Capstone Project-2

Seoul Bike Sharing DemandPrediction

ML SUPERVISED REGRESSION

SAMEER THETE

Contents

Problem Statements

- **Prediction of bike count required at each hour.**

- **Reduce waiting time of public.**

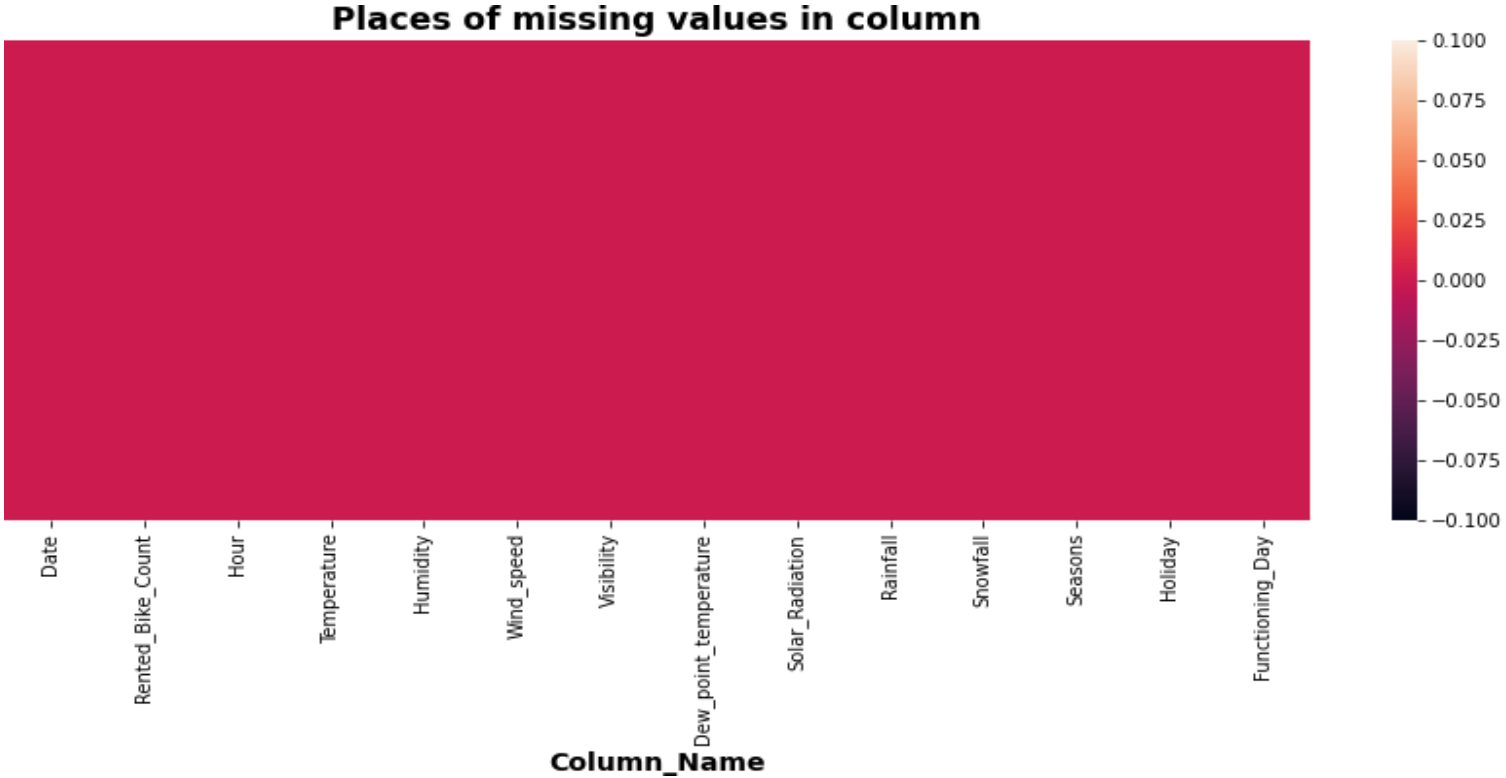
Data Summary

- Date : Year-Month-Day
- Rented Bike Count - Count of bikes rented at each hour
- Hour - Hour of the day
- Temperature - Temperature in Celsius
- Humidity - %
- Windspeed - m/s
- Visibility - 10m
- Dew point temperature -Celsius
- Solar radiation -MJ/m2
- Rainfall -mm
- Snowfall -cm
- Seasons -Winter, Spring, Summer, Autumn
- Holiday -Holiday/No Holiday
- Functional Day - NoFunc(Non Functional Hrs),Fun(Functional Hrs)

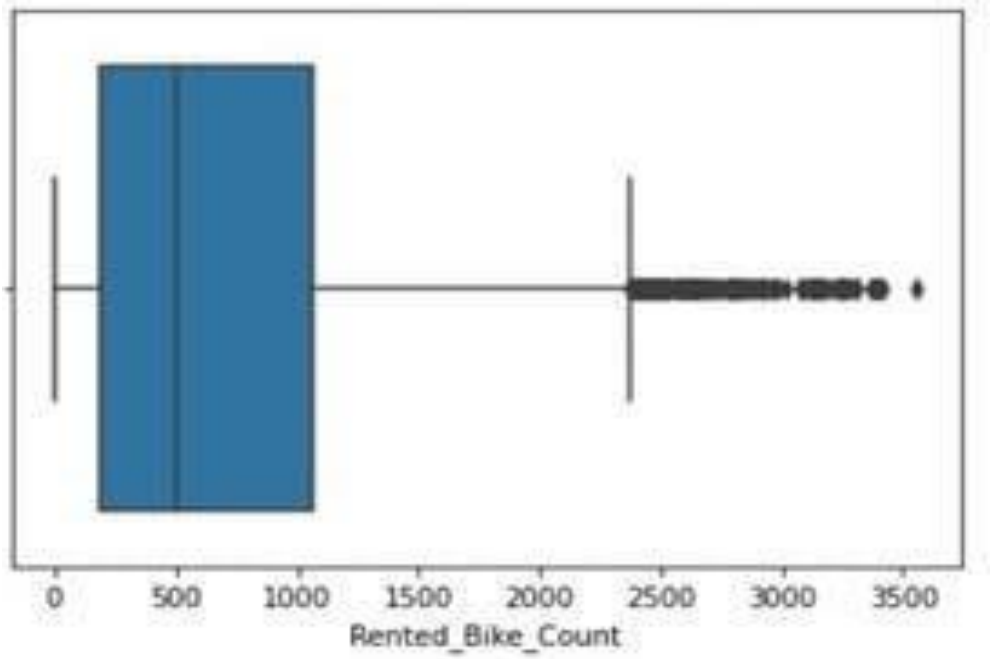
Basic Data Exploration

- The dataset has 8760 rows and 14 features(columns).
- Three categorical features ‘Seasons’, ‘Holiday’, & ‘Functioning Day’.
- One Datetime[ns] features ‘Date’.
- Outliers present only in dependent variable.
- No Missing Values.
- No Duplicated values.
- No null values.

