**Regression Assignment:**

**Problem Statement**: Predict a best model using AI predictions to find the insurance charges based on a person’s age, BMI, children, Sex and smoker/nonsmoker.

**Problem Identification**: Machine Learning, Supervised Learning and Regression

1.Multiple regression Model:

r\_score=0.7277

2.Support Vector Machine Model:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.No | C Value | Kernel:linear | Kernel:rbf | Kernel:poly | Kernel:sigmoid |
| 1 | 10 | 0.0668 | -0.3447 | -0.0480 | -0.1193 |
| 2 | 100 | 0.5524 | -0.1254 | -0.5198 | -0.1504 |
| 3 | 500 | 0.6122 | -0.1279 | -0.0291 | -0.5383 |
| 4 | 1000 | 0.6549 | -0.1224 | -0.0006 | -1.915 |
| 5 | 2000 | 0.7300 | -0.1108 | 0.0555 | -6.6213 |
| 6 | 3000 | 0.7103 | -0.0966 | 0.1102 | -14.620 |

2.Decision Tree Algorithm: r\_score with hyper tuning parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No | Criterion | splitter | max\_features | R\_score |
| 1 | Squared\_error | random | sqrt | 0.5591 |
| 2 | Squared\_error | random | log2 | 0.5907 |
| 3 | Squared\_error | best | sqrt | 0.5267 |
| 4 | Squared\_error | best | log2 | 0.5789 |
| 5 | Friedman\_mse | random | sqrt | 0.4935 |
| 6 | Friedman\_mse | random | log2 | 0.6248 |
| 7 | Friedman\_mse | best | sqrt | 0.5913 |
| 8 | Friedman\_mse | best | log2 | 0.5668 |
| 9 | Absolute\_error | random | sqrt | 0.6033 |
| 10 | Absolute\_error | random | log2 | 0.6359 |
| 11 | Absolute\_error | best | sqrt | 0.2863 |
| 12 | Absolute\_error | best | log2 | 0.6044 |
| 13 | poisson | random | sqrt | 0.6412 |
| 14 | poisson | random | log2 | 0.5713 |
| 15 | poisson | best | sqrt | 0.6240 |
| 16 | poisson | best | log2 | 0.6244 |

Random Forest Model:r\_score with different n\_estimators and state=0

|  |  |
| --- | --- |
| n-estimator | R\_score |
| 10 | 0.8668 |
| 20 | 0.8748 |
| 30 | 0.8735 |
| 40 | 0.8718 |
| 50 | 0.8714 |
| 60 | 0.8715 |
| 70 | 0.8726 |
| 80 | 0.8736 |
| 90 | 0.8735 |
| 100 | 0.8743 |
| 200 | 0.8738 |

Output:

**Best Model: Random Forest Model with r\_score= 0.8748**