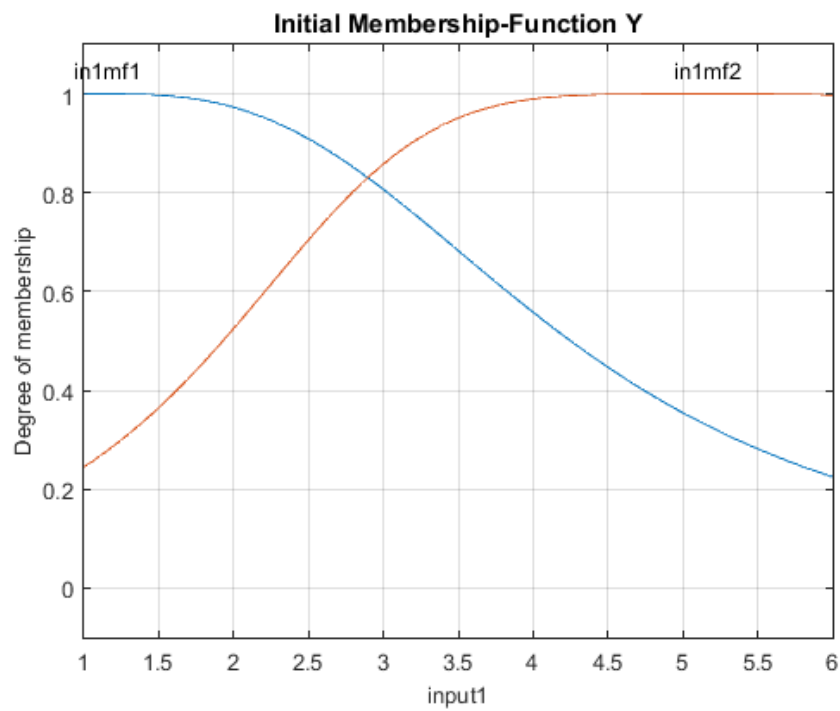
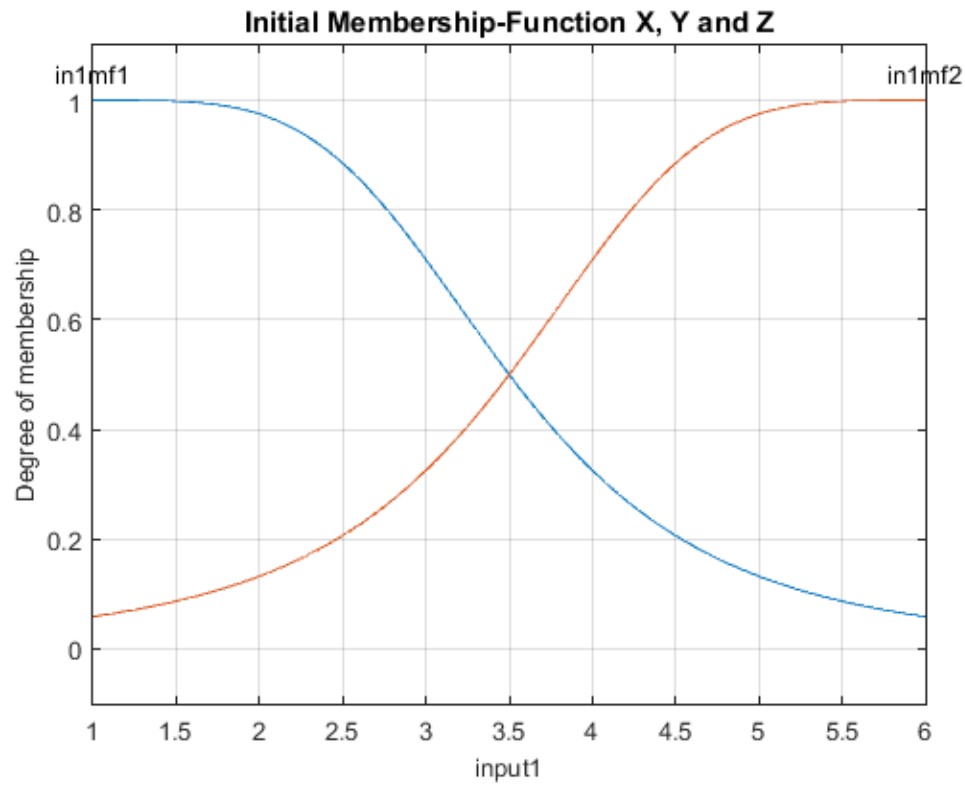
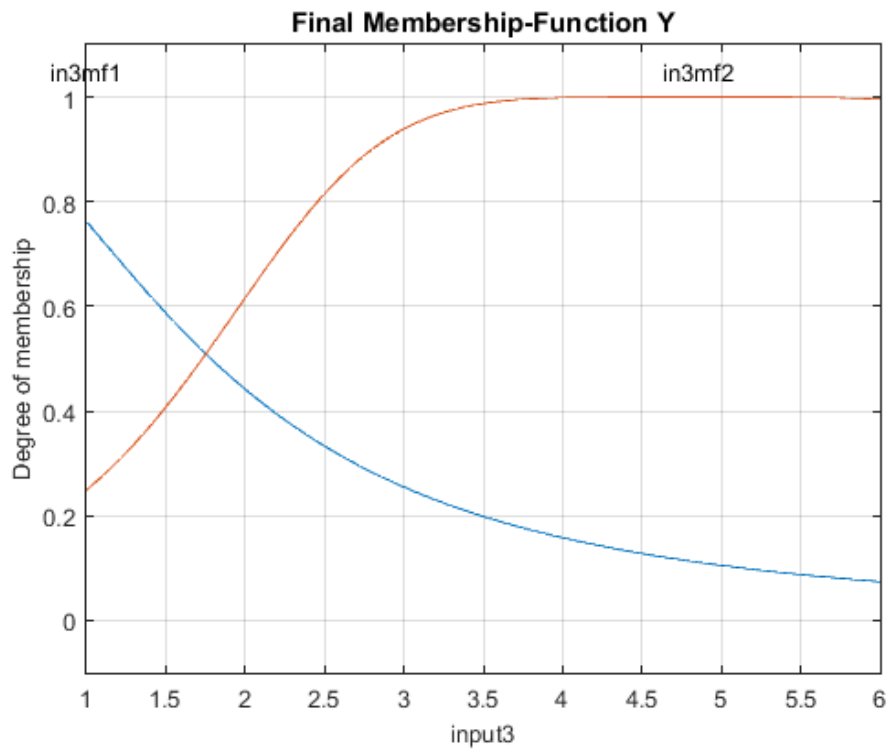
