TIME SERIES ANALYSIS OF SALES INFORMATION
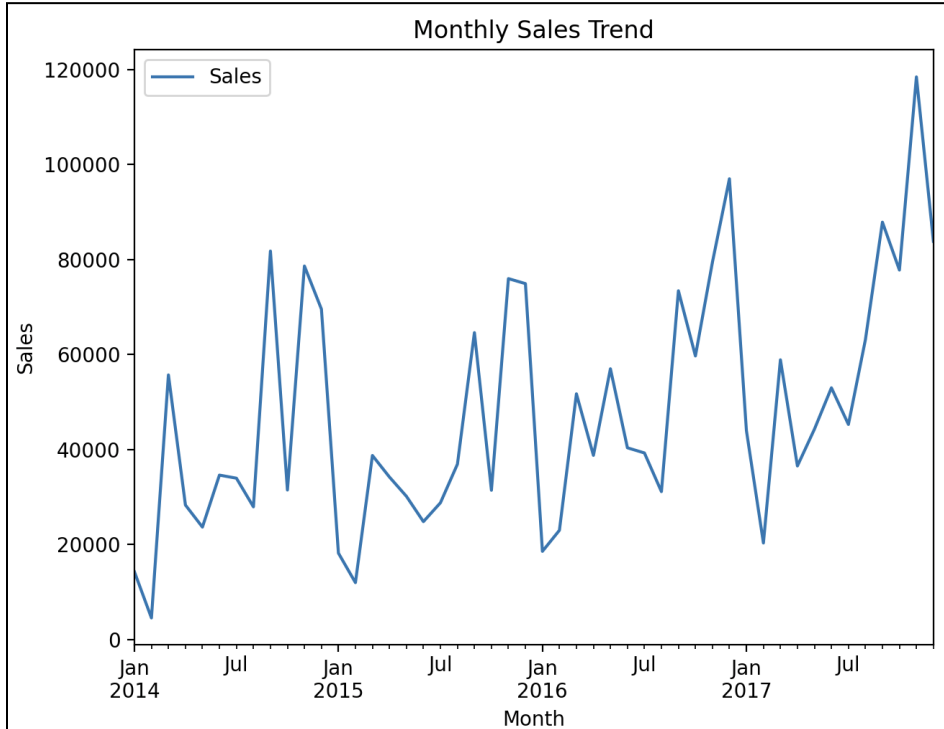
I have converted the Sales Information dataset into time series. I will be mainly looking at "Order Date", "Sales", "Profit", and "Category" to identify and analyze meaningful trends.

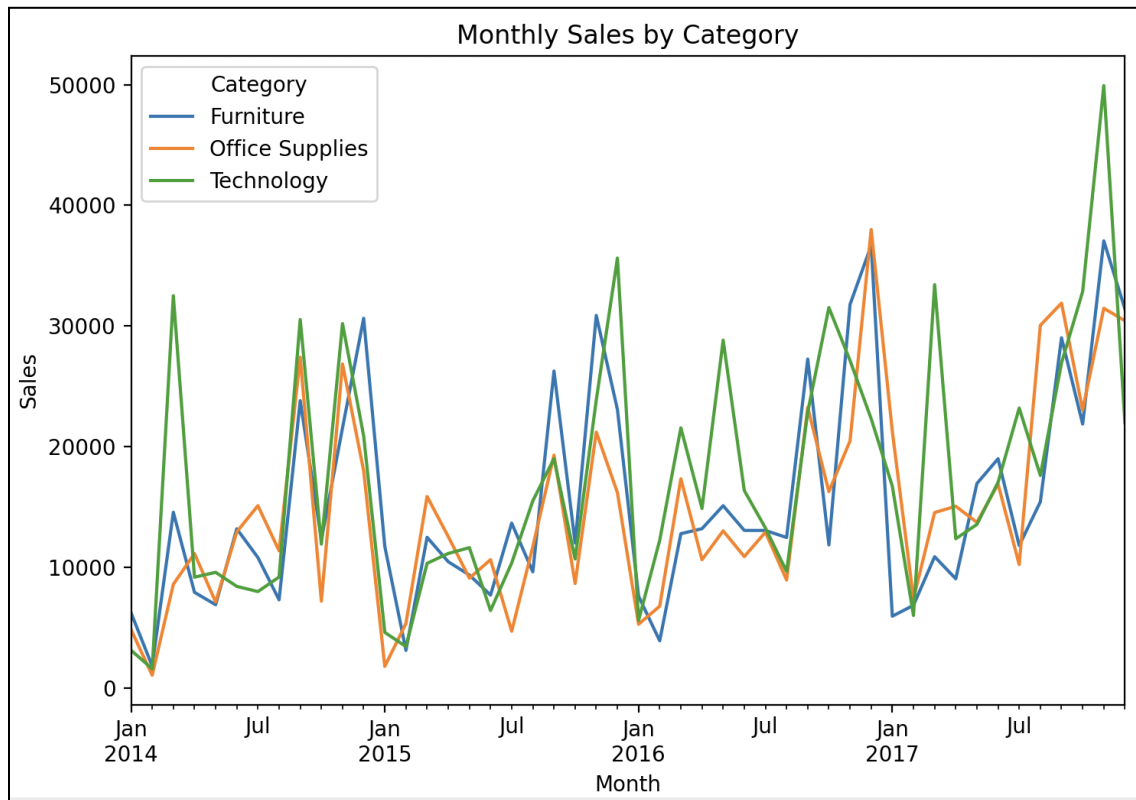## 1) Monthly Sales Trend (Summing the Sales for each Month)