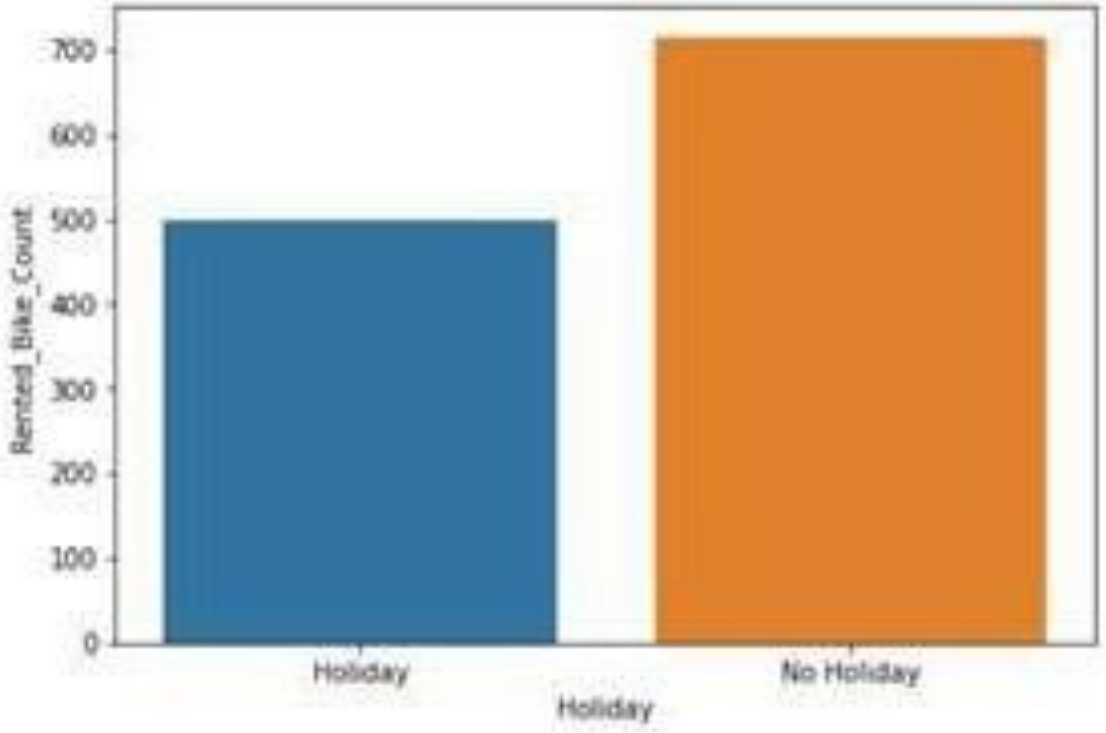
Missing Values



Checking for the outlier in our dependent variable



Division on rented bike on holiday and non holiday days



Distribution on rented bike according to different seasons

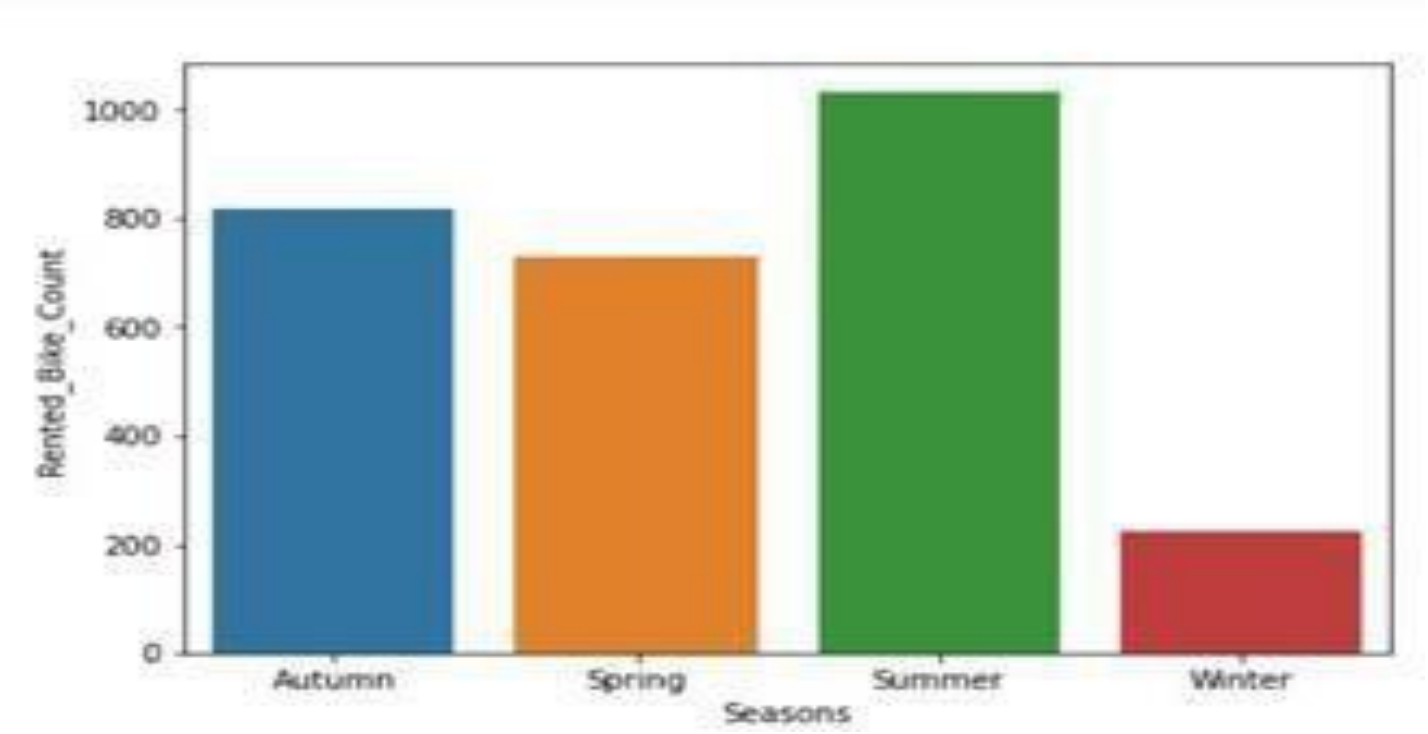
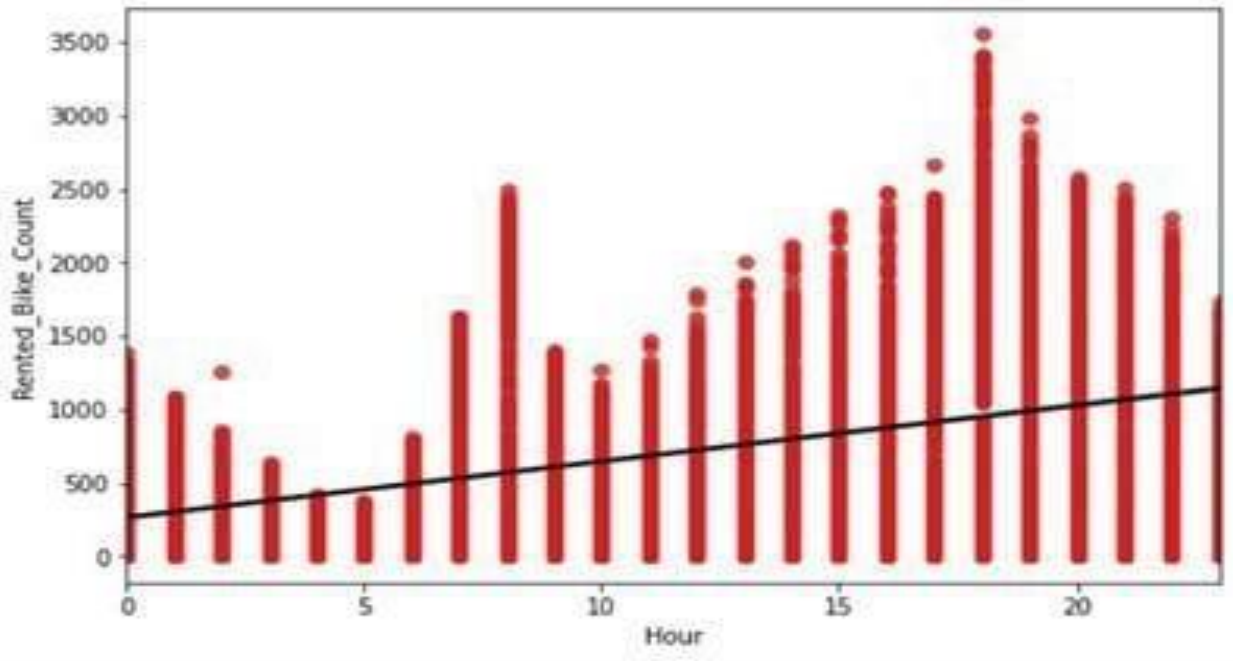
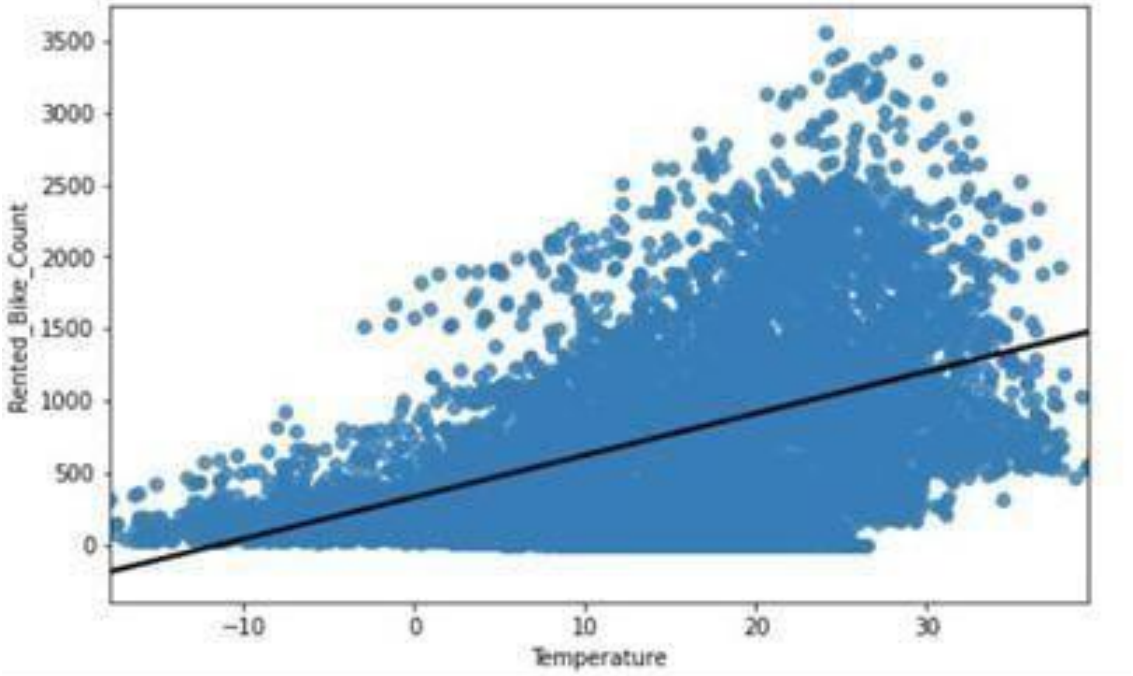