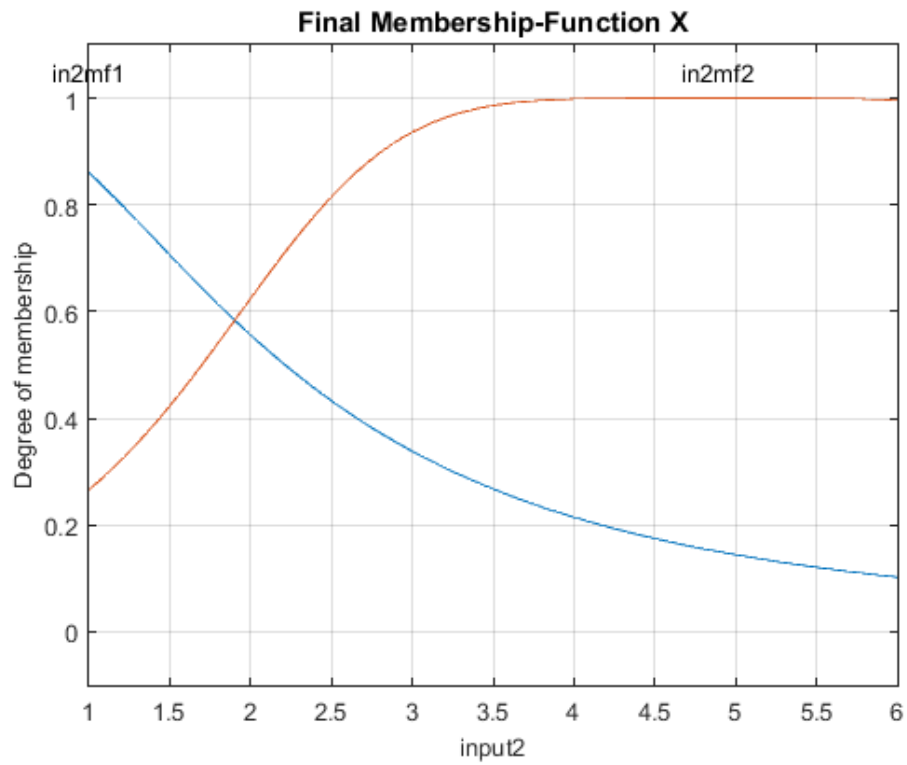
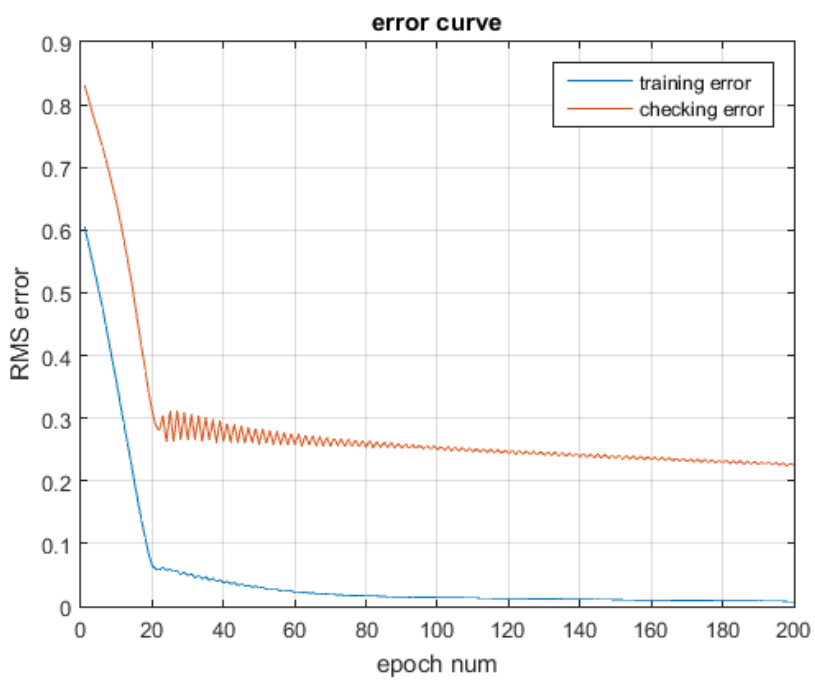
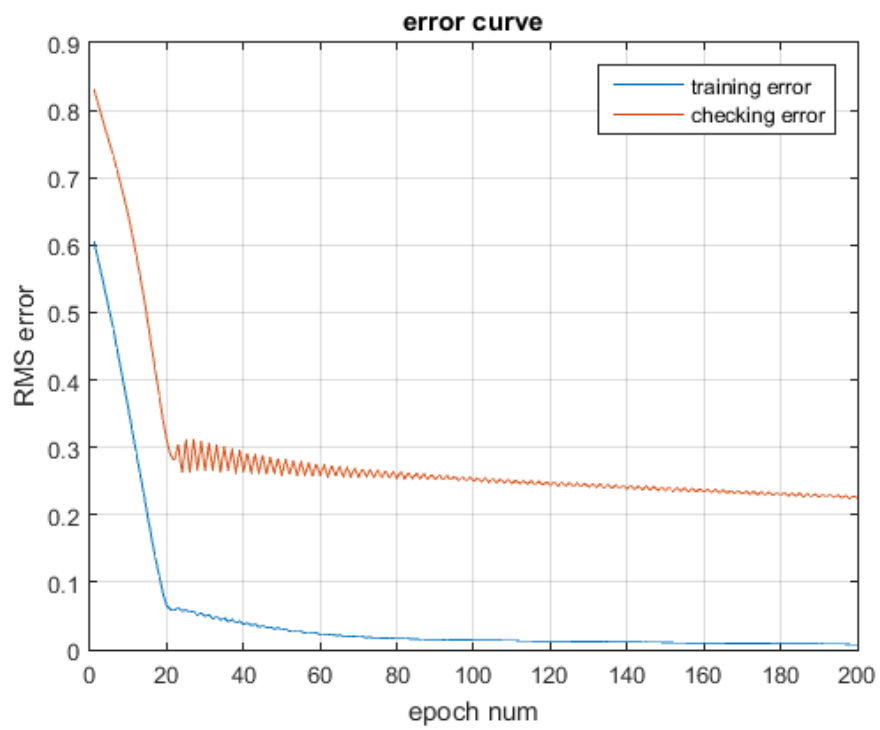


