TIME SERIES – FURNITURE SALES FORECAST

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INTRODUCTION:

- EVERY BUSINESS OWNER'S OBJECTIVE IS TO ESTIMATE THE FUTURE TRENDS - IN TERMS OF SALES, PROFITS, GAINS ETC.
- TO DO THIS ANALYSIS, THE OWNER FIRST HAS TO SEGREGATE THE DATA BY CATEGORY AND ANALYZE EACH ENTITY SEPARATELY.
- FOR EACH ENTITY, A FORECAST CAN BE ESTIMATED BASED ON THE PAST SALES OF THAT ENTITY. THE IDEA BEHIND THIS IS TO FIND OUT THE POPULARITY OF A CERTAIN PRODUCT AND HOW ITS SALES CAN IMPACT THE BUSINESS.

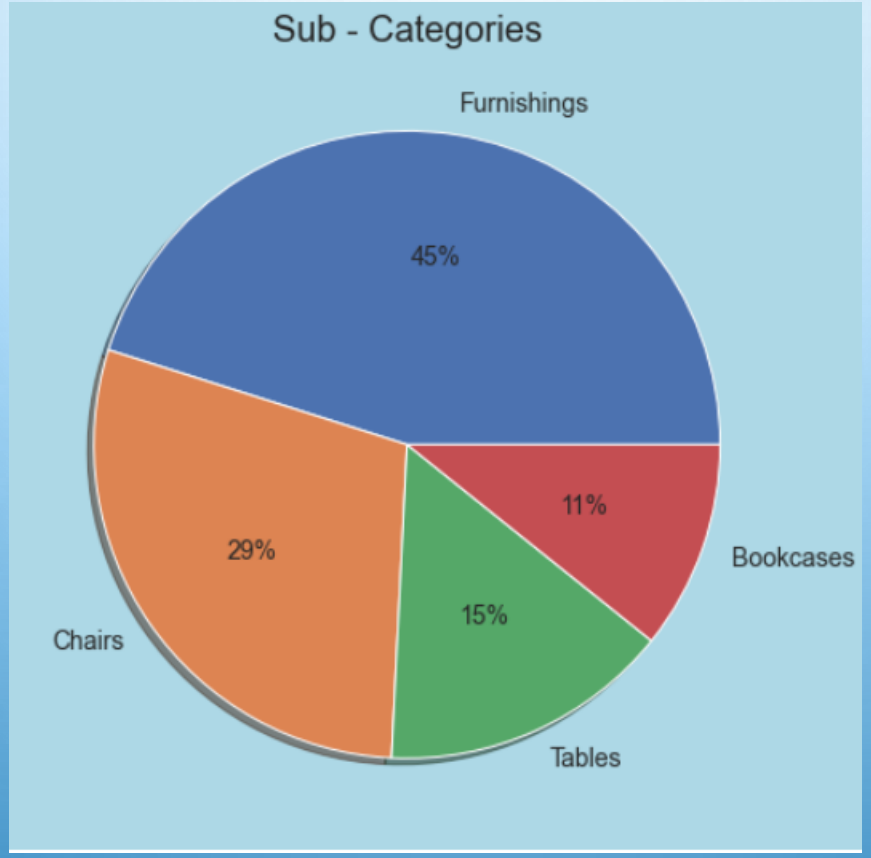
OBJECTIVE:

