**Experimental analysis and results**

MSE and R for different training algorithms and learning rates when momentum constant = 0.5, no. of nodes in hidden layer 1 = 30, and no. of nodes in hidden layer 2 = 35:

|  | lr = 0.4 | |
| --- | --- | --- |
| MSE | R |
| trainlm | 0.00018795 | 0.99988 |
| trainrp | 0.143 | 0.90697 |
| trainbr | 0.80494 | 0.094415 |

|  | lr = 0.7 | |
| --- | --- | --- |
| MSE | R |
| trainlm | 5.7801e-05 | 0.99996 |
| trainrp | 0.15567 | 0.89824 |
| trainbr | 0.80494 | 0.094115 |

|  | lr = 1.0 | |
| --- | --- | --- |
| MSE | R |
| trainlm | 1.7948e-05 | 0.99999 |
| trainrp | 0.19464 | 0.87092 |
| trainbr | 0.80494 | 0.094571 |

MSE and R for different training algorithms and momentum constants when learning rate = 1.0, no. of nodes in hidden layer 1 = 30, and no. of nodes in hidden layer 2 = 35:

|  | mc = 0.3 | |
| --- | --- | --- |
| MSE | R |
| trainlm | 0.00016988 | 0.99989 |
| trainrp | 0.14815 | 0.90345 |
| trainbr | 0.80494 | 0.093649 |

|  | mc = 0.5 | |
| --- | --- | --- |
| MSE | R |
| trainlm | 1.7948e-05 | 0.99999 |
| trainrp | 0.19464 | 0.87092 |
| trainbr | 0.80494 | 0.094571 |

|  | mc = 0.9 | |
| --- | --- | --- |
| MSE | R |
| trainlm | 6.5763e-05 | 0.99996 |
| trainrp | 0.15041 | 0.90188 |
| trainbr | 0.80494 | 0.092274 |

MSE and R for different number of nodes nodes in the hidden layers, after fixing a training algorithm, learning rate and momentum constant:

|  | trainlm; lr = 1.0; mc = 0.5 | |
| --- | --- | --- |
| MSE | R |
| [15, 20] | 0.0094815 | 0.99409 |
| [30, 35] | 1.7948e-05 | 0.99999 |
| [45, 50] | 6.1811e-07 | 1 |

From the above experimental analysis, we can conclude that the best architecture for the given network and dataset is achieved using Levenberg-Marquardt training algorithm, learning rate = 1.0, momentum constant = 0.5, number of nodes in hidden layer 1 = 45, and number of nodes in hidden layer 2 = 50. This is because of minimum mean square error (very close to the set error goal of 1e-9) and regression value being 1 under these settings.