Chapter 12 Project & - ANFIS

ANFIS Results.







OUTPUT:

ANFIS info:

Number of nodes: 34
Number of linear parameters: 32
Number of nonlinear parameters: 18
Total number of parameters: 50
Number of training data pairs: 216
Number of checking data pairs: 125
Number of fuzzy rules: 8

Start training ANFIS ...

1	0.605402	0.831868
2	0.580785	0.81134
3	0.555675	0.791393
4	0.530004	0.771902
5	0.503775	0.752678

Step size increases to 0.110000 after epoch 5.

6	0.477056	0.733488
7	0.44725	0.712113
8	0.417216	0.690135
9	0.38718	0.667263

Step size increases to 0.121000 after epoch 9.

10	0.357346	0.643291
11	0.324949	0.615519
12	0.293103	0.586298
13	0.261865	0.555735

Step size increases to 0.133100 after epoch 13.

14	0.231291	0.524012
15	0.198584	0.487997
16	0.167132	0.451273
17	0.137372	0.414428

Step size increases to 0.146410 after epoch 17.

18	0.109909	0.378394
19	0.0836592	0.341298
20	0.0648102	0.310568
21	0.0590948	0.287887

Step size increases to 0.161051 after epoch 21.

22	0.0580539	0.280432
23	0.0615965	0.304041
24	0.0573598	0.261499
25	0.0590593	0.311293
26	0.0552965	0.262682

Step size decreases to 0.144946 after epoch 26.

