

OLS Regression Results

Dep. Variable:	cnt	R-squared:	0.852			
Model:	OLS	Adj. R-squared:	0.846			
Method:	Least Squares	F-statistic:	141.0			
Date:	Mon, 27 Feb 2023	Prob (F-statistic):	2.45e-188			
Time:	20:25:39	Log-Likelihood:	527.82			
No. Observations:	510	AIC:	-1014.			
Df Residuals:	489	BIC:	-924.7			
Df Model:	20					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	0.3976	0.030	13.105	0.000	0.338	0.457
yr	0.2323	0.009	29.120	0.000	-0.217	0.448
holiday	-0.0937	0.023	-4.010	0.000	-0.140	-0.048
temp	0.3135	0.118	2.658	0.008	0.082	0.545
atemp	0.0984	0.127	0.776	0.438	-0.151	0.348
hum	-0.1678	0.037	-4.590	0.000	-0.240	-0.096
windspeed	-0.1658	0.025	-6.707	0.000	-0.214	-0.117
season_spring	-0.0689	0.018	-4.828	0.000	-0.122	-0.052
season_winter	0.0612	0.023	2.657	0.008	0.016	0.106
mnth_Dec	-0.0312	0.023	-1.380	0.168	-0.076	0.013
mnth_Feb	-0.0373	0.021	-1.786	0.075	-0.078	0.004
mnth_Jan	-0.0631	0.021	-2.970	0.003	-0.105	-0.021
mnth_July	-0.0406	0.016	-2.474	0.014	-0.073	-0.008
mnth_May	0.0392	0.016	2.469	0.014	0.008	0.070
mnth_Nov	-0.0476	0.027	-1.766	0.078	-0.100	0.005
mnth_Oct	0.0411	0.027	1.517	0.130	-0.012	0.094
mnth_Sep	0.0614	0.016	3.774	0.000	0.029	0.093
weekday_Thurs	-0.0324	0.012	-2.850	0.005	-0.055	-0.010
weekday_Wed	-0.0442	0.012	-3.686	0.000	-0.068	-0.021
weathersit_Mist	-0.0462	0.010	-4.582	0.000	-0.066	-0.026
weathersit_Snow	-0.2543	0.028	-9.237	0.000	-0.309	-0.201
Omnibus:	60.047	Durbin-Watson:	2.200			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	131.897			
Skew:	-0.648	Prob(JB):	2.28e-29			
Kurtosis:	5.128	Cond. No.	72.3			

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

As we can see we have, high atemp value for VIF and p-value, then we can remove it

```
In [135]: X_train_new = X_train_rf.drop(["atemp"], axis=1)
```

Model 2

Checking VIF

```
vif = pd.DataFrame()
vif['Features'] = X_train_new.columns
vif['VIF'] = [variance_inflation_factor(X_train_new.values, i) for i in range(X_train_new.shape[1])]
vif['VIF'] = round(vif['VIF'], 2)
vif = vif.sort_values(by = "VIF", ascending = False)
vif
```

	Features	VIF
3	hum	23.29
2	temp	15.33
6	season_winter	7.79
5	season_spring	5.02
4	windspeed	4.04
12	mnth_Nov	4.00
13	mnth_Oct	3.51
7	mnth_Dec	2.70
9	mnth_Jan	2.62
8	mnth_Feb	2.29
17	weathersit_Mist	2.14
0	mnth_July	2.10
10	mnth_July	1.55
14	mnth_Sep	1.49
11	mnth_May	1.34
18	weathersit_Snow	1.24
15	weekday_Thurs	1.20
16	weekday_Wed	1.18
1	holiday	1.06

OLS Regression Results

Dep. Variable:	cnt	R-squared:	0.852			
Model:	OLS	Adj. R-squared:	0.846			
Method:	Least Squares	F-statistic:	148.5			
Date:	Mon, 27 Feb 2023	Prob (F-statistic):	2.68e-189			
Time:	20:25:41	Log-Likelihood:	527.50			
No. Observations:	510	AIC:	-1015.			
Df Residuals:	490	BIC:	-930.3			
Df Model:	19					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	0.4201	0.030	13.364	0.000	0.342	0.460
yr	0.2321	0.008	29.122	0.000	0.216	0.248
holiday	-0.0944	0.023	-4.043	0.000	-0.140	-0.049
temp	0.4017	0.031	12.836	0.000	0.340	0.463
hum	-0.1660	0.036	-4.551	0.000	-0.238	-0.094
windspeed	-0.1689	0.024	-6.929	0.000	-0.217	-0.121
season_spring	-0.0867	0.018	-4.819	0.000	-0.122	-0.051
season_winter	0.0623	0.023	2.708	0.007	0.017	0.107
mnth_Dec	-0.0317	0.023	-1.403	0.161	-0.076	0.013
mnth_Feb	-0.0373	0.021	-1.788	0.074	-0.078	0.004
mnth_Jan	-0.0638	0.021	-3.008	0.003	-0.105	-0.023
mnth_July	-0.0400	0.016	-2.438	0.015	-0.072	-0.008
mnth_May	0.0398	0.016	2.509	0.012	0.009	0.071
mnth_Nov	-0.0479	0.027	-1.781	0.076	-0.101	0.005
mnth_Oct	0.0412	0.027	1.523	0.128	-0.012	0.094
mnth_Sep	0.0610	0.016	3.754	0.000	0.029	0.093
weekday_Thurs	-0.0324	0.012	-2.819	0.005	-0.055	-0.010
weekday_Wed	-0.0438	0.012	-3.658	0.000	-0.067	-0.020
weathersit_Mist	-0.0464	0.010	-4.605	0.000	-0.066	-0.027
weathersit_Snow	-0.2555	0.028	-9.274	0.000	-0.310	-0.201
Omnibus:	59.179	Durbin-Watson:	2.200			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	130.202			
Skew:	-0.639	Prob(JB):	5.33e-29			
Kurtosis:	5.120	Cond. No.	19.0			