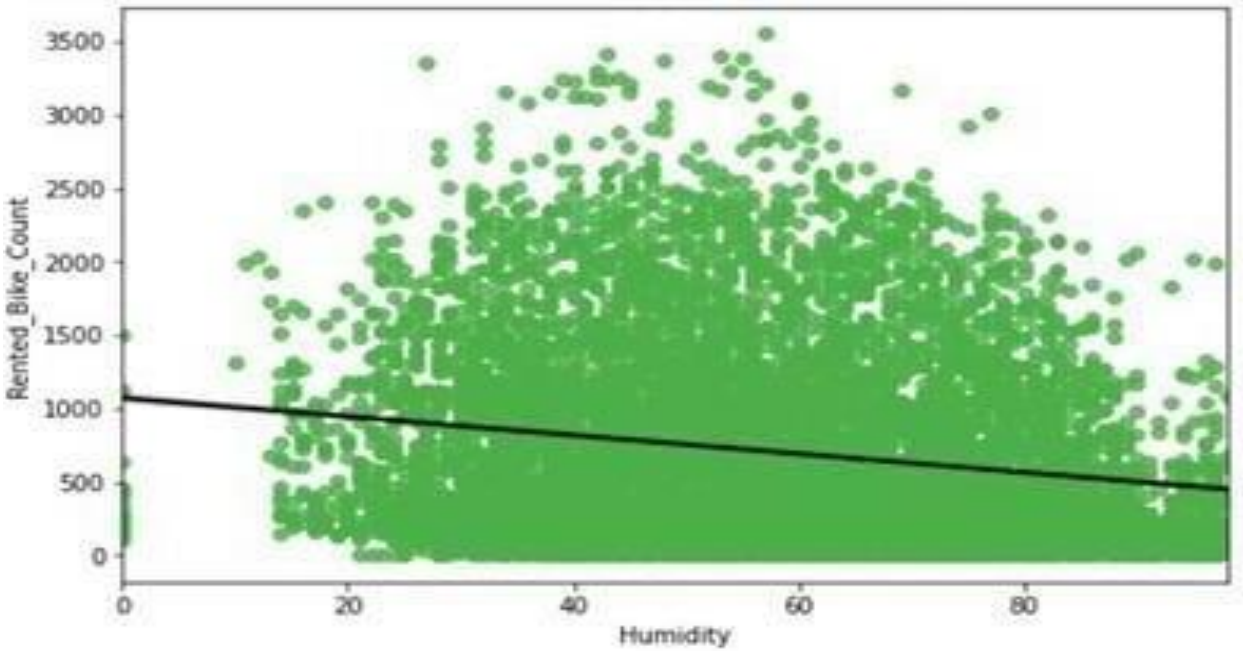
Chart showing distribution of Rented bike count per hour



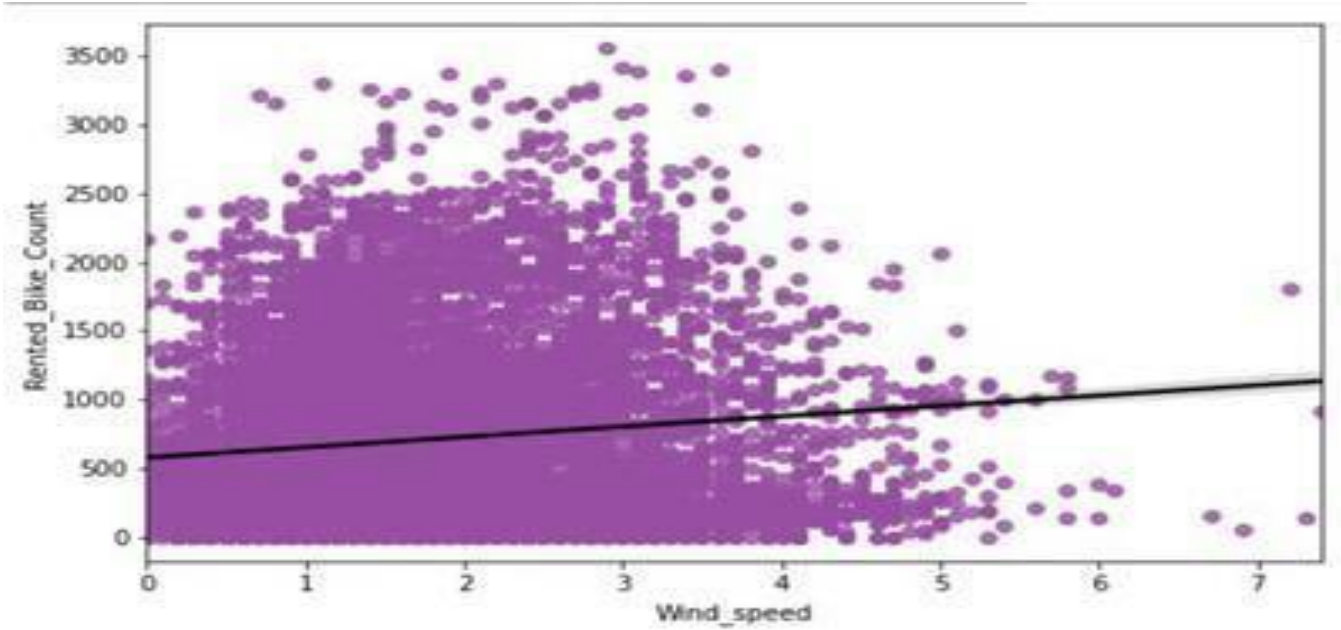
Relation of our dependent variable with Temperature



