092.50	4901.40	5635.87	5005.24

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested for



- In this model, The sales profit prediction for every month during the next 4 years.
- As we can see on Jan 2025 , The prediction of the revenue will be 7,565 \$.with 95% of Confidence it will be between 9,641 \$ and 5,499 \$.

Conclusion

According to the result of our tests and summary, We should be more care about some variables which by that can help in improving sales. Also we have to be careful for our unit costs and before increasing any prices. As, It can effect on Quantities.

References & dataset

- 1- **"Advertising Sales" , Advertising Budget & Sales Prediction**, Retrieved from the link <https://www.kaggle.com/datasets/yasserh/advertising-sales-dataset> .