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

As we have high VIF value for hum, then we can drop it

```
In [139]: X_train_new_1 = X_train_new.drop(["hum"], axis=1)
```

Model 3

Checking VIF

```
vif = pd.DataFrame()
vif['Features'] = X_train_new_1.columns
vif['VIF'] = [variance_inflation_factor(X_train_new_1.values, i) for i in range(X_train_new_1.shape[1])]
vif['VIF'] = round(vif['VIF'], 2)
vif = vif.sort_values(by = "VIF", ascending = False)
vif
```

	Features	VIF
5	season_winter	7.60
2	temp	5.09
4	season_spring	4.58
3	windspeed	4.02
11	mnth_Nov	3.89
12	mnth_Oct	3.49
6	mnth_Dec	2.54
8	mnth_Jan	2.44
7	mnth_Feb	2.24
0	yr	2.09
9	mnth_July	1.52
16	weathersit_Mist	1.51
13	mnth_Sep	1.46
10	mnth_May	1.27
14	weekday_Thurs	1.18
15	weekday_Wed	1.18
17	weathersit_Snow	1.09
1	holiday	1.06

OLS Regression Results

Dep. Variable:	cnt	R-squared:	0.846			
Model:	OLS	Adj. R-squared:	0.840			
Method:	Least Squares	F-statistic:	143.6			
Date:	Mon, 27 Feb 2023	Prob (F-statistic):	5.16e-186			
Time:	20:25:43	Log-Likelihood:	516.94			
No. Observations:	510	AIC:	-995.9			
Df Residuals:	491	BIC:	-915.4			
Df Model:	18					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	0.3157	0.024	13.208	0.000	0.269	0.363
yr	0.2269	0.008	29.393	0.000	0.221	0.253
holiday	-0.0918	0.024	-3.857	0.000	-0.139	-0.045
temp	0.3712	0.031	11.905	0.000	0.310	0.432
windspeed	-0.1402	0.024	-5.838	0.000	-0.187	-0.093
season_spring	-0.0887	0.018	-4.835	0.000	-0.125	-0.093
season_winter	0.0593	0.023	2.531	0.012	0.013	0.105
mnth_Dec	-0.0446	0.023	-1.946	0.052	-0.090	0.000
mnth_Feb	-0.0419	0.021	-1.970	0.049	-0.084	-0.000
mnth_Jan	-0.0739	0.022	-3.437	0.001	-0.116	-0.032
mnth_July	-0.0359	0.017	-2.150	0.032	-0.069	-0.003
mnth_May	0.0264	0.016	1.658	0.098	-0.005	0.058
mnth_Nov	-0.0565	0.027	-2.061	0.040	-0.110	-0.003
mnth_Oct	0.0307	0.028	1.118	0.264	-0.023	0.085
mnth_Sep	0.0481	0.016	2.949	0.003	0.016	0.080
weekday_Thurs	-0.0367	0.012	-3.138	0.002	-0.060	-0.014
weekday_Wed	-0.0443	0.012	-3.629	0.000	-0.068	-0.020
weathersit_Mist	-0.0716	0.009	-8.318	0.000	-0.088	-0.055
weathersit_Snow	-0.3027	0.026	-11.627	0.000	-0.354	-0.252
Omnibus:	54.649	Durbin-Watson:	2.190			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	111.988			
Skew:	-0.617	Prob(JB):	4.81e-25			
Kurtosis:	4.936	Cond. No.	16.9			

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

As we have high VIF value for temp, then we can drop it

```
In [141]: X_train_new_2 = X_train_new_1.drop(["season_winter"], axis=1)
```

Model 4

Checking VIF

```
vif = pd.DataFrame()
vif['Features'] = X_train_new_2.columns
vif['VIF'] = [variance_inflation_factor(X_train_new_2.values, i) for i in range(X_train_new_2.shape[1])]
vif['VIF'] = round(vif['VIF'], 2)
vif = vif.sort_values(by = "VIF", ascending = False)
vif
```