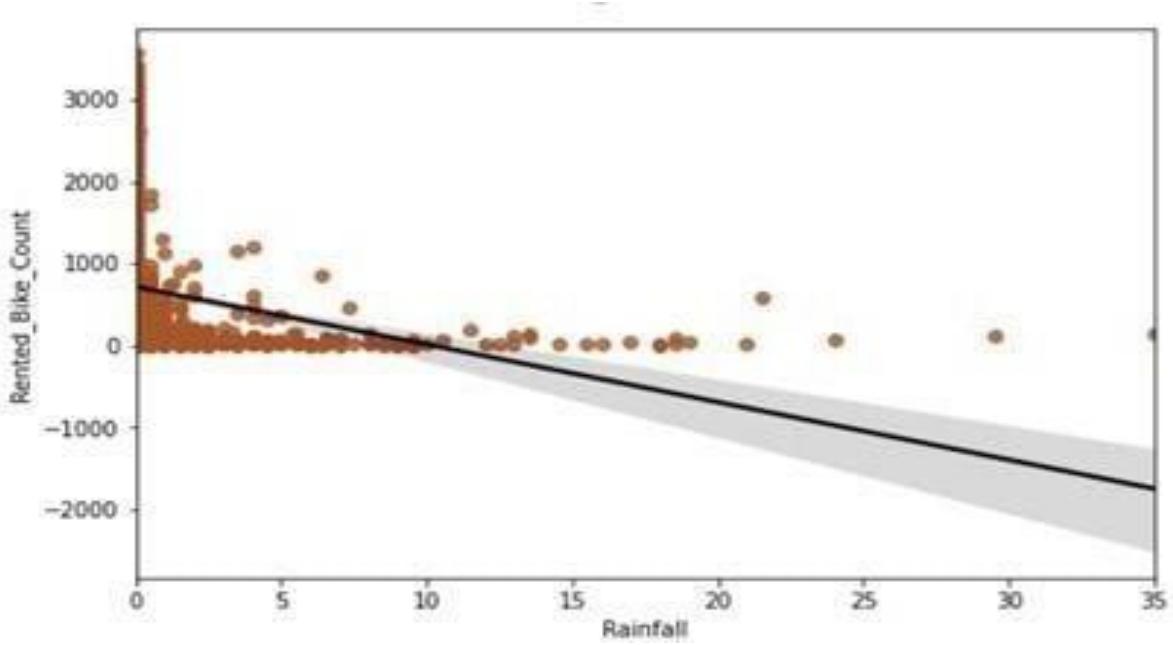
Relation of our dependent variable with Humidity



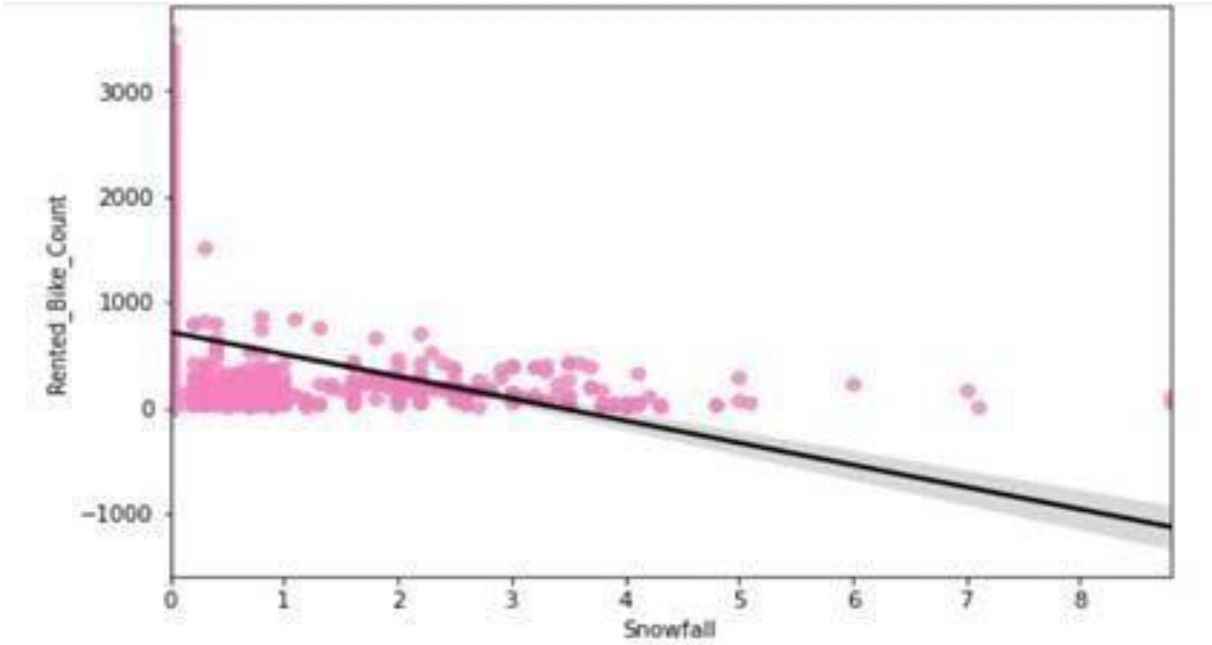
Relation of our dependent variable with wind speed



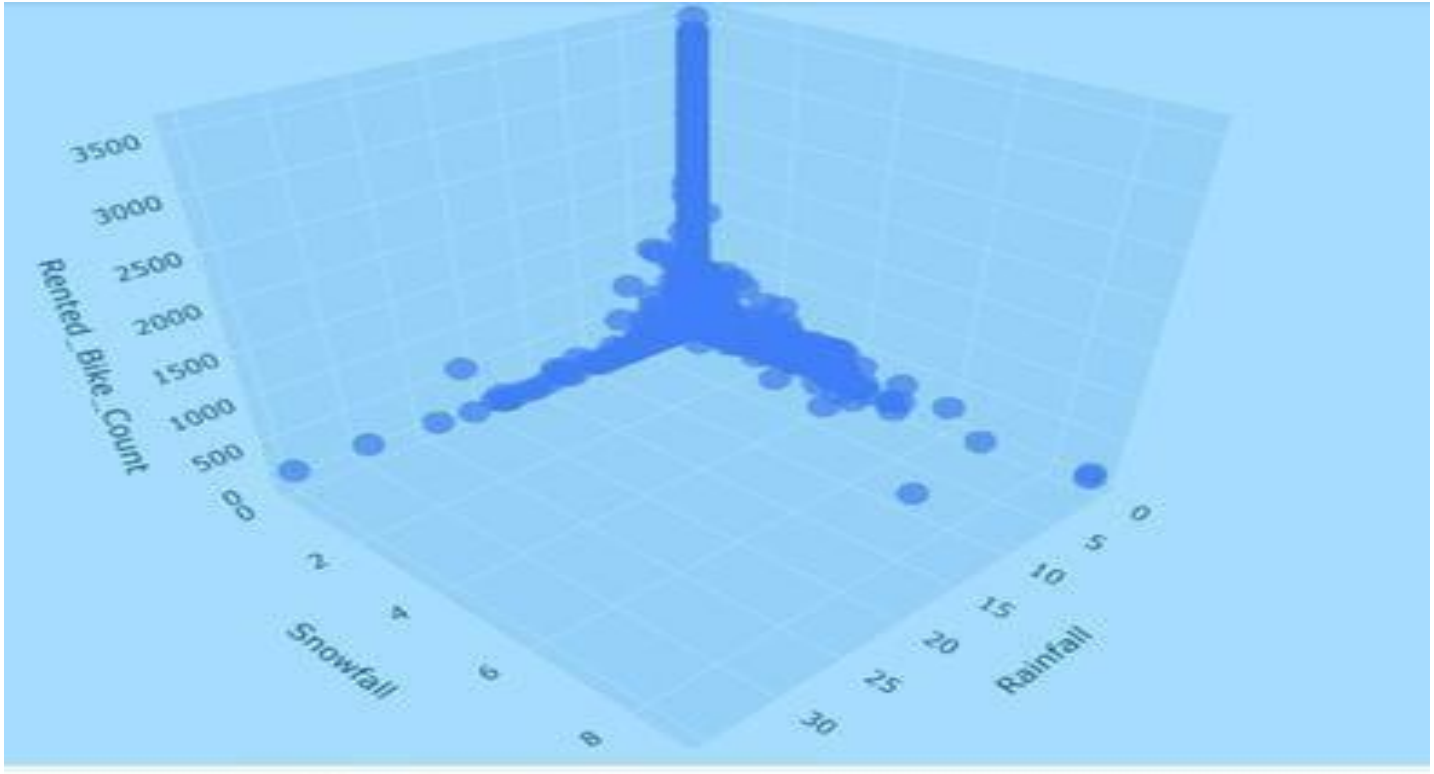
Relation of our dependent variable with Rainfall



