**Below Are The r2\_scores Calculated For Different Regression ML Models with Insurance Data**

1. **Multiple Linear Regression**--> r2\_score = 0.789 -- >it implies **78%** accuracy in prediction of our test data
2. **SVM(Support Vector Machine)**--->Best r2\_score = 0.877---> it implies **87%** percent max accuracy from below combination matrix of hyper-parameters

| **S.NO** | **C-Values** | **Kernel:linear** | **Kernel:poly** | **Kernel:rbf** | **Kernel:sigmoid** |
| --- | --- | --- | --- | --- | --- |
| 1 | 1.0 | -0.010543407775197355 | -0.07609549531818716 | -0.08343585041352841 | -0.07553682233949766 |
| 2 | 10 | 0.45958029276441337 | 0.03513787188625095 | -0.0327793744017828 | 0.03823293811594919 |
| 3 | 100 | 0.6276501359169483 | 0.6139950817219111 | 0.31735516363366145 | 0.5219161138070013 |
| 4 | 1000 | 0.764931290606295 | 0.854420696873579 | 0.8104257702399931 | 0.22248543437439128 |
| 5 | 5000 | 0.7414179787462394 | 0.8579024939516943 | 0.8748747155328088 | -7.022207349410854 |
| 6 | 10000 | 0.7414227747333042 | 0.8577398907005558 | 0.8779176067658443 | -35.2702182609943 |
| 7 | 0.1 | -0.0809980247453892 | -0.08834224496633847 | -0.08907989638931135 | -0.08828073015398874 |
| 8 | 0.01 | -0.08883516857857776 | -0.08957227456244765 | -0.08964607586387885 | -0.08956609915626523 |
| 9 | 0.001 | -0.08962159363036681 | -0.08969533106837102 | -0.08970271156010545 | -0.08969471328850309 |
| 10 | 0.0001 | -0.0897002632422308 | -0.08970763725442676 | -0.08970837530721587 | -0.08970757547404729 |

High “R2\_Score” Parameters from above table:

| **S.NO** | **C-value** | **Kernel:rbf** |
| --- | --- | --- |
| 6 | 10000 | **0.8779176067658443** |

1. **Decision Tree - Regressor**--->Best r2\_score = 0.745---> it implies **74%** percent max accuracy

| **S.NO** | **criterion** | **splitter** | **max\_features** | **R2\_Value** |
| --- | --- | --- | --- | --- |
| 1 | squared\_error | best | auto | 0.6992637683818983 |
| 2 | squared\_error | best | sqrt | 0.7369024264237592 |
| 3 | squared\_error | best | log2 | 0.6527324961162786 |
| 4 | squared\_error | random | auto | 0.7306255229341017 |
| 5 | squared\_error | random | sqrt | 0.718519894169253 |
| 6 | squared\_error | random | log2 | 0.6493332498454322 |
| 7 | friedman\_mse | best | auto | 0.7014865295914485 |
| 8 | friedman\_mse | best | sqrt | 0.7002681506264155 |
| 9 | friedman\_mse | best | log2 | 0.7340822861135674 |
| 10 | friedman\_mse | random | auto | 0.7007059166483409 |
| 11 | friedman\_mse | random | sqrt | 0.6884085496480474 |
| 12 | friedman\_mse | random | log2 | 0.6383354602497453 |
| 13 | absolute\_error | best | auto | 0.6720270697626931 |
| 14 | absolute\_error | best | sqrt | 0.648341151802796 |
| 15 | absolute\_error | best | log2 | 0.7328418668816994 |
| 16 | absolute\_error | random | auto | 0.7455708497901046 |
| 17 | absolute\_error | random | sqrt | 0.6581885161273221 |
| 18 | absolute\_error | random | log2 | 0.547032153819963 |

from below combination matrix of hyper-parameters

High “R2\_Score” Parameters from above table:

| **S.NO** | **criterion** | **splitter** | **max\_features** | **R2\_score** |
| --- | --- | --- | --- | --- |
| 16 | absolute\_error | random | auto | **0.7455708497901046** |

1. **RandomForest - Regressor**--->Best r2\_score = 0.875---> it implies **87%** percent max accuracy

| **S.NO** | **criterion** | **n\_estimators** | **max\_features** | **R2\_Value** |
| --- | --- | --- | --- | --- |
| 1 | squared\_error | 100 | auto | 0.851720798251022 |
| 2 | squared\_error | 100 | sqrt | 0.8710604257002563 |
| 3 | squared\_error | 100 | log2 | 0.8726118782212714 |
| 4 | squared\_error | 500 | auto | 0.8561810191197293 |
| 5 | squared\_error | 500 | sqrt | 0.872232416041898 |
| 6 | squared\_error | 500 | log2 | 0.872706207767189 |
| 7 | squared\_error | 1000 | auto | 0.8582726528883846 |
| 8 | squared\_error | 1000 | sqrt | 0.8735532881013544 |
| 9 | squared\_error | 1000 | log2 | 0.8731537298708718 |
| 10 | friedman\_mse | 100 | auto | 0.8565822313598334 |
| 11 | friedman\_mse | 100 | sqrt | 0.8688437362339622 |
| 12 | friedman\_mse | 100 | log2 | 0.8705824925583763 |
| 13 | friedman\_mse | 500 | auto | 0.8587609982898827 |
| 14 | friedman\_mse | 500 | sqrt | 0.8736557263742084 |
| 15 | friedman\_mse | 500 | log2 | 0.8734411473727917 |
| 16 | friedman\_mse | 1000 | auto | 0.8559660291179678 |
| 17 | friedman\_mse | 1000 | sqrt | 0.8735249580993515 |
| 18 | friedman\_mse | 1000 | log2 | 0.8725260471260201 |
| 19 | absolute\_error | 100 | auto | 0.8527244982950515 |
| 20 | absolute\_error | 100 | sqrt | 0.8709815760599569 |
| 21 | absolute\_error | 100 | log2 | 0.8730297695343568 |
| 22 | absolute\_error | 500 | auto | 0.8565778701793808 |
| 23 | absolute\_error | 500 | sqrt | 0.8753862863201038 |
| 24 | absolute\_error | 500 | log2 | 0.8752636848146169 |
| 25 | absolute\_error | 1000 | auto | 0.8564424755342319 |
| 26 | absolute\_error | 1000 | sqrt | 0.8754926480059106 |
| 27 | absolute\_error | 1000 | log2 | 0.8744060864656766 |

from below combination matrix of hyper-parameters

High “R2\_Score” Parameters from above table:

| **S.NO** | **criterion** | **n\_estimators** | **max\_features** | **R2\_score** |
| --- | --- | --- | --- | --- |
| 26 | absolute\_error | 1000 | sqrt | **0.8754926480059106** |