The plot shows the monthly sales trend over time. There is a clear seasonal pattern with sales peaking around the end of the year, likely due to the holiday season. Sales also seem to be generally increasing over time, indicating growth in the business. However, there are also some noticeable dips, suggesting periods of lower demand or possible supply issues.

2) Monthly Profit Trend (Summing the Profits for each Month)
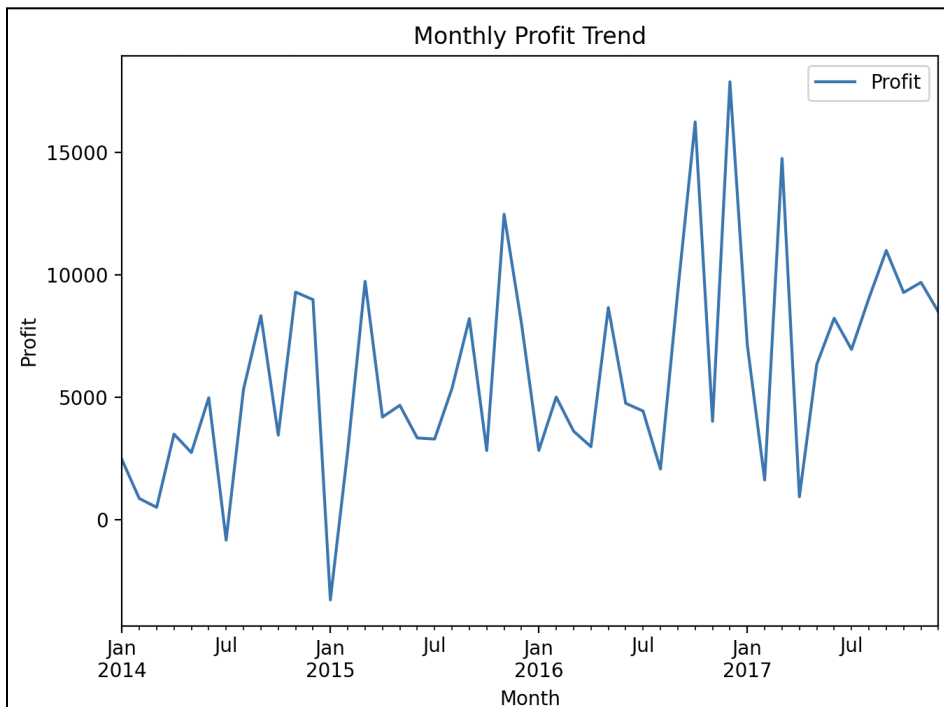
The plot shows the monthly profit trend over time. There is a clear seasonal pattern with profits peaking around the end of the year, likely due to the holiday season. Profits also seem to be generally increasing over time, indicating growth in the business. However, there are also some noticeable dips, suggesting periods of lower demand or possible supply issues.