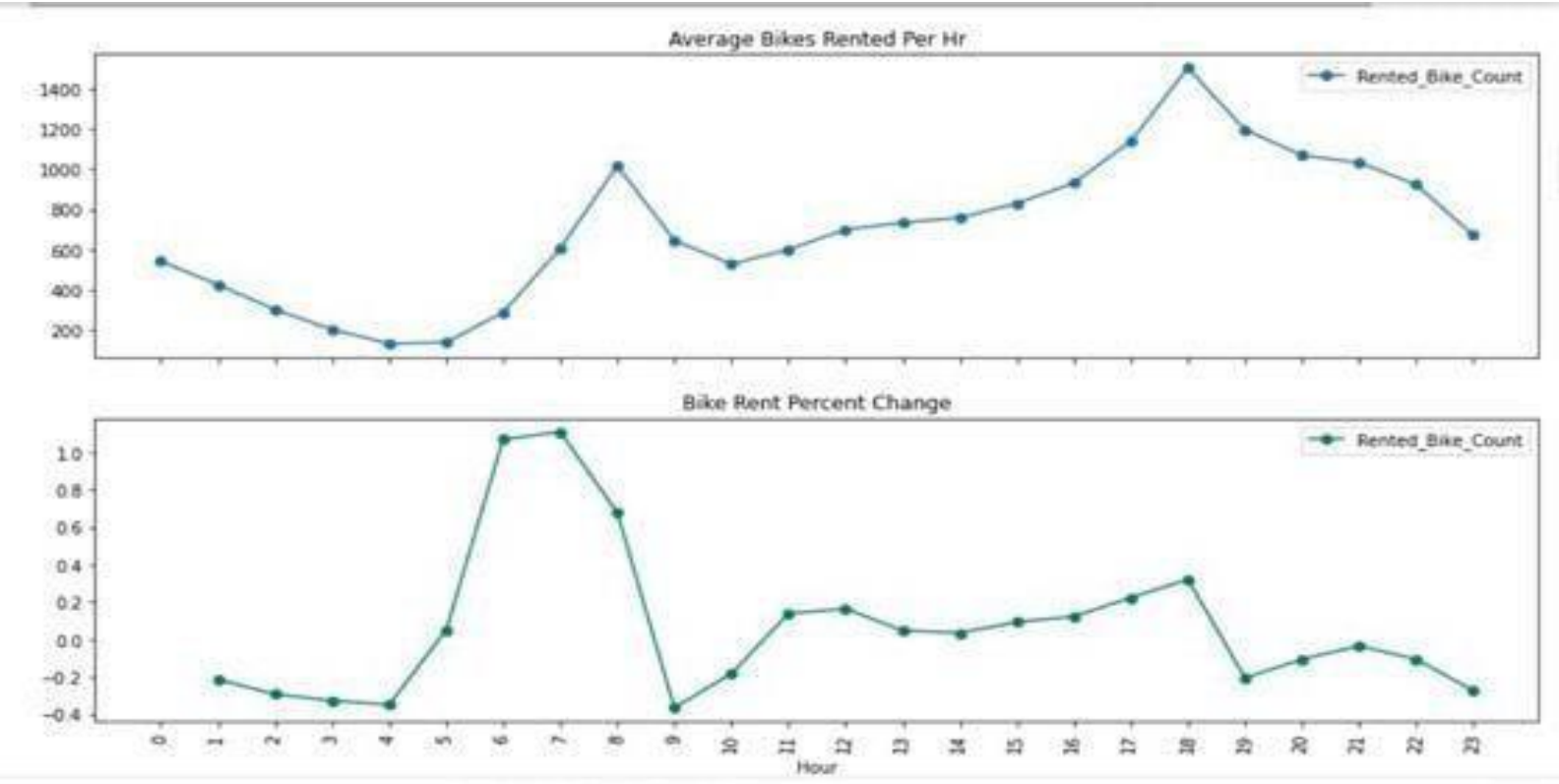
Relation of our dependent variable with Snowfall



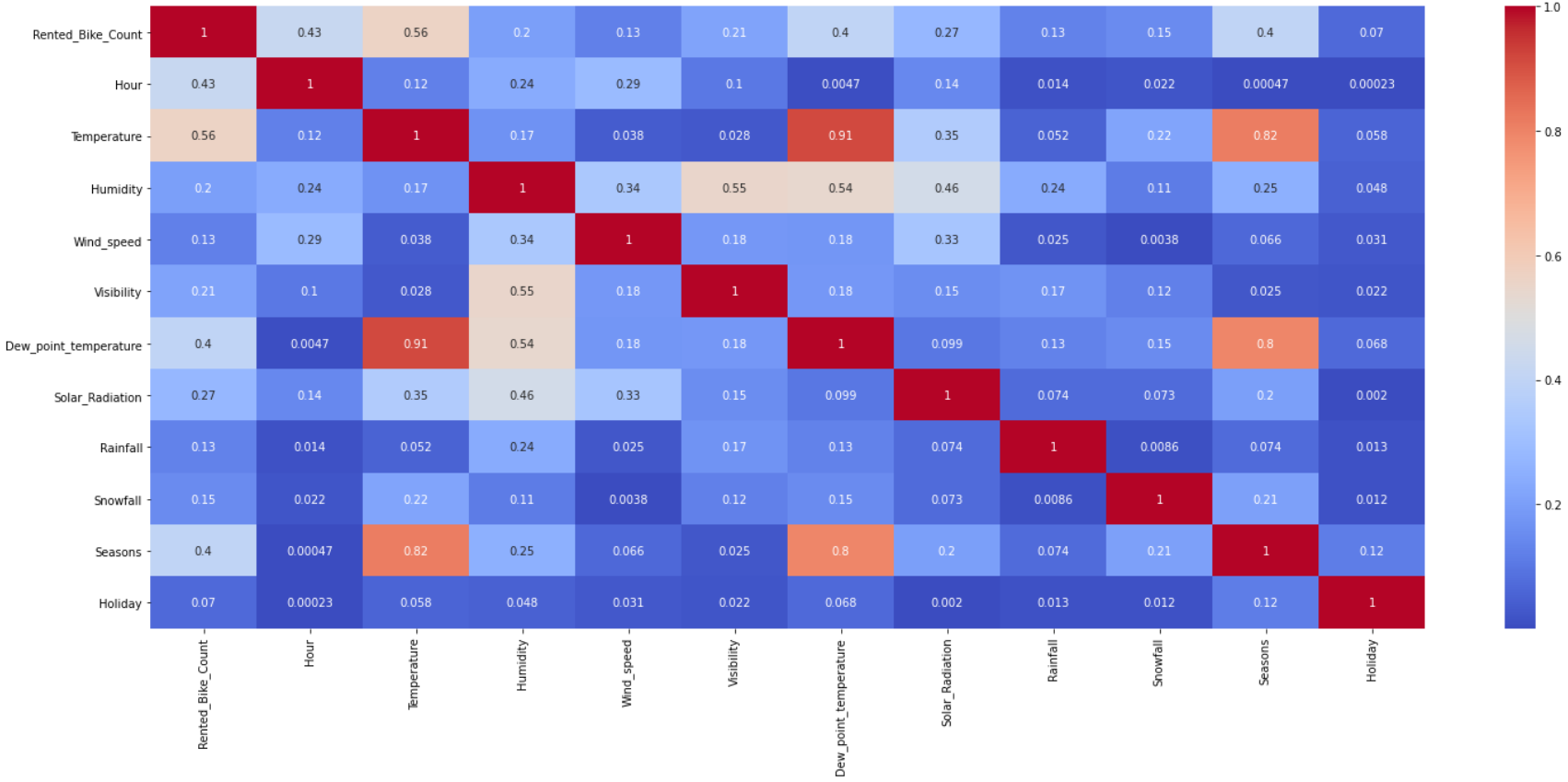
3-d plot showing relation between Snowfall , Rainfall and Rented bike count