27	0.0567471	0.311179
28	0.0513525	0.266398

29	0.0542111	0.308569
30	0.0495062	0.264095
Step size decreases to 0.130451 after epoch 30.		
31	0.0518612	0.306501
32	0.0462024	0.266357
33	0.0492266	0.303113
34	0.0444983	0.263456
Step size decreases to 0.117406 after epoch 34.		
35	0.0469129	0.300817
36	0.0416288	0.265136
37	0.0443303	0.297466
38	0.0400546	0.262205
Step size decreases to 0.105666 after epoch 38.		
39	0.042152	0.295318
40	0.0375143	0.263603
41	0.0397501	0.292272
42	0.0360715	0.260887
Step size decreases to 0.095099 after epoch 42.		
43	0.0377676	0.290358
44	0.0338096	0.262124
45	0.0356087	0.28768
46	0.0325023	0.259698
Step size decreases to 0.085589 after epoch 46.		
47	0.0338417	0.285993
48	0.0304928	0.260815
49	0.0319372	0.283657
50	0.0293224	0.258671
Step size decreases to 0.077030 after epoch 50.		
51	0.0303818	0.282166
52	0.0275479	0.259681
53	0.0287195	0.280122
54	0.0265127	0.257785
Step size decreases to 0.069327 after epoch 54.		
55	0.0273628	0.278794
56	0.024958	0.258691
57	0.0259235	0.276996
58	0.0240541	0.257006
Step size decreases to 0.062394 after epoch 58.		
59	0.0247511	0.275805
60	0.0227057	0.257811
61	0.0235173	0.274212
62	0.0219293	0.256305
Step size decreases to 0.056155 after epoch 62.		
63	0.0225175	0.273136
64	0.0207764	0.257015
65	0.0214762	0.271718
66	0.0201257	0.255661
Step size decreases to 0.050540 after epoch 66.		
67	0.0206416	0.27074

68	0.0191608	0.25628
69	0.0197851	0.269473
70	0.0186353	0.255056

Step size decreases to 0.045486 after epoch 70.

71	0.0191109	0.268578
72	0.0178522	0.25559
73	0.0184313	0.267437
74	0.0174486	0.254476

Step size decreases to 0.040937 after epoch 74.

75	0.0179083	0.266605
76	0.0168353	0.254924
77	0.0173879	0.265562
78	0.0165395	0.253896

Step size decreases to 0.036843 after epoch 78.

79	0.0169928	0.264767
80	0.0160704	0.254255
81	0.0165954	0.263779
82	0.0158541	0.253278

Step size decreases to 0.033159 after epoch 82.

83	0.016289	0.262991
84	0.0154914	0.253534
85	0.0159668	0.262013
86	0.0153214	0.252571

Step size decreases to 0.029843 after epoch 86.

87	0.0157088	0.26121
88	0.0150273	0.252712
89	0.0154239	0.260216
90	0.0148789	0.251736

Step size decreases to 0.026859 after epoch 90.

91	0.01519	0.259396
92	0.0146266	0.251769
93	0.0149267	0.258395
94	0.0144875	0.250787

Step size decreases to 0.024173 after epoch 94.

95	0.0147091	0.257575
96	0.0142615	0.250737
97	0.014466	0.256595
98	0.0141267	0.249776

Step size decreases to 0.021756 after epoch 98.

99	0.0142642	0.255798
100	0.013919	0.249671
101	0.0140422	0.254862
102	0.0137862	0.248755

Step size decreases to 0.019580 after epoch 102.

103	0.0138554	0.254098
104	0.0135924	0.248614
105	0.013653	0.253213
106	0.0134604	0.247752

Step size decreases to 0.017622 after epoch 106.

107	0.0134795	0.252488
108	0.0132778	0.247587
109	0.0132934	0.251653
110	0.0131458	0.246778
Step size decreases to 0.015860 after epoch 110.		
111	0.0131308	0.250964
112	0.0129726	0.246593
113	0.0129578	0.250172
Step size increases to 0.017446 after epoch 113.		
114	0.0128403	0.245832
115	0.0128451	0.249889
116	0.0127096	0.245095
117	0.0126892	0.249238
118	0.012576	0.244462
119	0.0125413	0.248639
Step size increases to 0.019190 after epoch 119.		
120	0.0124406	0.243876
121	0.0124502	0.248489
122	0.0123109	0.243226
123	0.0122996	0.247878
124	0.0121792	0.242627
125	0.0121548	0.247297
Step size increases to 0.021109 after epoch 125.		
126	0.0120465	0.242058
127	0.0120803	0.247205
128	0.0119196	0.241427
129	0.0119311	0.246601
130	0.0117914	0.240834
Step size decreases to 0.018998 after epoch 130.		
131	0.0117874	0.246022
132	0.011601	0.240838
133	0.0116279	0.24532
134	0.0114787	0.240152
135	0.0114808	0.244689
136	0.0113544	0.239534
Step size decreases to 0.017099 after epoch 136.		
137	0.0113407	0.244097
138	0.0111812	0.239466
139	0.0111868	0.24339
140	0.0110616	0.238777
141	0.0110462	0.242766
142	0.0109399	0.238168
143	0.0109123	0.242187
Step size increases to 0.018809 after epoch 143.		
144	0.010817	0.237601
145	0.0108338	0.242037
146	0.0106998	0.236973
147	0.0106976	0.241445
148	0.0105813	0.236392

149	0.0105669	0.240882
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Step size increases to 0.020689 after epoch 149.