	Features	VIF
2	temp	5.08
3	windspeed	4.02
4	season_spring	3.96
7	mnth_Jan	2.25
0	yr	2.08
6	mnth_Feb	2.08
15	weathersit_Mist	1.51
8	mnth_July	1.51
12	mnth_Sep	1.31
9	mnth_May	1.27
5	mnth_Dec	1.25
10	mnth_Nov	1.18
11	mnth_Oct	1.18
13	weekday_Thurs	1.18
14	weekday_Wed	1.18
16	weathersit_Snow	1.09
1	holiday	1.06

OLS Regression Results

Dep. Variable:	cnt	R-squared:	0.844			
Model:	OLS	Adj. R-squared:	0.838			
Method:	Least Squares	F-statistic:	156.3			
Date:	Mon, 27 Feb 2023	Prob (F-statistic):	9.60e-186			
Time:	20:25:44	Log-Likelihood:	513.64			
No. Observations:	510	AIC:	-991.3			
Df Residuals:	492	BIC:	-915.1			
Df Model:	17					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	0.3286	0.023	13.993	0.000	0.282	0.375
yr	0.2280	0.008	29.420	0.000	0.222	0.254
holiday	-0.0948	0.024	-3.965	0.000	-0.142	-0.048
temp	0.3574	0.031	11.579	0.000	0.297	0.418
windspeed	-0.1445	0.024	-6.001	0.000	-0.192	-0.097
season_spring	-0.1080	0.017	-6.444	0.000	-0.141	-0.075
season_winter	-0.0081	0.018	-0.450	0.653	-0.043	0.027
mnth_Feb	-0.0238	0.021	-1.430	0.153	-0.071	0.011
mnth_Jan	-0.0633	0.021	-2.985	0.003	-0.105	-0.022
mnth_July	-0.0359	0.017	-2.137	0.033	-0.069	-0.003
mnth_May	0.0238	0.016	1.490	0.137	-0.008	0.055
mnth_Nov	-0.0037	0.019	-0.206	0.837	-0.039	0.031
mnth_Oct	0.0859	0.017	5.092	0.000	0.053	0.119
mnth_Sep	0.0609	0.016	3.900	0.000	0.030	0.092
weekday_Thurs	-0.0373	0.012	-3.173	0.002	-0.060	-0.014
weekday_Wed	-0.0443	0.012	-3.629	0.000	-0.068	-0.020
weathersit_Mist	-0.0716	0.009	-8.318	0.000	-0.088	-0.055
weathersit_Snow	-0.3027	0.026	-11.627	0.000	-0.358	-0.256
Omnibus:	50.826	Durbin-Watson:	2.193			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	98.906			
Skew:	-0.595	Prob(JB):	3.35e-22			
Kurtosis:	4.800	Cond. No.	15.1			

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

As we have high VIF of temp, then removing it

```
In [147]: X_train_new_3 = X_train_new_2.drop(["temp"], axis=1)
```

Model 5

Checking VIF

```
vif = pd.DataFrame()
vif['Features'] = X_train_new_3.columns
vif['VIF'] = [variance_inflation_factor(X_train_new_3.values, i) for i in range(X_train_new_3.shape[1])]
vif['VIF'] = round(vif['VIF'], 2)
vif = vif.sort_values(by = "VIF", ascending = False)
vif
```

	Features	VIF
3	season_spring	3.93
2	windspeed	2.88
6	mnth_Jan	2.22
5	mnth_Feb	2.07
0	yr	1.81
14	weathersit_Mist	1.46
4	mnth_Dec	1.25
9	mnth_Nov	1.18
11	mnth_Sep	1.18
8	mnth_May	1.17
12	weekday_Thurs	1.17
13	weekday_Wed	1.17
7	mnth_July	1.16
10	mnth_Oct	1.14
15	weathersit_Snow	1.09
1	holiday	1.06

OLS Regression Results

Dep. Variable:	cnt	R-squared:	0.801			
Model:	OLS	Adj. R-squared:	0.795			
Method:	Least Squares	F-statistic:	124.1			
Date:	Mon, 27 Feb 2023	Prob (F-statistic):	3.21e-161			
Time:	20:25:46	Log-Likelihood:	452.19			
No. Observations:	510	AIC:	-870.4			
Df Residuals:	493	BIC:	-798.4			
Df Model:	16					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	0.5626	0.013	41.742	0.000	0.536	0.589
yr	0.2496	0.009	27.589	0.000	0.232	0.267
holiday	-0.0891	0.027	-3.308	0.001	-0.142	-0.036
windspeed	-0.1760	0.027	-6.527	0.000	-0.229	-0.133
season_spring	-0.1774	0.019	-10.051	0.000	-0.212	-0.143
mnth_Dec	-0.0977	0.018	-5.380	0.000	-0.133	-0.062
mnth_Feb	-0.0836	0.023	-3.655	0.000	-0.128	-0.039
mnth_Jan	-0.1492	0.022	-6.666	0.000	-0.193	-0.105
mnth_July	0.0411	0.017				