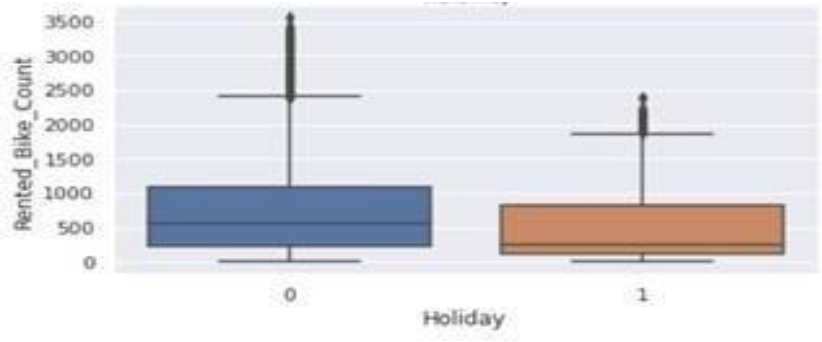
Per hour distribution

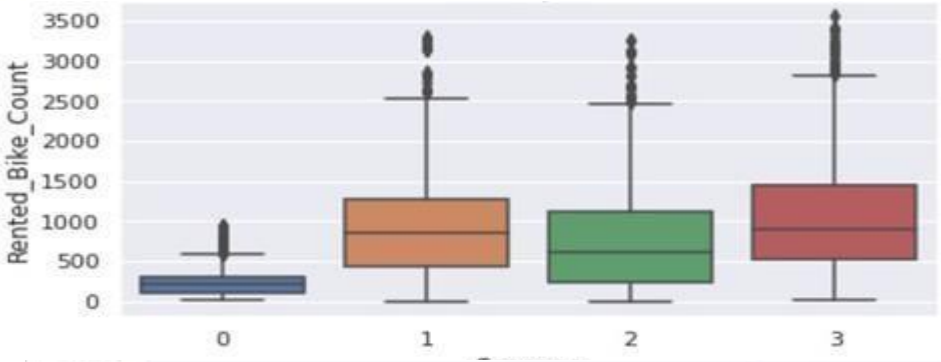


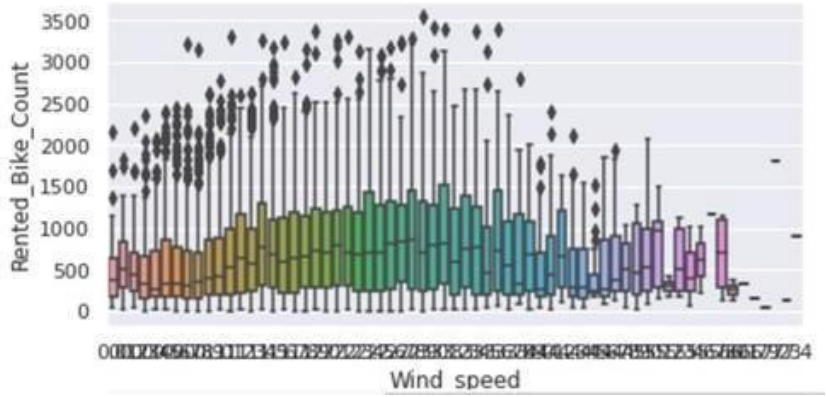
Correlation between different factors

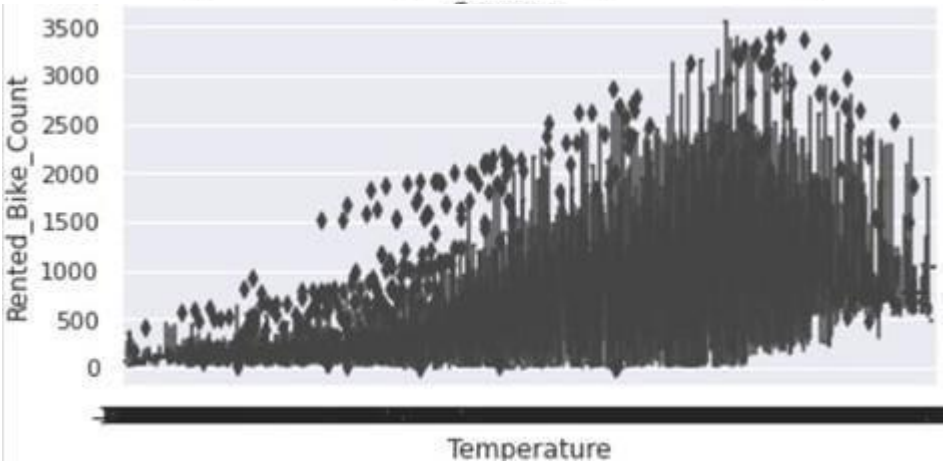


Outliers present in our important independent features









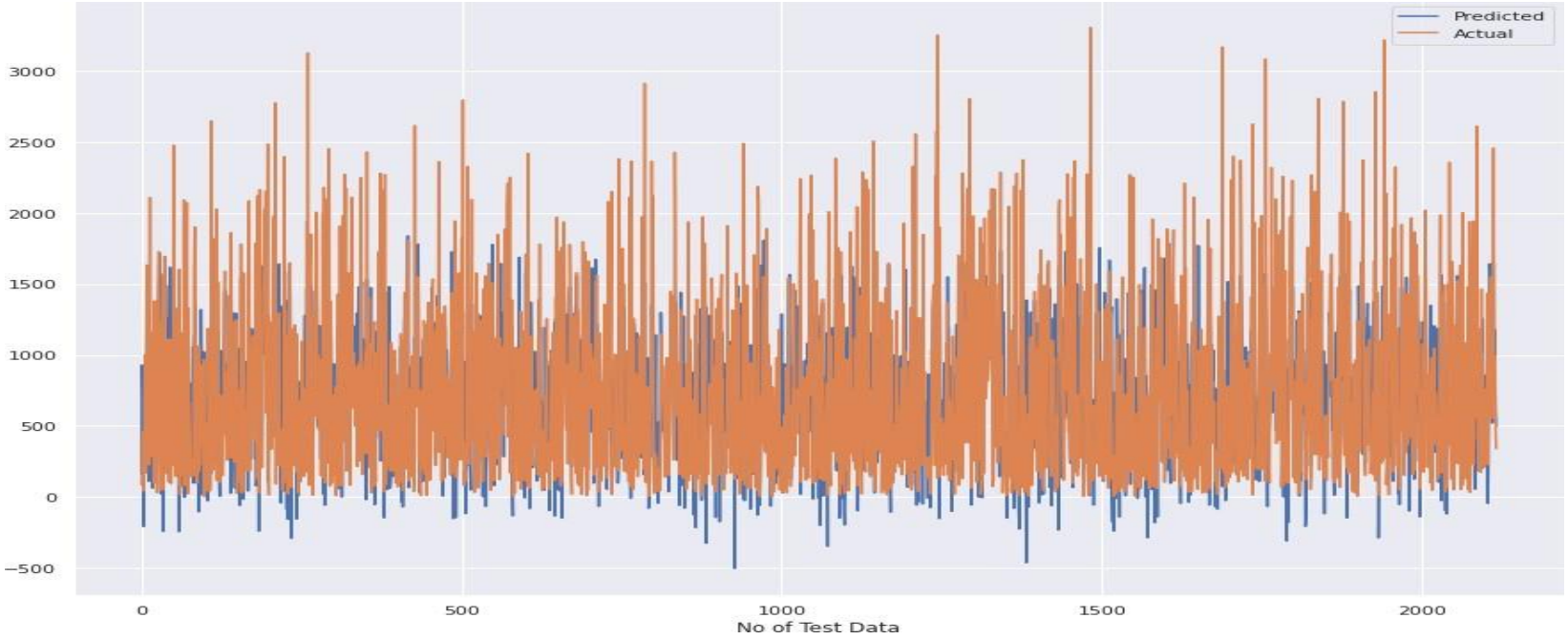
Linear Regression

MSE : 198793.5341180045
RMSE : 445.8626852720515

MAE : 333.68919457334323

Adjusted R2 : 0.5049660638596776

r2_score: 0.5073055437091121



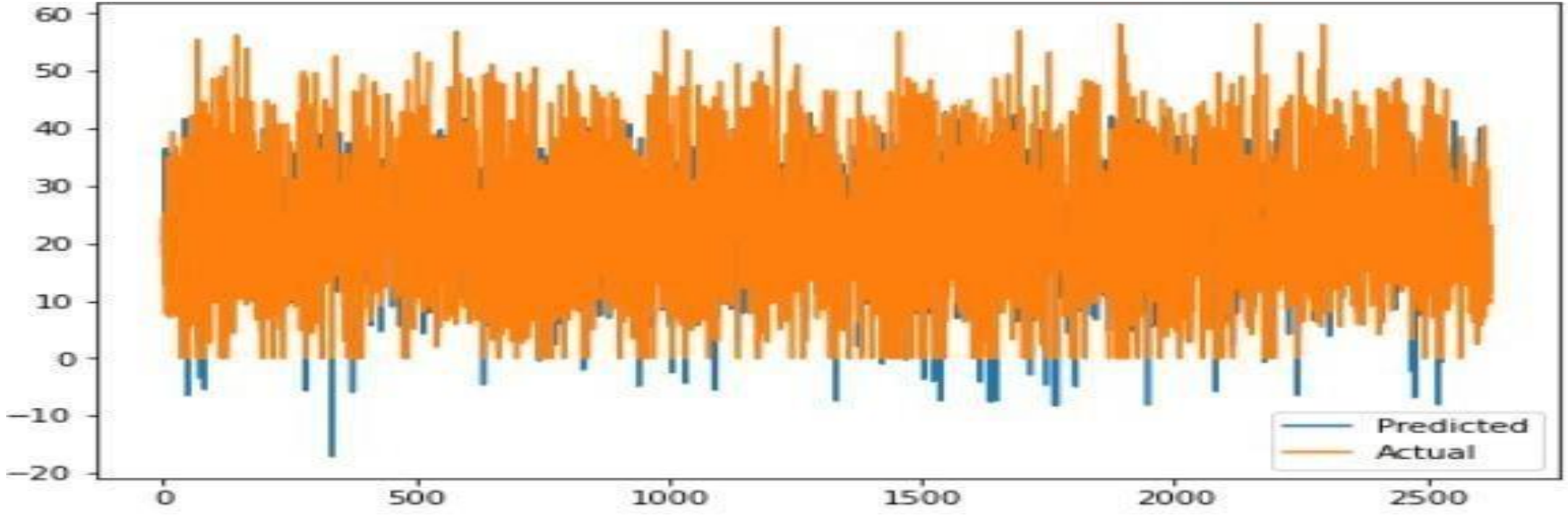
Lasso Regression

MSE : 198793.663747306

RMSE : 445.86283064111325

r2_score 0.5073052224328767

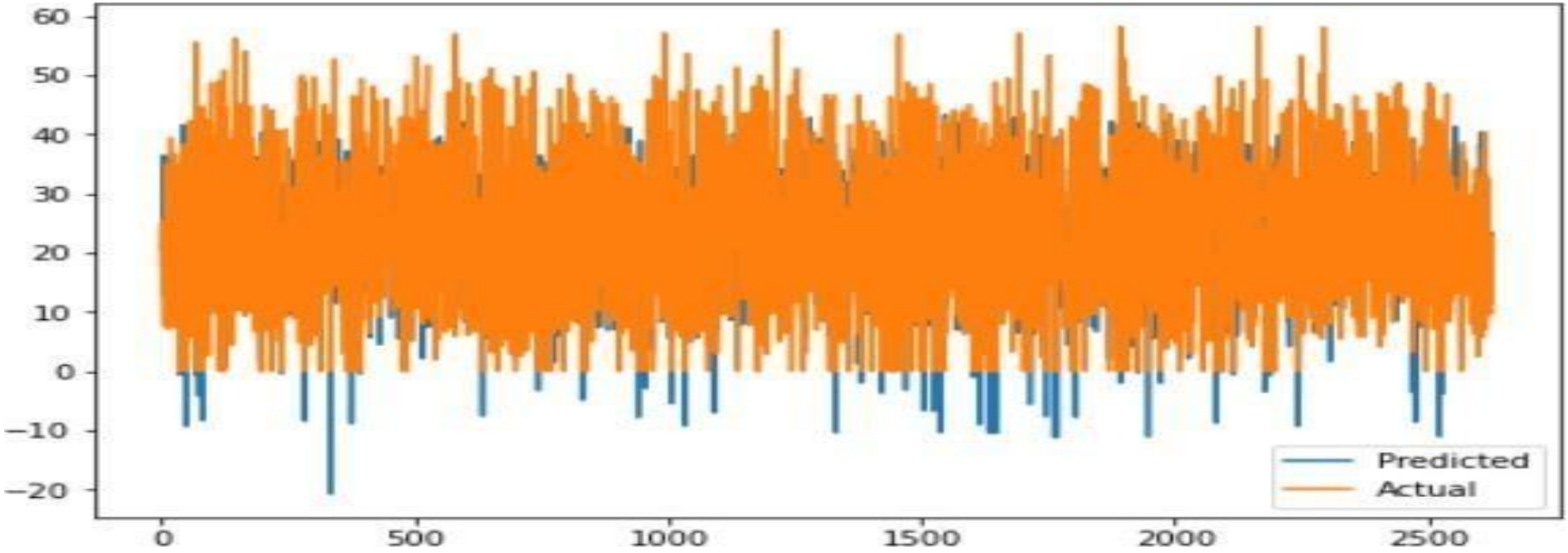
MAE : 333.68926336070683



Ridge Regression