- TO HELP THE STORES BY PREDICTING FUTURE FURNITURE SALES OF A CERTAIN STORE

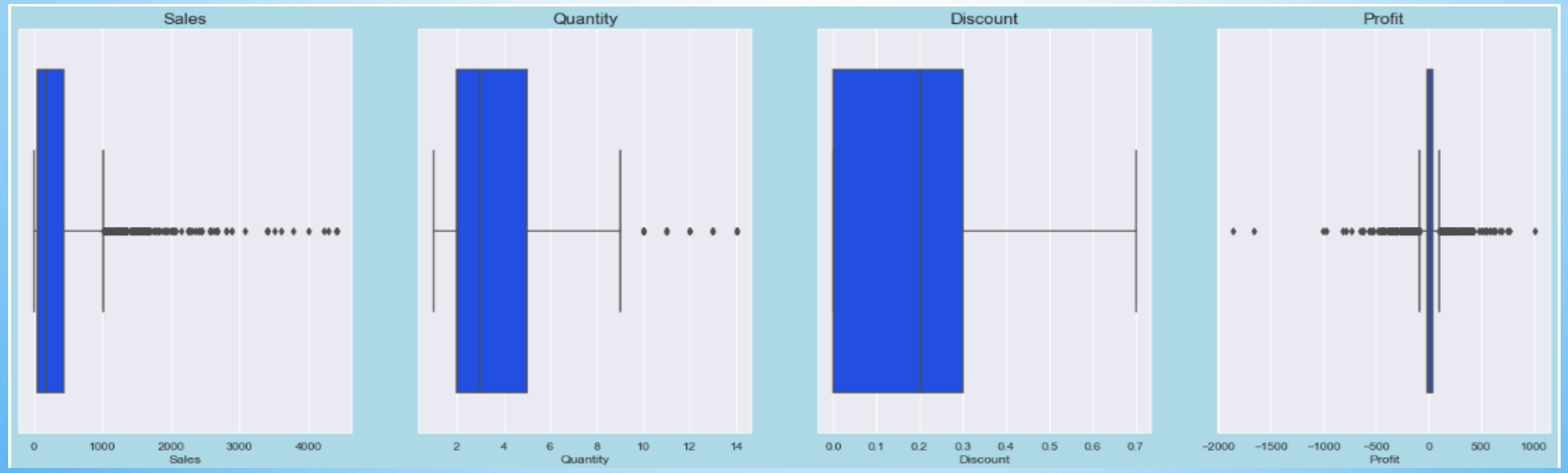
FEATURE	DATA TYPE	DESCRIPTION
Order Date	Date	Date when the order was made
Category	Categorical	Product category
Sub Category	Character	Specific product belonging to a given product category
Sales	Numeric	Sales amount for the given order
Quantity	Numeric	Number of items purchased against the order
Discount	Numeric	Discount offered on the selected product
Profit	Numeric	Overall profit made