3) Monthly Sales by Category (Summing the Sales for each Month for each Category)

Monthly Sales by Category

The plot shows the monthly sales trend over time for each category: Furniture, Office Supplies, and Technology. All three categories show a clear seasonal pattern with sales peaking around the end of the year, likely due to the holiday season. The Technology category consistently has the highest sales, followed by Furniture and Office Supplies. The sales in all categories seem to be generally increasing over time, indicating growth in the business. However, there are also some noticeable dips, suggesting periods of lower demand or possible supply issues. The plot provides valuable insights into the sales performance of different categories over time and can help in making informed business decisions

CONCLUSION

The time series analysis reveals a consistent seasonal pattern in sales and profits, with peaks during the holiday season, indicating the impact of seasonal trends on the business. Overall, there is a positive growth trend in both sales and profits. The category-wise analysis shows that Technology leads in sales, followed by Furniture and Office Supplies. However, occasional dips suggest potential periods of lower demand or supply issues. These insights can guide strategic decision-making to optimize sales and profits, such as inventory management based on category performance and seasonality.

FUTURE TREND PREDICTION USING ARIMA FORECASTING MODEL

I will be using the ARIMA forecasting model to predict the next 12 months of all the previous time series analysis.

1) Monthly Sales Trend for the next 12 months

| Dates	Sales
2018-01-31	71581.934004
2018-02-28	55743.042701
2018-03-31	74972.678143
2018-04-30	64319.174221
2018-05-31	68388.262619
2018-06-30	73453.160523
2018-07-31	69074.279364
2018-08-31	80090.015504
2018-09-30	95596.164413
2018-10-31	89323.705559
2018-11-30	114793.335895
2018-12-31	93092.603554
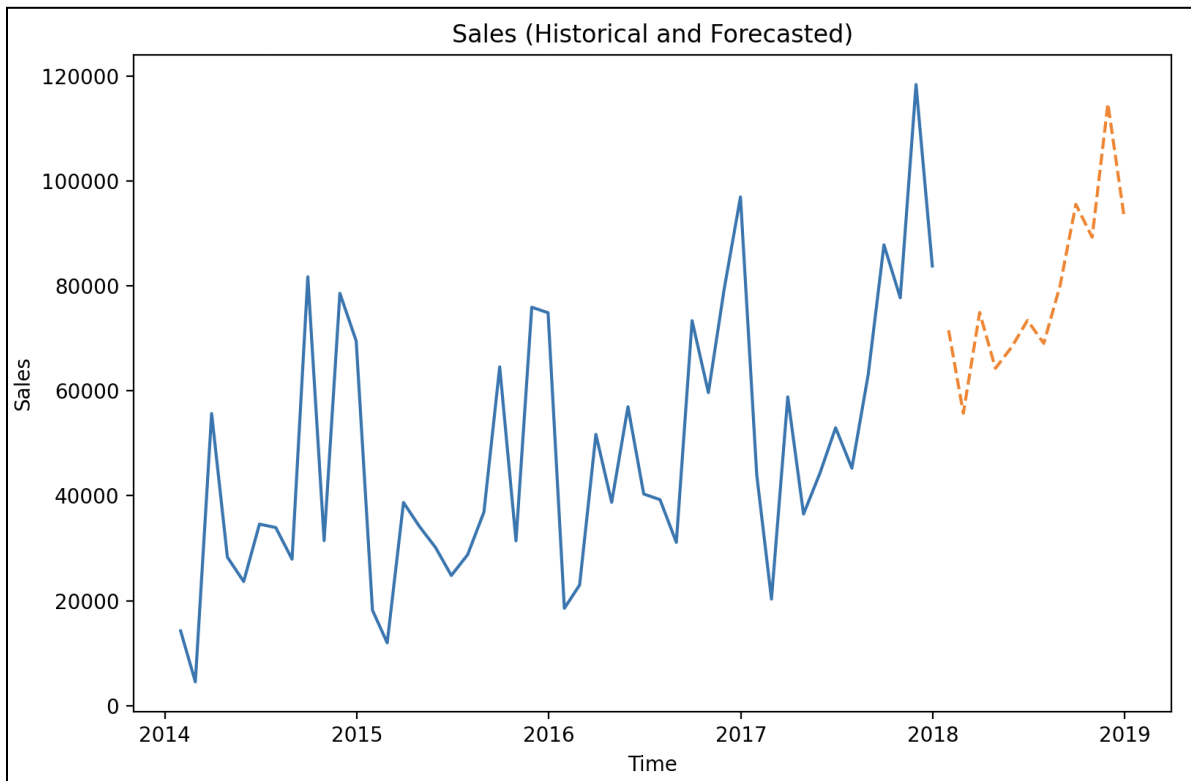
The plot above shows the monthly sales trend for the next 12 months. The Historical plot is represented by the blue line, and the Forecasted plot is represented by the dotted Orange line. As we can see, the forecast follows the same upward trend, also ending with a peak and drop

the same way as historical plot does. However, the peak for the predicted graph does not go past the peak for the historical graph which suggests that the sales are not going to increase in the near future, they are going to remain similar to the end of the historical period.