150	0.0104621	0.235839
151	0.0105053	0.240789
152	0.0103485	0.235231
153	0.0103712	0.240206
154	0.0102341	0.234659

Step size decreases to 0.018620 after epoch 154.

155	0.0102423	0.239647
156	0.0100598	0.23466
157	0.0100988	0.238977
158	0.00995138	0.234003

Step size decreases to 0.016758 after epoch 158.

159	0.0099668	0.238371
160	0.00979637	0.233903
161	0.00982214	0.237661
162	0.00969099	0.233209

Step size decreases to 0.015083 after epoch 162.

163	0.00969306	0.237046
164	0.00954855	0.233049
165	0.00955402	0.236338
166	0.00944496	0.232361

Step size decreases to 0.013574 after epoch 166.

167	0.00943091	0.235739
168	0.0093118	0.232171
169	0.00929983	0.235053

Step size increases to 0.014932 after epoch 169.

170	0.00920948	0.231508
171	0.00921369	0.234776
172	0.00910931	0.230858
173	0.00909598	0.234201
174	0.00900754	0.230294
175	0.00898466	0.233669

Step size increases to 0.016425 after epoch 175.

176	0.00890517	0.229771
177	0.0089169	0.2335
178	0.00880777	0.229194
179	0.00880479	0.232959
180	0.00870963	0.228661
181	0.00869753	0.232445

Step size increases to 0.018067 after epoch 181.

182	0.00861136	0.228154
183	0.00864478	0.232328
184	0.00851807	0.227598
185	0.00853561	0.231798
186	0.00842442	0.227075

Step size decreases to 0.016261 after epoch 186.

187	0.00843106	0.231291
188	0.00828434	0.227045

189	0.00831491	0.23069
190	0.00819603	0.226455

Step size decreases to 0.014635 after epoch 190.

191	0.00820849	0.230148
192	0.00807155	0.226342
193	0.00809217	0.229518
194	0.00798618	0.225726

Step size decreases to 0.013171 after epoch 194.

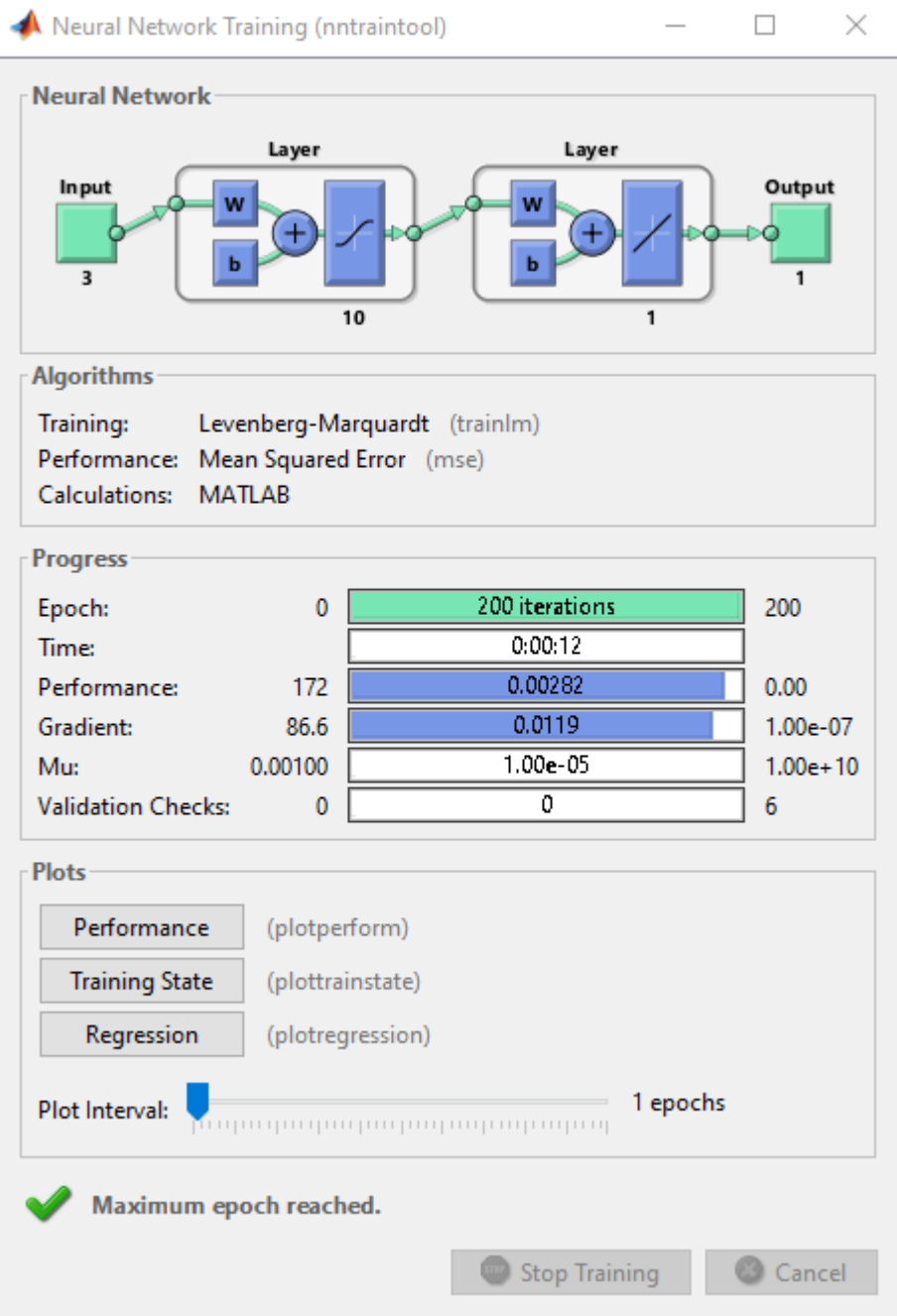
195	0.00798863	0.228973
196	0.00787202	0.225567
197	0.00787733	0.228349
198	0.00778856	0.224958