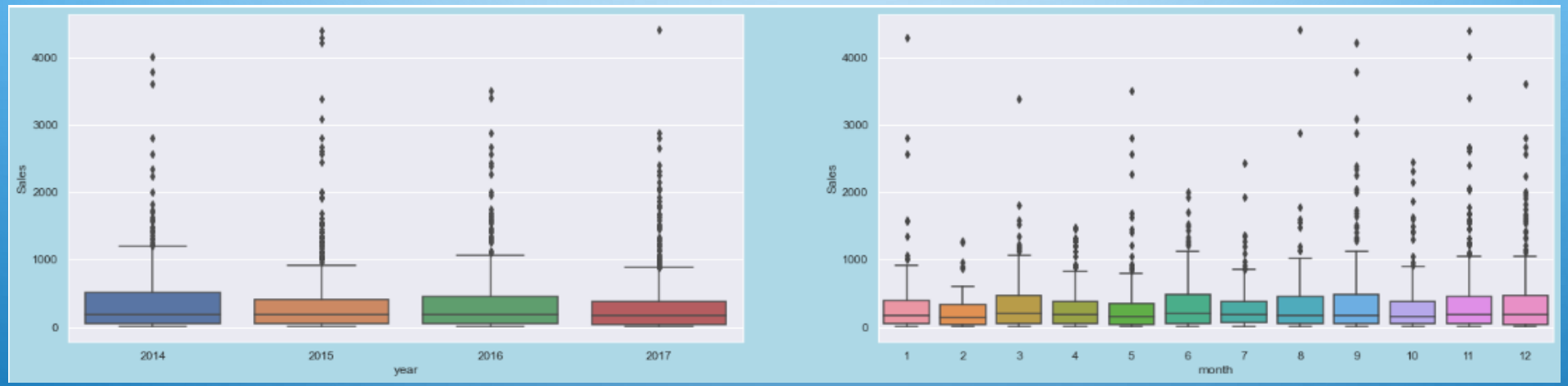
➢DATA PRE-PROCESSING

- THERE IS NO ANY MISSING VALUES OR ANY SPECIAL CHARACTERS PRESENT IN THE DATASET
- **UNIVARIANT ANALYSIS**



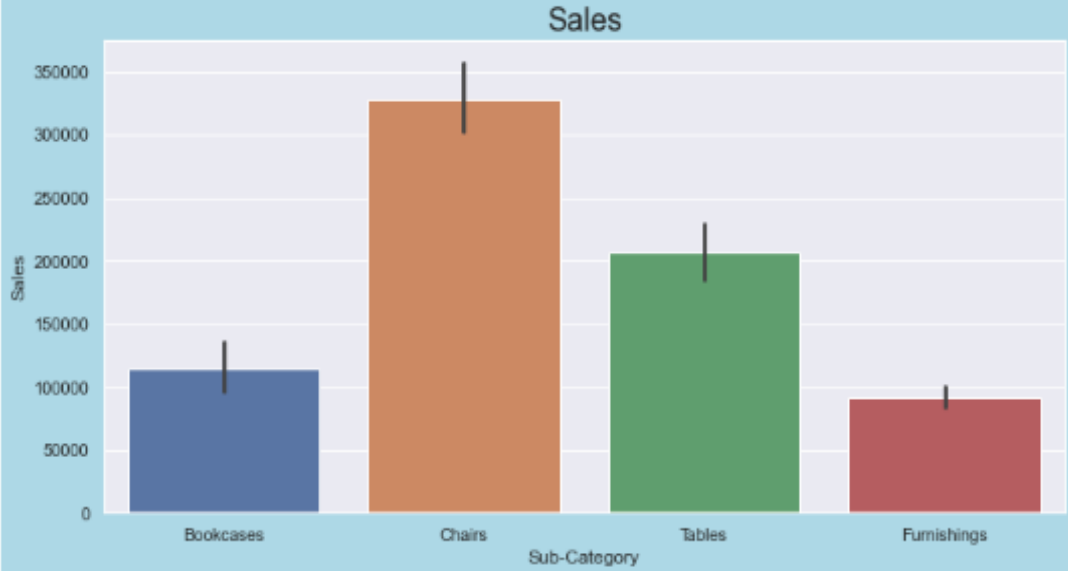
- BELOW PLOTS SHOWS THE DISTRIBUTION OF NUMERICAL FEATURES IN THE DATASET AND THERE MORE OUTLIERS ARE PRESENT IN THE FEATURES

