Predict the Insurance Charges

1. We collect the all datasets for client end. And to verify all datasets are accurate. The problem statement is predict the insurance charges conations under

   Machine Learning → Supervised Learning → Regression Method.

2. Total Number of Rows = 1338, Total Number of Columns = 6.

3. Collecting the dataset for client end is categorical format. So we using pre-processing method to convert the meaningful datasets of nominal type (One Hot Encoding).

4. All the research values (r2_score of the models)

4.1. Multiple Linear Regression R^2 Value = **0.7894**

4.2. Support Vector Machine (Regression):

S. No	HYPER PARAMETER	LINEAR (r value)	RBF (r value)	POLY (r value)	SIGMOID (r value)
1.	C10	0.4624	0.0322	0.0387	0.0393
2.	C100	0.6288	0.3200	0.6179	0.5276
3.	C500	0.7631	0.6642	0.8263	0.4446
4.	C1000	0.7649	0.8102	0.8566	0.2874
5.	C2000	0.7440	0.8547	0.8605	-0.5939
6.	C3000	0.7414	0.8663	0.8598	-2.1244

The SVM Regression use R^2 Value (Non-Linear RBF and hyper parameter (C3000) = **0.8663**

4.3.Decision Tree:

S.NO	CRITERION	SPLITTER	R VALUE
1.	squared_error	best	0.6789
2.	squared_error	random	0.6965
3.	friedman_mse	best	0.6793
4.	friedman_mse	random	0.7453
5.	absolute_error	best	0.6690
6.	absolute_error	random	0.6537

The Decision Tree R^2 Value (friedman_mse, random) = **0.7453**

4.4 Random Forest:

S.NO	CRITERION	MAX_FEATURES	R VALUE
1.	squared_error	Sqrt	0.8561
2.	squared_error	Log2	0.8711
3.	friedman_mse	Sqrt	0.8568
4.	friedman_mse	Log2	0.8720
5.	absolute_error	Sqrt	0.8504
6.	absolute_error	Log2	0.8727

The Random Forest R^2 Value (absolute_error, Log2) = **0.8727**

5. All the research values (R^2_score of the models) :

S.NO	*REGRESSION*	*RESEARCH FINAL VALUE (R^2)*
1.	MLR	**0.7894**
2.	SVR	**0.8663**
3.	Decision Tree	**0.7453**
4.	Random Forest	**0.8727**

6. Final Model :

The Final Machine Learning Best Method of Regression is

1. Random Forest R^2 Value (absolute_error, Log2) = **0.8727.**

(Or)

2. The SVM Regression use R^2 Value (Non-Linear RBF and hyper parameter (C3000) = **0.8663.**