MSE : 198890.40226455292
RMSE : 445.97130206388044
MAE : 333.7678564764892

r2_score 0.5070654634720594

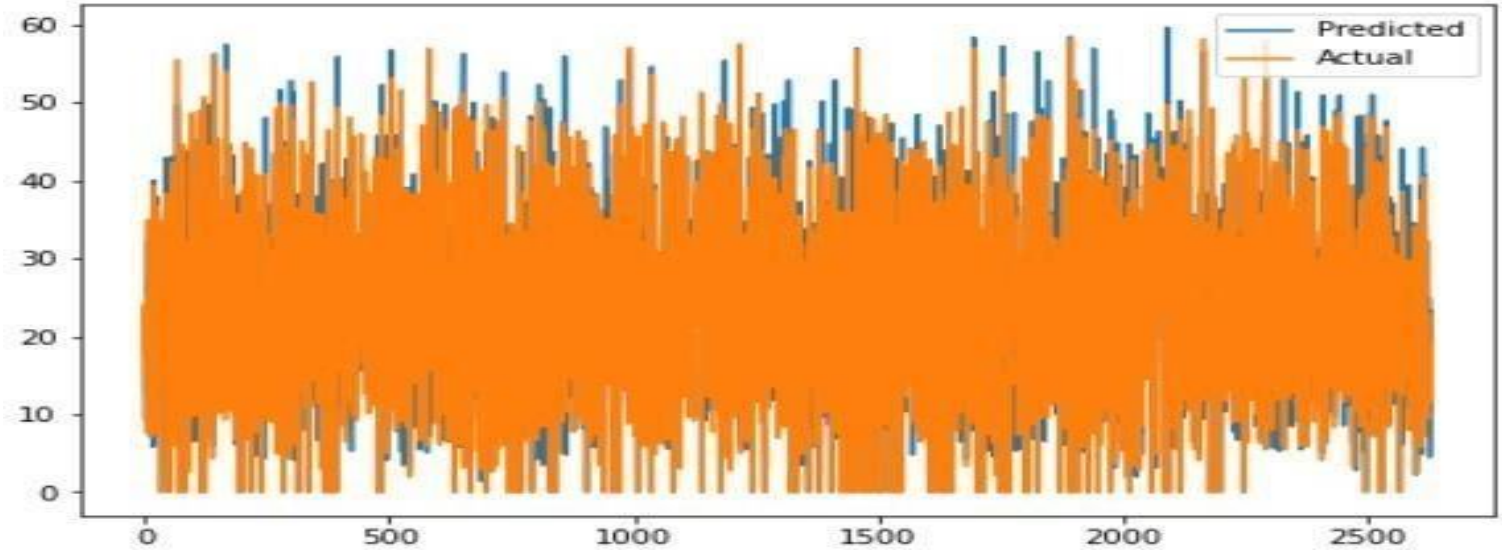


Decision Tree

MSE : 111943.4251299008

r2_score:0.7225568466076131

RMSE : 334.579475057722



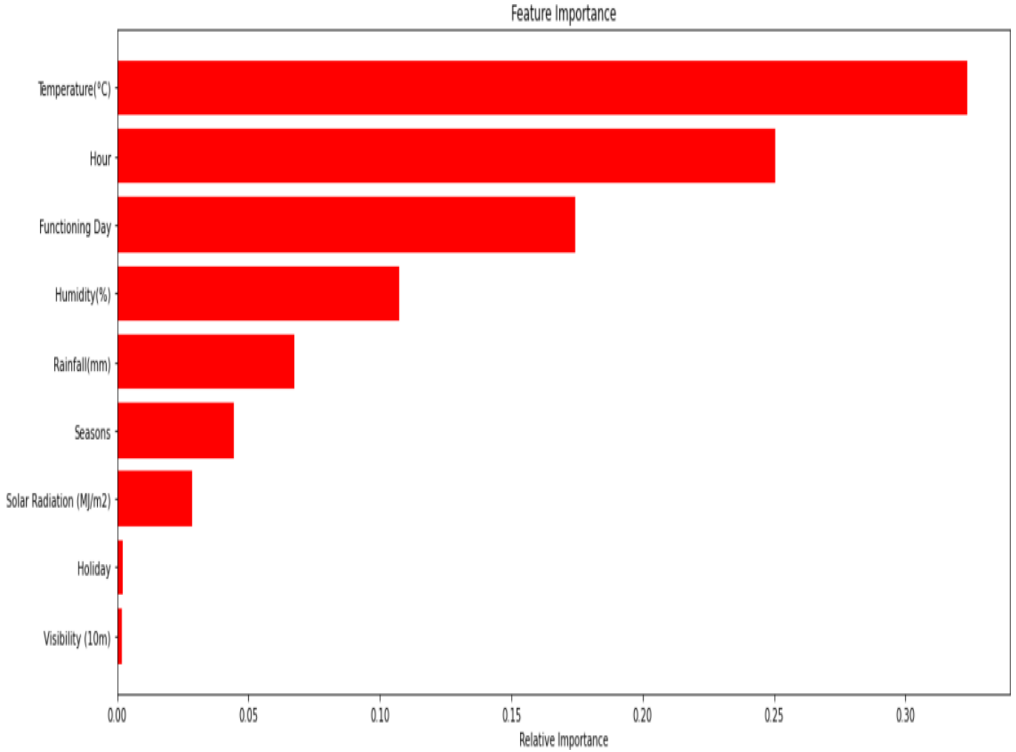
193.50543221539914

Adjusted R2 : 0.7212394527168611

MAE :

Gradient Boosting Machine

MAE : 174.081134728031
MSE : 67935.3191486026
RMSE : 260.6440468313109
Adjusted R2 : 0.830828056906927
r2_score 0.831627546241016



Random Forest

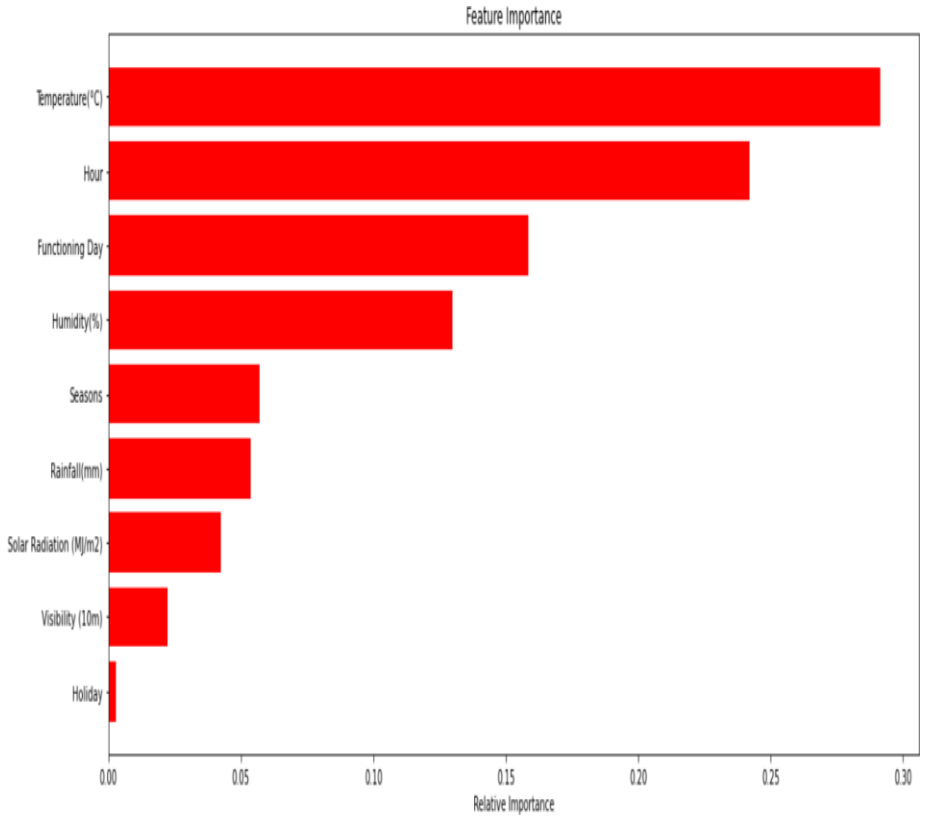
MSE : 60132.13303353803
RMSE : 245.21854137388965

MAE : 150.1287009919697

Adjusted R2 : 0.8502594833570604

r2_score:0.8509671417532936

Feature Importance



XGBoost