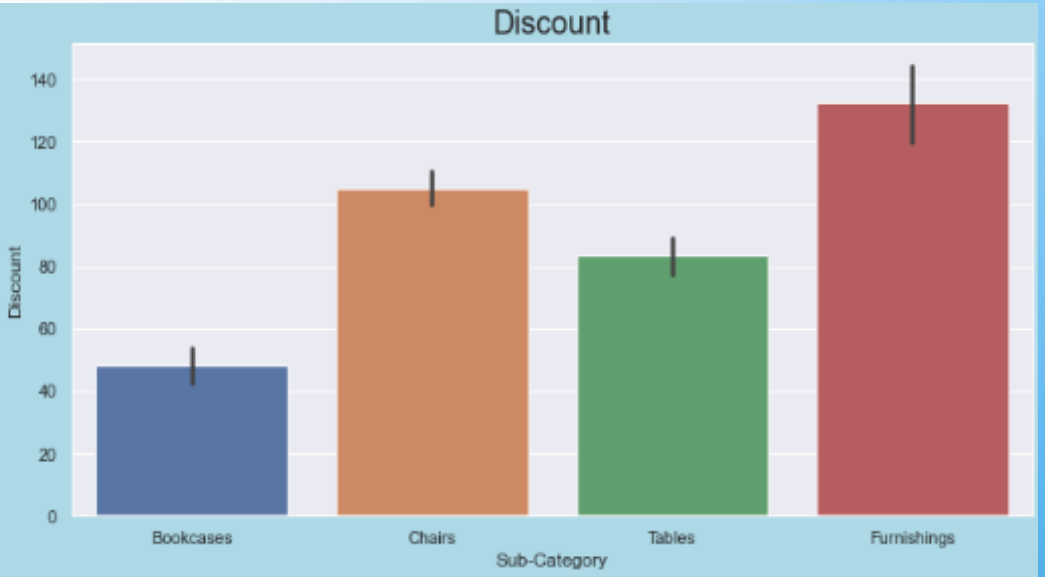


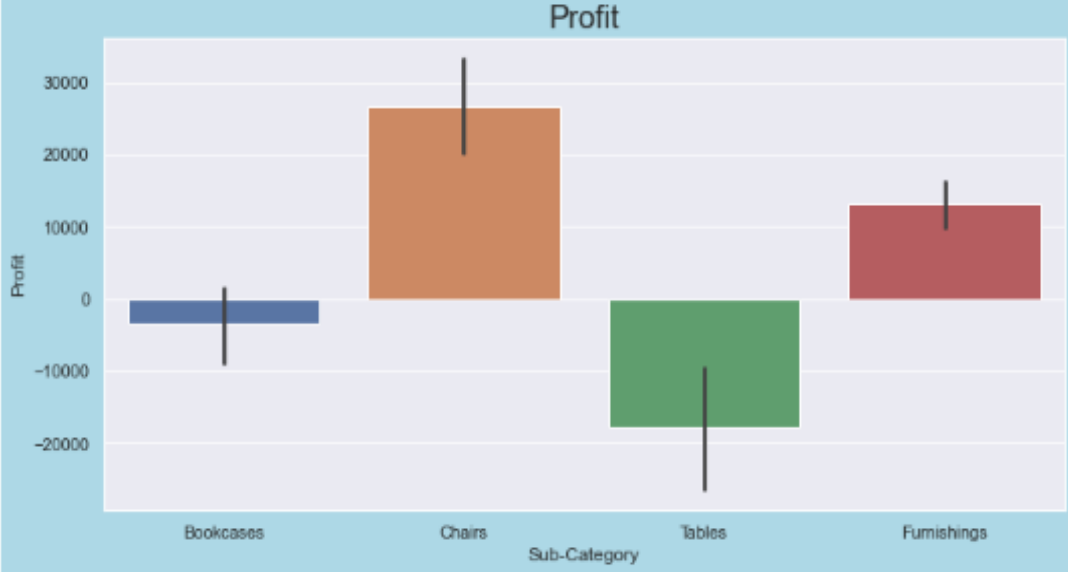


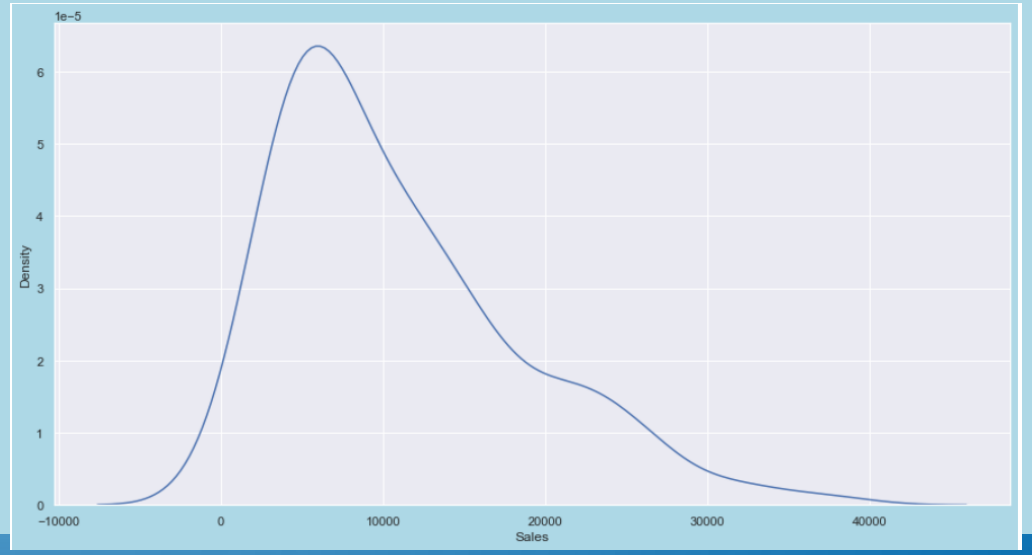
➢ BIVARIANT ANALYSIS

➢ HERE WE CAN SEE HOW SALES OF DIFFERENT