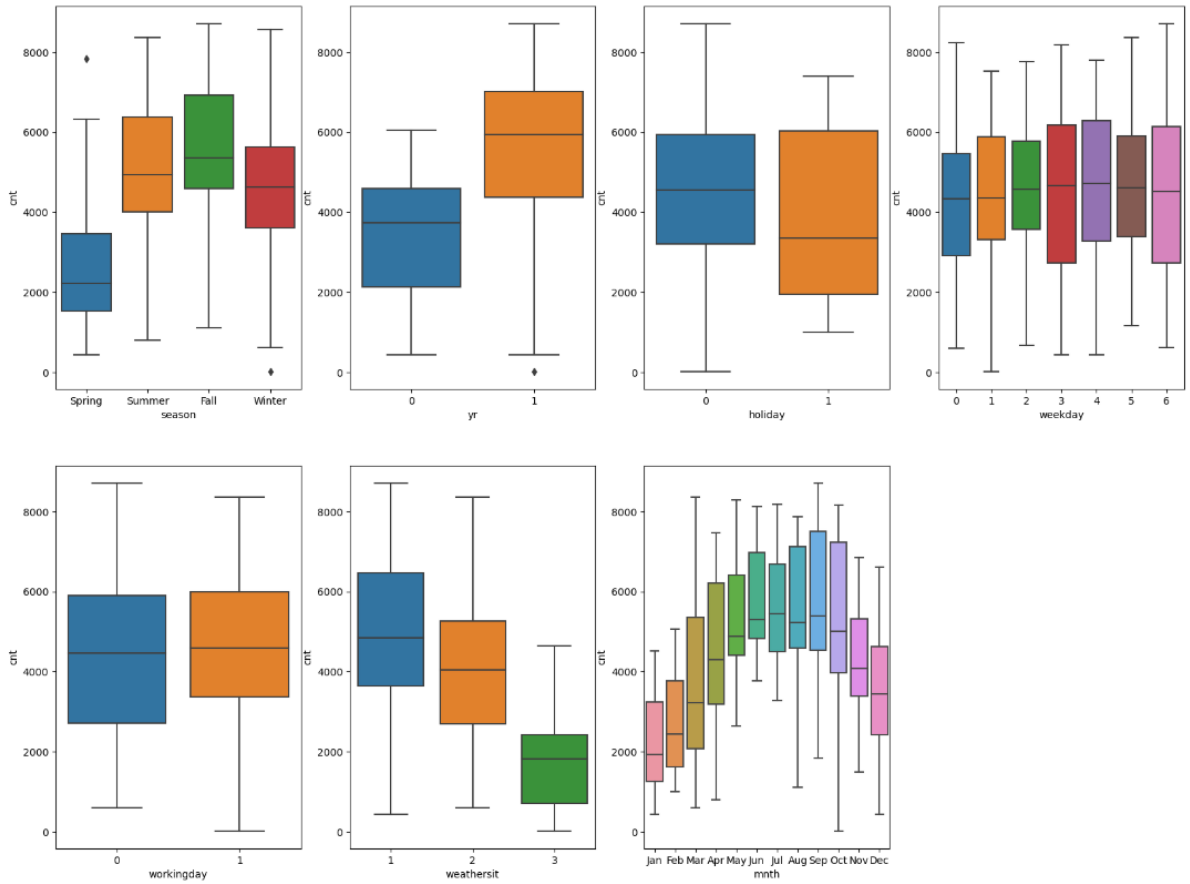
Rajat Haldar

Assignment-based Subjective Questions

1. From your analysis of the categorical variables from the dataset, what could you infer about their effect on the dependent variable?
Ans.