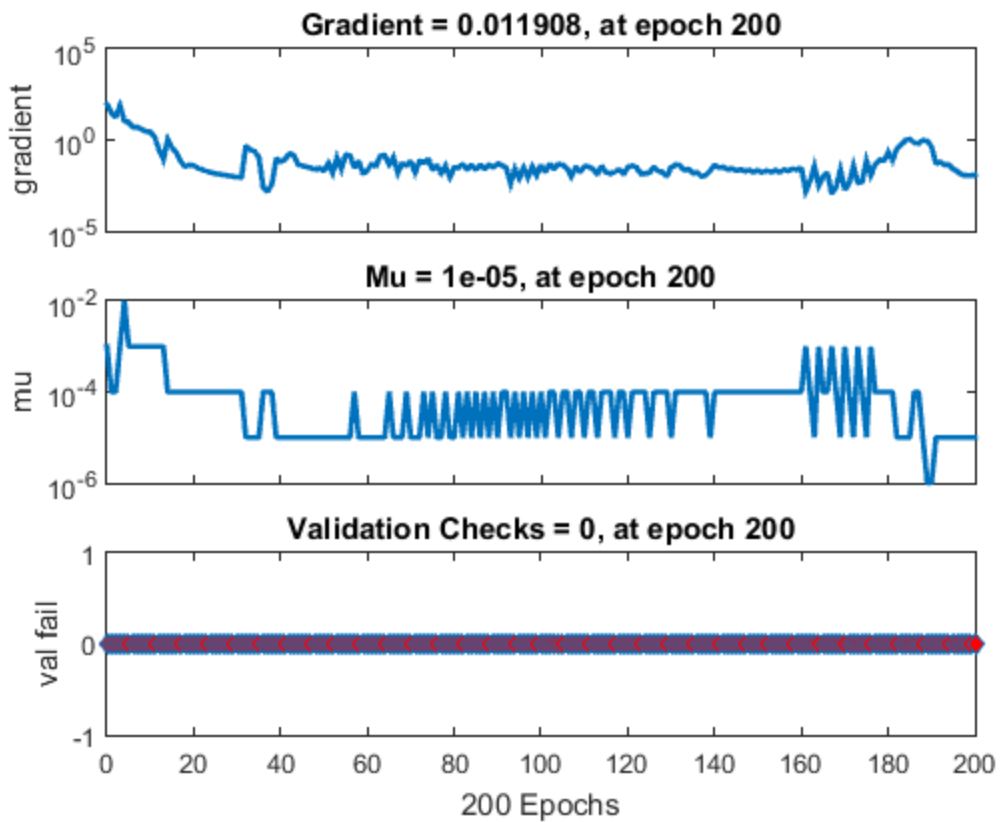
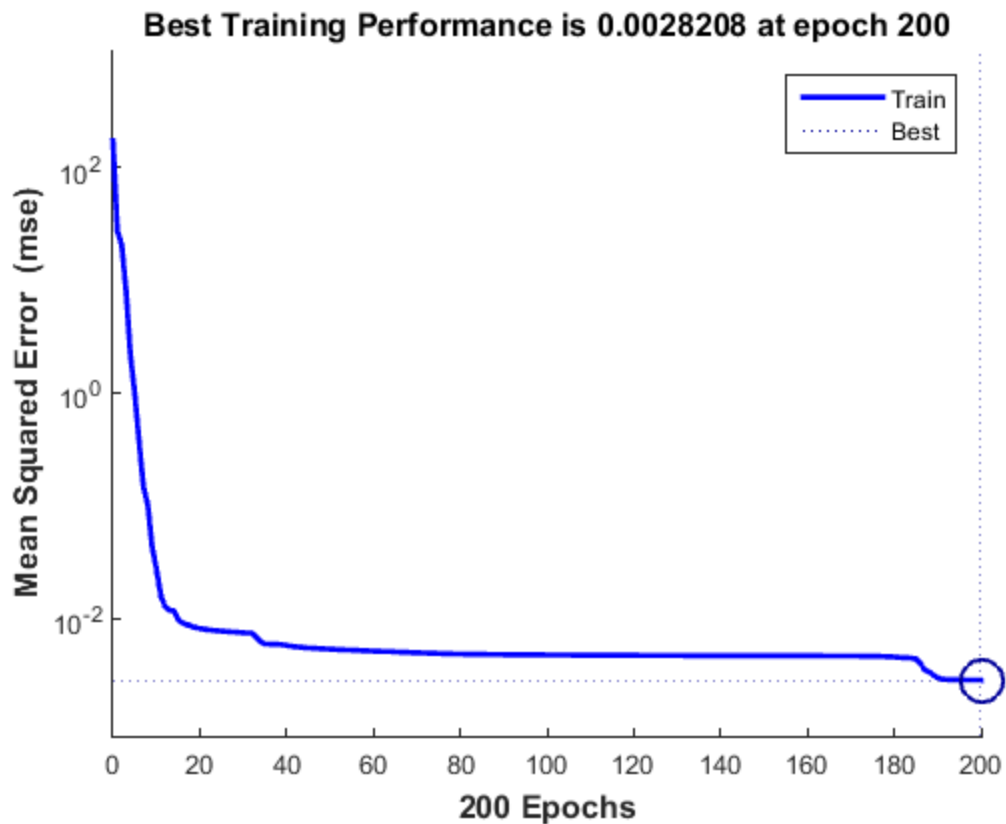
Step size decreases to 0.011854 after epoch 198.

