Multiple Linear Regression

Predicts output using weighted linear combinations of features; best for linear patterns. Handles multicollinearity but may miss non■linear relations.

Model	R^2 Value
Multiple Linear Regression	0.768088164

Support Vector Regression (SVR)

SVR fits the best boundary within a margin; kernels handle non■linear patterns. Performance depends on C and kernel choice.

S.No	C	Linear	Poly	RBF	Sigmoid
1	1.0	-0.00295	-0.07015	-0.0773	0.0694
2	10	0.46823	0.04938	-0.02637	0.04502
3	100	0.62879	0.62089	0.32642	0.51774
4	500	0.74015	0.82143	0.66313	0.49695
5	1000	0.70929	0.85065	0.79547	0.32486
6	3000	0.70623	0.85455	0.84669	-2.6117
7	10000	0.70462	0.85499	0.85491	-37.8809

Decision Tree Regression

Rule■based splits fit non■linear relations; can overfit depending on criterion, splitter, and features.

S.No	Criterion	Splitter	MaxFeatures	R^2
1	squared_error	best	None	0.7545
2	squared_error	best	sqrt	0.70639
3	squared_error	best	log2	0.64851
7	friedman_mse	best	None	0.75923

Random Forest Regression

Ensemble of trees; reduces overfitting and boosts accuracy. Best for complex interactions.

S.No	Criterion	n_estimators	MaxFeatures	R^2

1	squared_error	10	None	0.83587
2	squared_error	100	None	0.84551
16	absolute_error	100	sqrt	0.85538

Overall Best Model

Random Forest (absolute_error, 100 trees, max_features = sqrt) achieved the highest R^2 = 0.85538.