The categorical variable in the dataset were season , yr , holiday, weekday ,workingday, and weathersit and mnth . These were visualized using a boxplot (Fig. attached) .
These variables had the following effect on our dependant variable:-

- Season - The boxplot showed that spring season had least value of cnt whereas fall had maximum value of cnt. Summer and winter had intermediate value of cnt.
- Weathersit - There are no users when there is heavy rain/ snow indicating that this weather is extremely unfavourable. Highest count was seen when the weathersit was' Clear, Partly Cloudy'.
- Yr - The number of rentals in 2019 was more than 2018
- Holiday - rentals reduced during holiday.
- Mnth - September saw highest no of rentals while December saw least. This observation is in accordance with the observation made in weathersit. The weather situation in December is usually heavy snow due to which the rentals might have dropped.
- Weekday - The count of rentals is almost even throughout the week
- Workingday – The median count of users is constant almost throughout the week.

Rajat Haldar

2. Why is it important to use **drop_first=True** during dummy variable creation?
Ans. drop_first=True helps in reducing the extra column created during the dummy variable creation and hence avoid redundancy of any kind.

3. Looking at the pair-plot among the numerical variables, which one has the highest correlation with the target variable?
Ans. The temp variable has the highest correlation with the target variable.

4. How did you validate the assumptions of Linear Regression after building the model on the training set?
Ans. Validated the assumptions of linear regression by checking the VIF, error distribution of residuals and linear relationship between the dependent variable and a feature variable.

5. Based on the final model, which are the top 3 features contributing significantly towards explaining the demand of the shared bikes?
Ans. The top 3 features contributing significantly towards the demand of the shared bikes are the temperature, the year and the holiday variables.

General Subjective Questions

1. Explain the linear regression algorithm in detail.

Ans. Linear Regression is an ML algorithm used for supervised learning. It helps in predicting a dependent variable(target) based on the given independent variable(s). The regression technique tends to establish a linear relationship between a dependent variable and the other given independent variables. There are two types of linear regression- simple linear regression and multiple linear regression. Simple linear regression is used when a single independent variable is used to predict the value of the target variable. Multiple Linear Regression is when multiple independent variables are used to predict the numerical value of the target variable. A linear line showing the relationship between the dependent and independent variables is called a regression line. A positive linear relationship is when the dependent variable on the Y-axis along with the independent variable in the X-axis. However, if dependent variables value decreases with increase in independent variable value increase in X-axis, it is a negative linear relationship.

Rajat Haldar

2. Explain the Anscombe's quartet in detail.
Ans. Anscombe's quartet consists of four data sets that have nearly identical simple descriptive statistics but have very different distributions and appear very different when presented graphically. Each dataset consists of eleven points. The primary purpose of Anscombe's quartet is to illustrate the importance of looking at a set of data graphically before beginning the analysis process as the statistics merely does not give the an accurate representation of two datasets being compared.

3. What is Pearson's R?
Ans: Pearson's Correlation Coefficient is used to establish a linear relationship between two quantities. It gives an indication of the measure of strength between two variables and the value of the coefficient can be between -1 and +1.

4. What is scaling? Why is scaling performed? What is the difference between normalized scaling and standardized scaling?
Ans: Scaling is a technique performed in pre-processing during building a machine learning model to standardize the independent feature variables in the dataset in a fixed range.

The dataset could have several features which are highly ranging between high magnitudes and units. If there is no scaling performed on this data, it leads to incorrect modelling as there will be some mismatch in the units of all the features involved in the model.

The difference between normalization and standardization is that while normalization brings all the data points in a range between 0 and 1, standardization replaces the values with their Z scores.

5. You might have observed that sometimes the value of VIF is infinite. Why does this happen?
Ans: The value of VIF is infinite when there is a perfect correlation between the two independent variables. The R-squared value is 1 in this case. This leads to VIF infinity as VIF equals to 1/(1-R2). This concept suggests that is there is a problem of multi-collinearity and one of these variables need to be dropped in order to define a working model for regression.

6. What is a Q-Q plot? Explain the use and importance of a Q-Q plot in linear regression.
Ans: The quantile-quantile (Q-Q) plot are used to plot quantiles of a sample distribution with a theoretical distribution to determine if any dataset concerned follows any distribution such as normal, uniform or exponential distribution. It helps us determine if two datasets follow the same kind of distribution. It also helps to find out if the errors in dataset are normal in nature or not.