**Assignment – 6**

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**Metrics for Regression**

1. **Simple linear regression:-**

**R2** = **0.97409** **(**Best possible score is 1.0)

**mean\_gamma\_deviance = 0.005602** ( the best value is 0.0)

**mean\_poisson\_deviance = 353.77809** ( the best value is 0.0)

**explained\_variance\_score = 0.97728 (**Best possible score is 1.0)

**max\_error = 8424.436** ( the best value is 0.0)

**mean\_absolute\_error = 8424.436** ( the best value is 0.0)

**mean\_squared\_error = 23370078.80** ( the best value is 0.0)

**mean\_squared\_log\_error = 0.00578** ( the best value is 0.0)

**median\_absolute\_error = 3086.783** ( the best value is 0.0)

**mean\_absolute\_percentage\_error = 0.0578** ( the best value is 0.0)

1. **Multiple Linear Regression**

**r\_score =** 0.9358 **(**Best possible score is 1.0)

**explained\_variance\_score = 0.94410 (Best possible score is 1.0)**

**max\_error =** 14784.6273 ( the best value is 0.0)

**mean\_absolute\_error =** 6520.6971 ( the best value is 0.0)

**mean\_squared\_error =** 61903144.402 ( the best value is 0.0)

**mean\_squared\_log\_error =** 0.005943 ( the best value is 0.0)

**median\_absolute\_error =** 5216.4540 ( the best value is 0.0)

**mean\_absolute\_percentage\_error =** 0.05823 ( the best value is 0.0)

**d2\_tweedie\_score =** 0.93586 **(**Best possible score is 1.0)

**3.Support Vector Machine:-**

Explained variance regression= Best possible score is 1.0

**The explained\_variance\_score for best parameter {'C': 3000, 'gamma': 'auto', 'kernel': 'poly'}: = 0.8687**

Max\_error metric = (the best value is 0.0).

**The max\_error for best parameter {'C': 3000, 'gamma': 'auto', 'kernel': 'poly'} = 22770.506**

Mean absolute error= The best value is 0.0.

**The mean\_absolute\_error for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 2151.357747**

Neg Mean squared error= the best value is 0.0

**The mean\_squared\_error for best parameter {'C': 3000, 'gamma': 'auto', 'kernel': 'poly'} = 22342787.0006**

Neg root Mean squared error= the best value is 0.0

**The mean\_squared\_error for best parameter {'C': 3000, 'gamma': 'auto', 'kernel': 'poly'} = 22342787.00068**

Mean squared logarithmic error=the best value is 0.0

**The mean\_squared\_log\_error for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 0.1606**

Median absolute error= The best value is 0.0.

**The median\_absolute\_error for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 393.0902**

Mean Poisson deviance =the best value is 0.0

**The mean\_poisson\_deviance for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 2025.9569**

R2\_score=the best value is 1

**The R\_score value for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 0.859893**

Mean absolute percentage error=the best value is 0.0

**The mean\_absolute\_percentage\_error for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 0.12807**

d2\_tweedie\_score= the best value is 1.0

**The d2\_tweedie\_score for best parameter {'C': 3000, 'gamma': 'scale', 'kernel': 'poly'} = 0.8598**

**4.Decision Tree Regression:-**

Max\_error metric = (the best value is 0.0).

**The max\_error for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 24667.6098**

Mean absolute error= The best value is 0.0.

**The mean\_absolute\_error for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 3312.4238**

Neg Mean squared error= the best value is 0.0

**The mean\_squared\_error for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 47550318.456**

Mean squared logarithmic error=the best value is 0.0

**The mean\_squared\_log\_error for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 0.30449**

Median absolute error= The best value is 0.0.

**The median\_absolute\_error for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 575.950**

Mean Poisson deviance =the best value is 0.0

**The mean\_poisson\_deviance for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 3289.260**

Mean Gamma Deviance= the best value is 0.0

**The mean\_gamma\_deviance for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 0.35001**

Explained\_variance\_score = the best value is 0.0

**The explained\_variance\_score for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 0.70601**

R2\_score=the best value is 1

**The R\_score value for best parameter {'criterion': 'friedman\_mse', 'max\_features': 'auto', 'splitter': 'best' } =0.69529**

Mean absolute percentage error=the best value is 0.0

**The mean\_absolute\_percentage\_error for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 0.39310**

d2\_tweedie\_score= the best value is 1.0

**The d2\_tweedie\_score for best parameter {'criterion': 'mse', 'max\_features': 'auto', 'splitter': 'random'} = 0.70182**

**5.Random Forest Regression**

Max\_error metric = (the best value is 0.0).

**The max\_error for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 22126.2784**

Mean absolute error= The best value is 0.0.

**The mean\_absolute\_error for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 2639.0690**

Neg Mean squared error= the best value is 0.0

**The mean\_squared\_error for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 20355193.1846**

Mean squared logarithmic error=the best value is 0.0

**The mean\_squared\_log\_error for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 0.22053**

Median absolute error= The best value is 0.0.

**The median\_absolute\_error for best parameter {'criterion': 'mse', 'max\_features': 'sqrt', 'n\_estimators': 100} : 1252.03837**

Mean Poisson deviance =the best value is 0.0

**The mean\_poisson\_deviance for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 1985.0264**

Mean Gamma Deviance= the best value is 0.0

**The mean\_gamma\_deviance for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 0.2683**

Explained\_variance\_score = the best value is 0.0

**The explained\_variance\_score for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 0.87307**

R2\_score=the best value is 1

**The R\_score value for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 0.8723**

Mean absolute percentage error=the best value is 0.0

**The mean\_absolute\_percentage\_error for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 0.3475**

d2\_tweedie\_score= the best value is 1.0

**The d2\_tweedie\_score for best parameter {'criterion': 'mae', 'max\_features': 'log2', 'n\_estimators': 100} : 0.87235**

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The Final Machine Learning best model of Regression:

**Simple Linear:**

**R2** = **0.97409** **(**Best possible score is 1.0)

**mean\_gamma\_deviance = 0.005602** ( the best value is 0.0)

**explained\_variance\_score = 0.97728 (**Best possible score is 1.0)

**mean\_squared\_log\_error = 0.00578** ( the best value is 0.0)

**mean\_absolute\_percentage\_error = 0.0578** ( the best value is 0.0)

**Multiple Linear Regression:**

**mean\_absolute\_percentage\_error =** 0.05823 ( the best value is 0.0)

**d2\_tweedie\_score =** 0.93586 **(**Best possible score is 1.0)

**r\_score =** 0.9358 **(**Best possible score is 1.0)

**explained\_variance\_score = 0.94410 (Best possible score is 1.0)**

**mean\_squared\_log\_error =** 0.005943 ( the best value is 0.0)

**Support Vector Machine:-**

Explained variance regression = **0.8687**

Mean squared logarithmic error = **0.1606**

R2\_score =  **0.8598**

Mean absolute percentage error = **0.1280**

d2\_tweedie\_score = **0.8598**

**Decision Tree Regression:-**

Mean squared logarithmic error = **0.3044**

Mean Gamma Deviance = **0.35001**

**Random Forest Regression:-**

Mean squared logarithmic error = **0.2205**

R2\_score = **0.8723**

d2\_tweedie\_score = **0.8723**

**THANK YOU**