SUBCATEGORY IMPACT ON THE BUSINESS

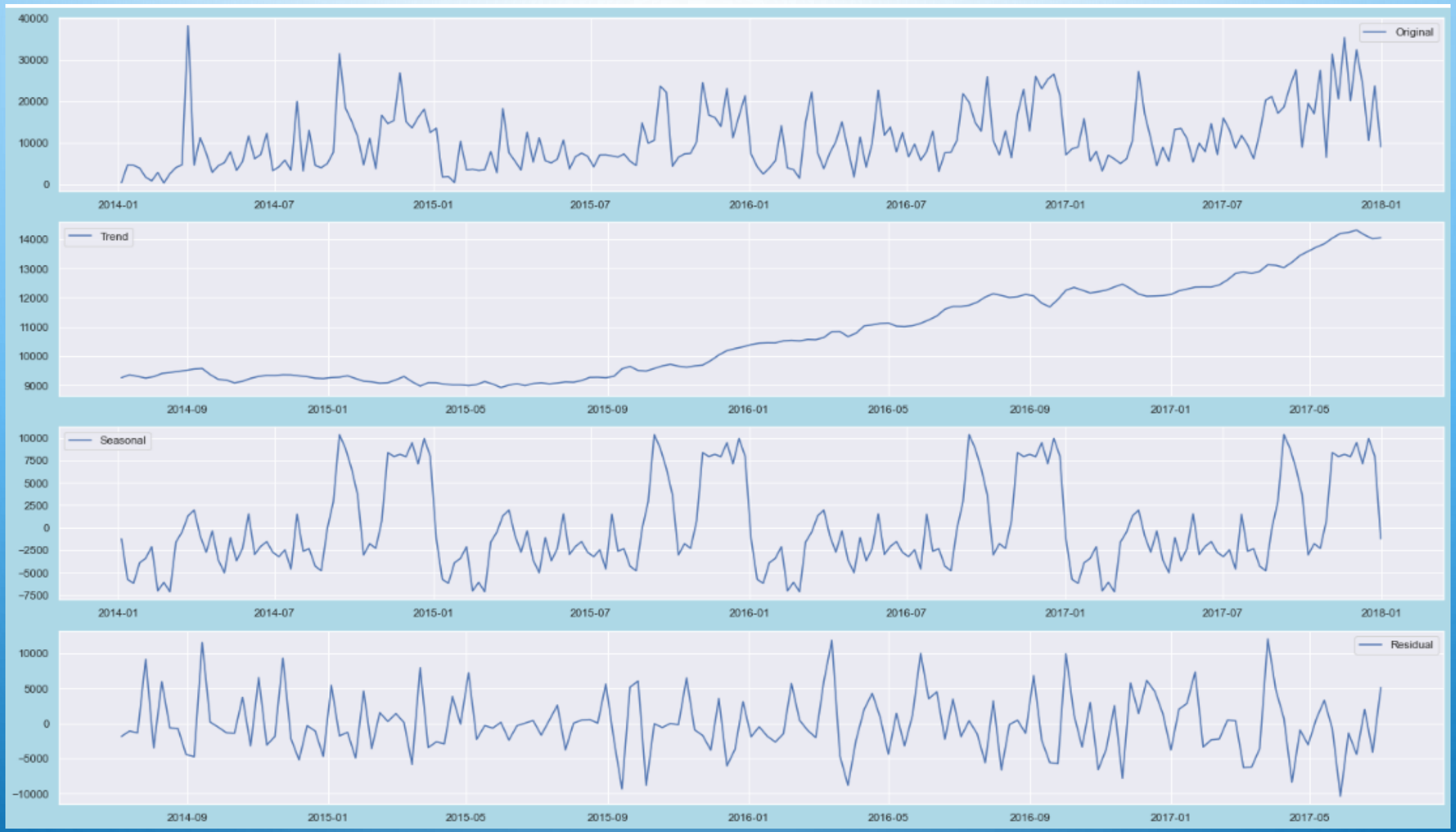






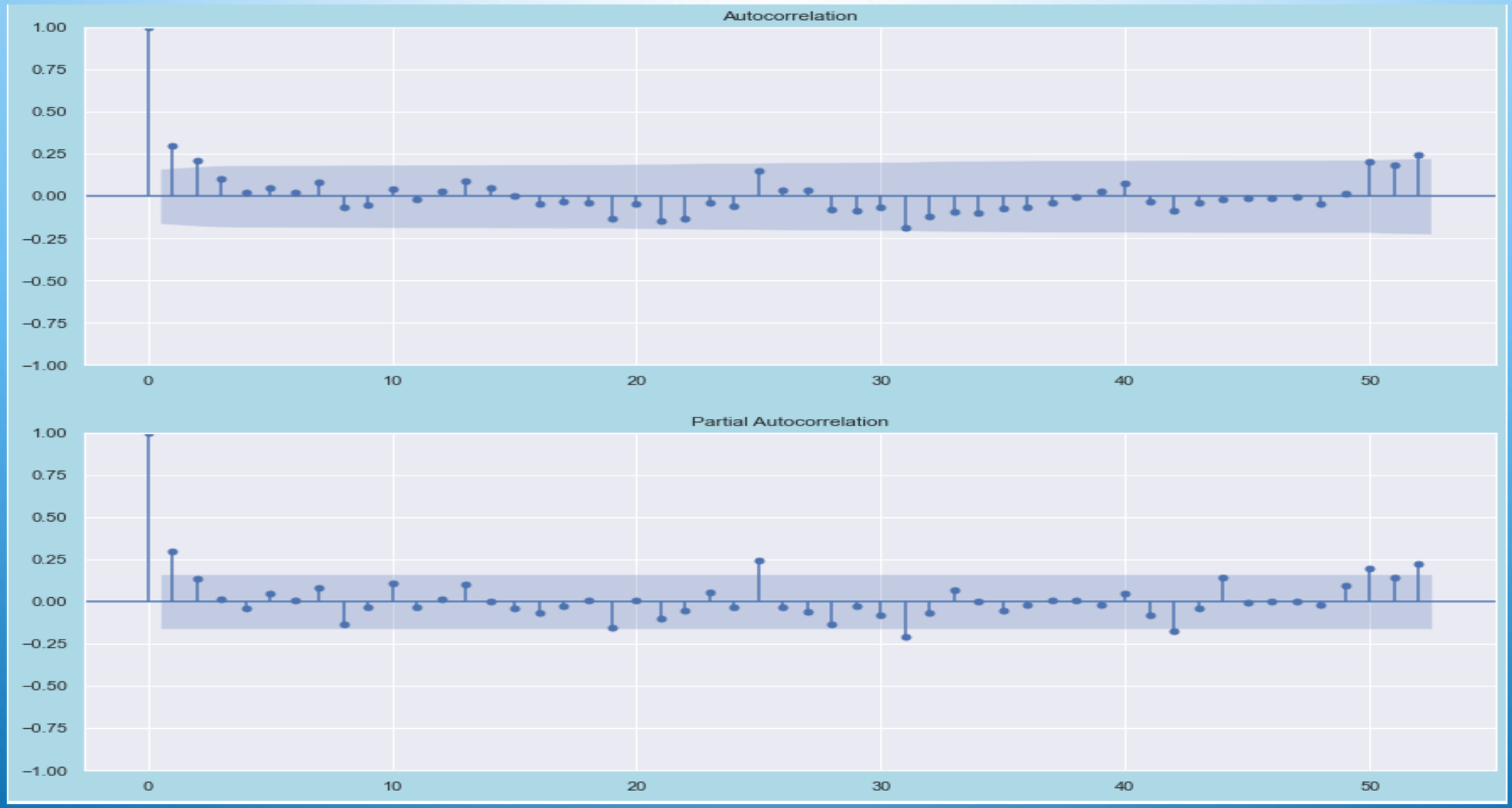


➢ THE BELOW PLOTS SHOWS THE TIME SERIES COMPONENTS