2) Monthly Profit Trend for the next 12 months

| Dates	Profits
2018-01-31	8783.964149
2018-02-28	9634.808156
2018-03-31	9337.645508
2018-04-30	9890.123282
2018-05-31	10112.793597
2018-06-30	9908.994604
2018-07-31	10288.524413
2018-08-31	10326.441705
2018-09-30	10364.101314
2018-10-31	10672.604239
2018-11-30	10711.655549
2018-12-31	10857.121037
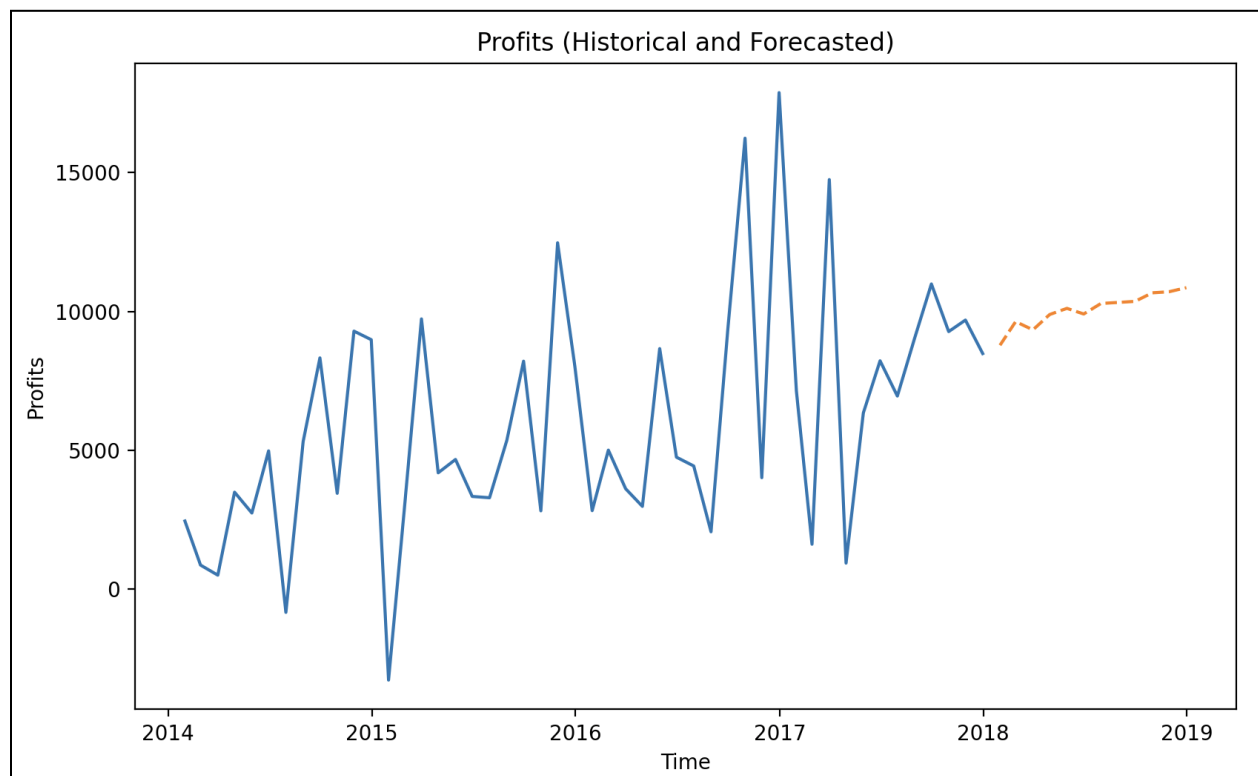
The plot above shows the monthly sales trend for the next 12 months. The Historical plot is represented by the blue line, and the Forecasted plot is represented by the dotted Orange line.