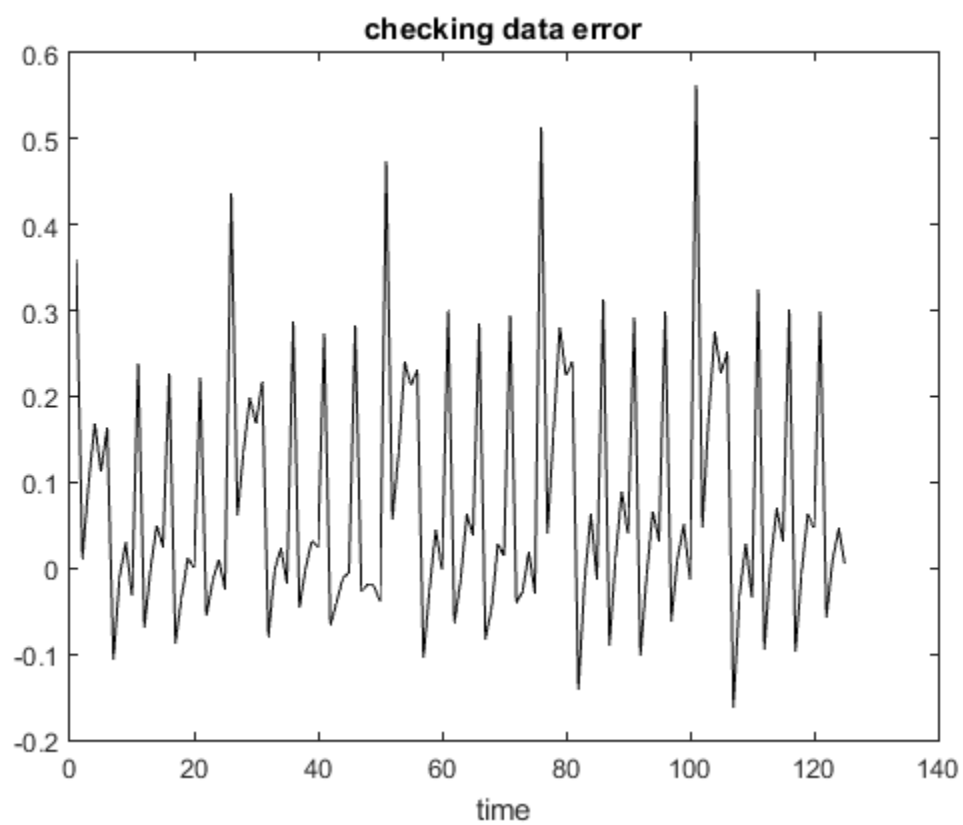
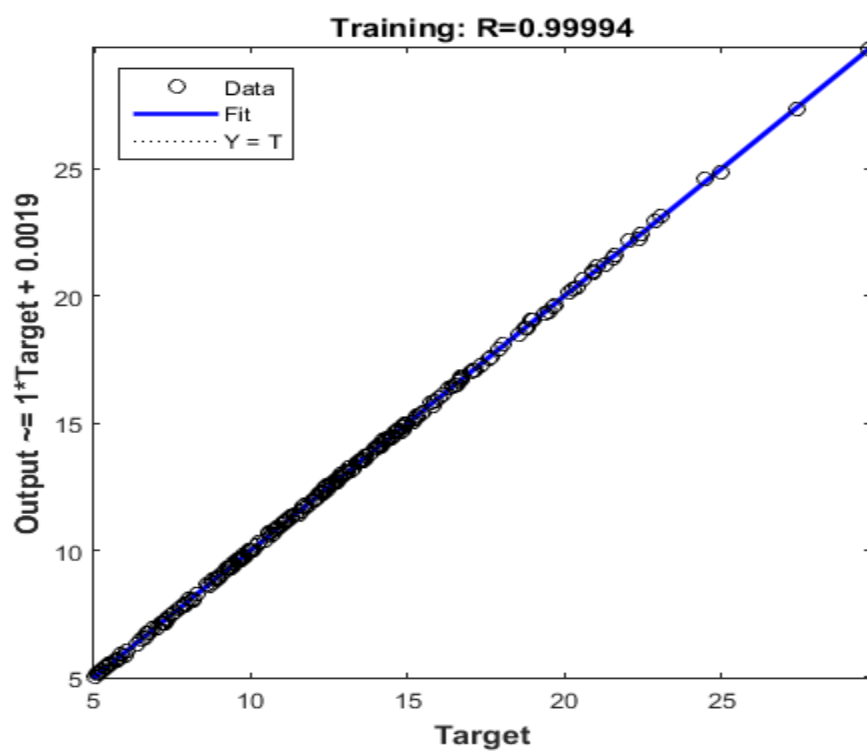
199	0.00777894	0.227819
200	0.00768218	0.224776