➢ ACF AND PACF PLOTS

➢ THE ORDER OF AR AND MA CAN BE FIND USING PACF AND ACF PLOTS, THOSE ARE THE PARAMETERS FOR MODEL BUILDING



➢MODEL BUILDING

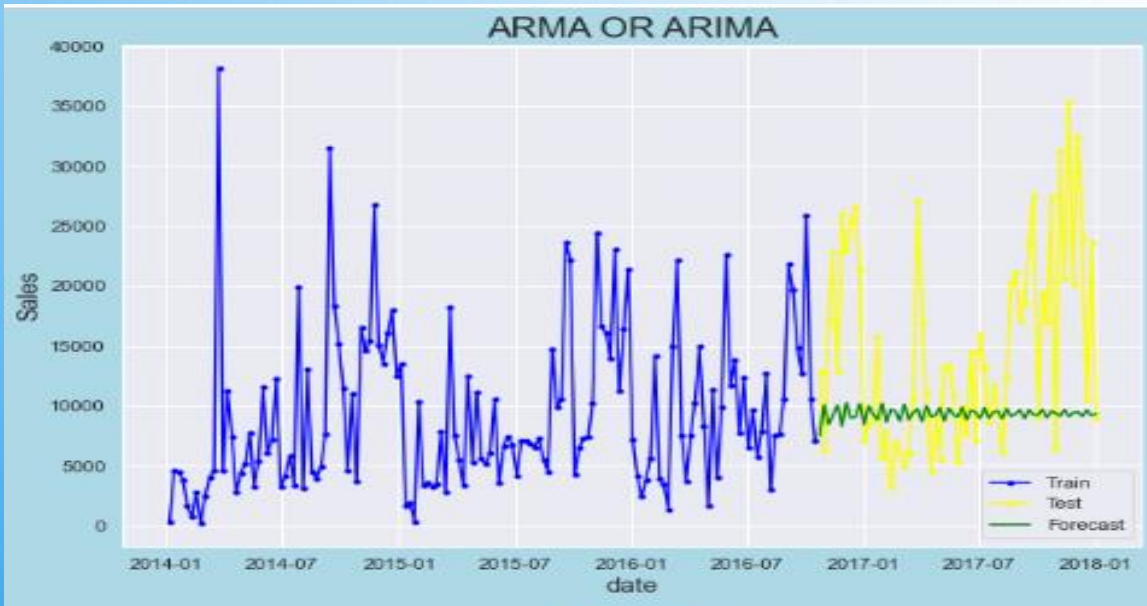