Based on the ARIMA forecasting model, it suggests that profits will continue to increase in the near future. This projection indicates a positive outlook for the business, as the forecasted trend suggests a continuation of the upward trajectory.

3) Monthly Sales by Category for the next 12 months

Dates	Furniture	Office Supplies	Technology
2018-01-31	7279.173238	25543.426571	20300.856823
2018-02-28	8227.149484	18220.948074	18664.865621
2018-03-31	12774.696488	21992.688676	30435.459932
2018-04-30	11510.526076	22268.290555	22434.194454
2018-05-31	19051.604160	21563.198498	25205.423075
2018-06-30	20565.056538	23239.857345	23429.275544
2018-07-31	13506.151820	19717.335236	24938.030627
2018-08-31	17049.808076	30182.810502	23837.627973
2018-09-30	30553.726993	31152.340530	30659.242453
2018-10-31	22284.446546	26474.361088	30987.730154
2018-11-30	38152.118834	30928.700118	37642.086495
2018-12-31	35304.411501	30381.940061	29982.949381
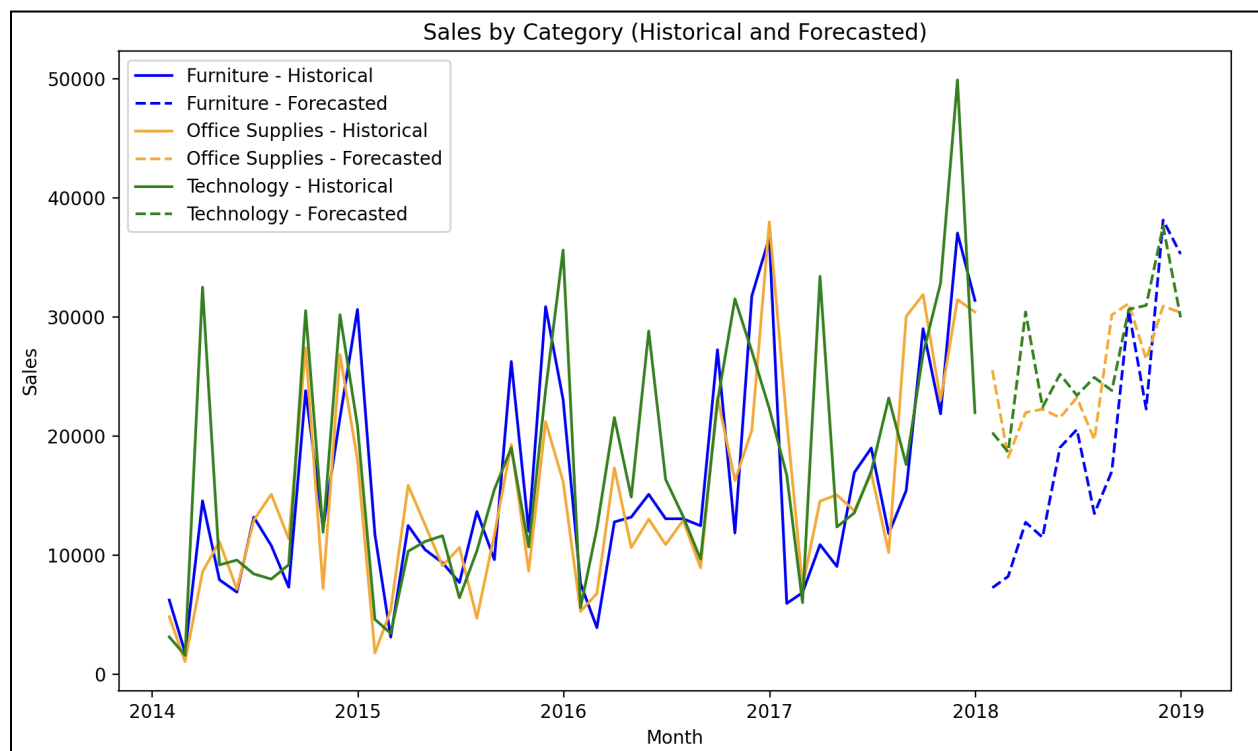
The plot above shows the monthly sales trend by category for the next 12 months. The solid lines indicate the historical plots and the dotted lines indicate the forecasted plot. The forecasted

graph is similar to the historical trend, where Technology consistently has the highest sales. However, by the end, Furniture peaks the highest, crossing all the other categories. Furniture shows the most increase in sales in the near future.