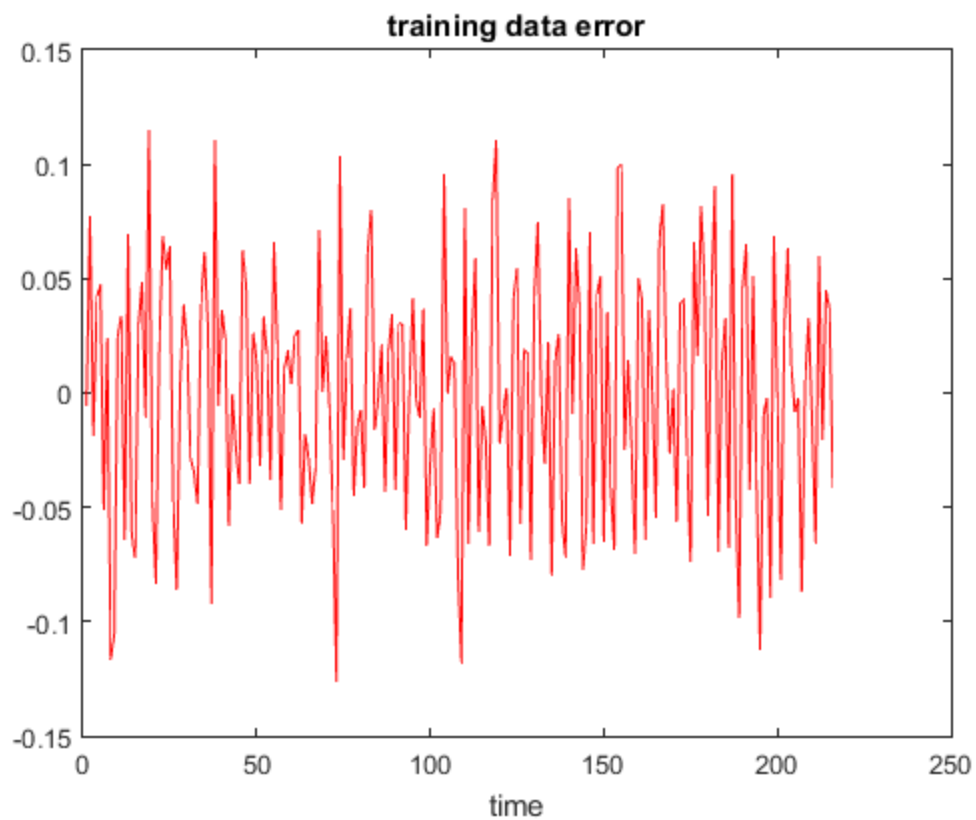
Designated epoch number reached --> ANFIS training completed at epoch 200.

NN Results:









Conclusion:

Model		ANFIS	GMDH
Training Data	Size	216	20
Checking Data	Size	125	20
Parameters		50	-
Training Error		0.04%	4.30%
CheckingError		1.06%	5.20%