➢ EDA OBSERVATIONS

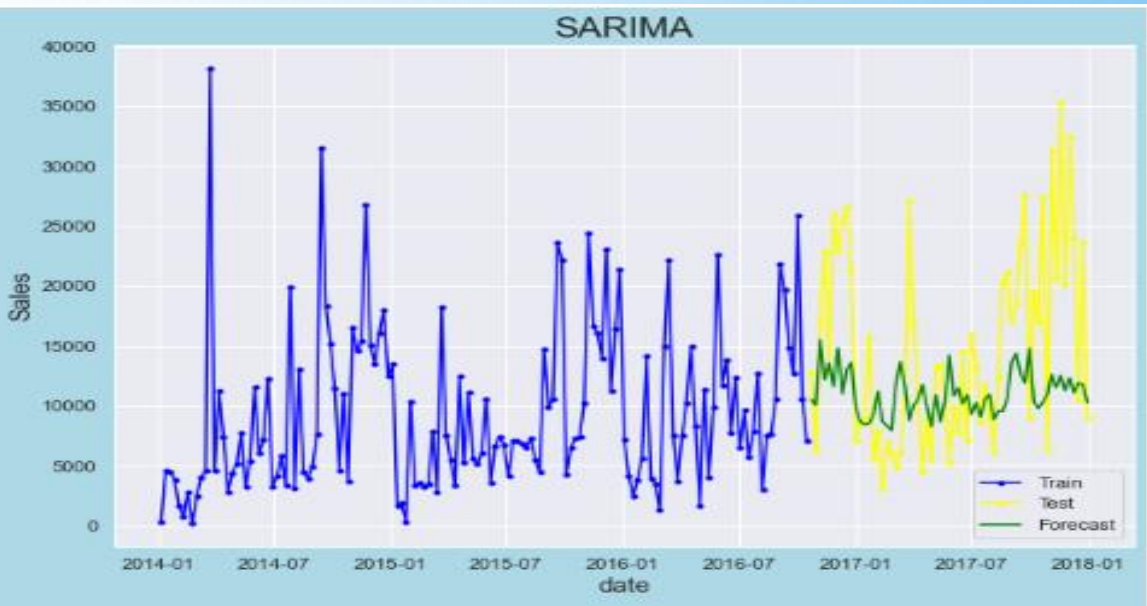
- TREND IS PRESENT IN THE DATASET
- SEASONALITY IS PRESENT IN THE DATASET
- DATA SET IS STATIONARY
- ANALYSIS SHOULD BE IN TERMS OF TIME