MSE : 54287.031544213925

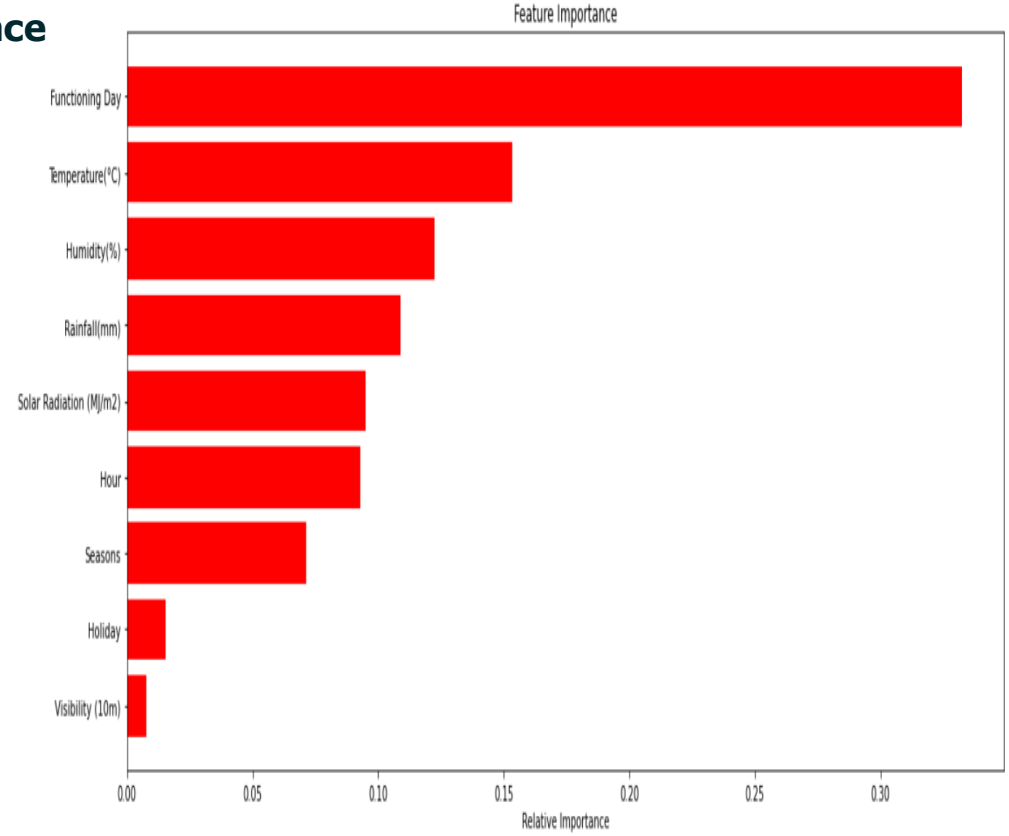
RMSE : 232.9957758076612

MAE : 143.48340080681663

adj_r2: 0.8657453657658387

r2 :0.8662260483087465

Feature Importance



Challenges

- **Large Dataset to handle.**
- **Needs to plot lot of Graphs to analyse.**
- **Carefully handled Feature selection part as it affects the R2 score.**
- **Carefully tuned Hyperparameters as it affects the R2 score.**

Conclusion

- The Rented Bike Count has been increased from 2017 to 2018.
- No overfitting is seen.
- XGBoost Regressor gives the highest R2 score of 96.6% for Train Set and 89.4% for Test set.
- Feature Importance value for Random Forest, Gradient Boost, and XGBoost are different.
- We can deploy this model.

THANK YOU