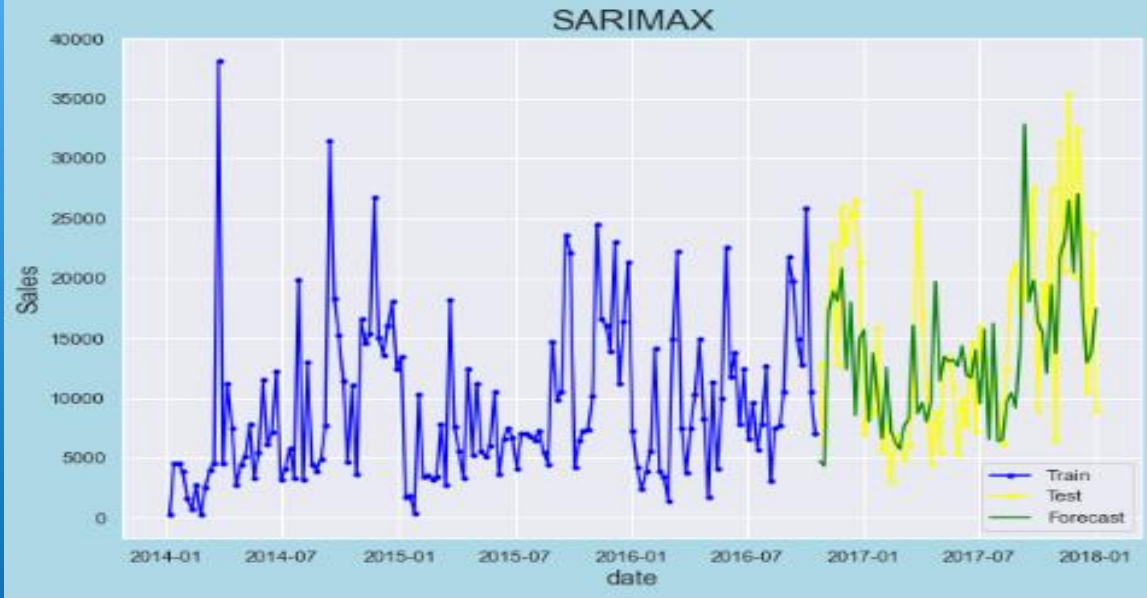
➢ ALGORITHM SELECTION

- BASED ON THE EDA OBSERVATIONS WE NEED TO SELECT TIME SERIES ALGORITHMS
- AS THE TREND AND SEASONALITY PRESENT NEED TO SELECT ALGORITHMS WHICH CAPTURE TREND AND SEASONALITY
- WE CAN TAKE SARIMAX BECAUSE THE TREND AND SEASONALITY BOTH EXIST AND THE MULTIPLE FEATURES ARE AVAILABLE BUT FOR COMPARISON PURPOSE AMRA, SARIMA AND SARIMAX ALGORITHMS ARE USED FOR MODEL BUILDING

- **FROM VISUALIZATION OF FORECASTED DATA THE SARIMAX MODEL IS SHOWING BETTER PREDICTION COMPARED TO OTHER FEATURES**







- FROM THE TABLE THE SARIMAX MODEL IS SHOWING LESS ERRORS FOR BOTH PAST PREDICTIONS AS WELL AS FUTURE PREDICTIONS SO WE CAN CONCLUDE SARIMAX IS BEST MODEL FOR FUTURE PREDICTION

	Techniques	Past_MSE	Forecast_MSE	Past_RMSE	Forecast_RMSE
0	ARMA	3.914374e+07	9.547661e+07	6256.495452	9771.213485
1	SARIMA	4.008159e+07	7.306347e+07	6331.002005	8547.717121
2	SARIMAX	2.273111e+07	4.575030e+07	4767.714953	6763.896742

➢ CONCLUSION

- THERE IS POSITIVE TREND PRESENT IN THE FURNITURE SALES
- MORE SALES AS WELL AS MORE PROFIT IS FOR CHAIR PRODUCTS
- THE CHAIR PRODUCTS ARE POSITIVELY IMPACT ON THE FURNITURE SALES
- THE TABLE PRODUCTS ARE NEGATIVELY IMPACT ON THE FURNITURE SALES
- IN ORDER TO DECREASE THE TABLE IMPACT DISCOUNTS SHOULD BE REDUCED
- THE SARIMAX MODEL IS SHOWING LESS ERROR WITH BOTH PAST AS WELL AS FUTURE PREDICTIONS
- THE FUTURE AND PAST PREDICTIONS ARE ACCURATE IN SARIMAX MODEL

THANK YOU