NATALIE ADHIAMBO -665121

ANN in R

```
> iris<-iris%>%mutate_if(is.character, as.factor)
> iris
```

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
1	5.1	3.5	1.4	0.2	setosa
2	4.9	3.0	1.4	0.2	setosa
3	4.7	3.2	1.3	0.2	setosa
4	4.6	3.1	1.5	0.2	setosa
5	5.0	3.6	1.4	0.2	setosa
6	5.4	3.9	1.7	0.4	setosa
7	4.6	3.4	1.4	0.3	setosa
8	5.0	3.4	1.5	0.2	setosa
9	4.4	2.9	1.4	0.2	setosa
10	4.9	3.1	1.5	0.1	setosa
11	5.4	3.7	1.5	0.2	setosa
12	4.8	3.4	1.6	0.2	setosa
13	4.8	3.0	1.4	0.1	setosa
14	4.3	3.0	1.1	0.1	setosa
15	5.8	4.0	1.2	0.2	setosa
16	5.7	4.4	1.5	0.4	setosa
17	5.4	3.9	1.3	0.4	setosa
18	5.1	3.5	1.4	0.3	setosa
19	5.7	3.8	1.7	0.3	setosa
20	5.1	3.8	1.5	0.3	setosa
21	5.4	3.4	1.7	0.2	setosa
22	5.1	3.7	1.5	0.4	setosa
23	4.6	3.6	1.0	0.2	setosa
24	5.1	3.3	1.7	0.5	setosa
25	4.8	3.4	1.9	0.2	setosa
26	5.0	3.0	1.6	0.2	setosa
27	5.0	3.4	1.6	0.4	setosa
28	5.2	3.5	1.5	0.2	setosa
29	5.2	3.4	1.4	0.2	setosa
30	4.7	3.2	1.6	0.2	setosa
31	4.8	3.1	1.6	0.2	setosa
32	5.4	3.4	1.5	0.4	setosa
33	5.2	4.1	1.5	0.1	setosa
34	5.5	4.2	1.4	0.2	setosa
35	4.9	3.1	1.5	0.2	setosa

36	5.0	3.2	1.2	0.2	setosa
37	5.5	3.5	1.3	0.2	setosa
38	4.9	3.6	1.4	0.1	setosa
39	4.4	3.0	1.3	0.2	setosa
40	5.1	3.4	1.5	0.2	setosa
41	5.0	3.5	1.3	0.3	setosa
42	4.5	2.3	1.3	0.3	setosa
43	4.4	3.2	1.3	0.2	setosa
44	5.0	3.5	1.6	0.6	setosa
45	5.1	3.8	1.9	0.4	setosa
46	4.8	3.0	1.4	0.3	setosa
47	5.1	3.8	1.6	0.2	setosa
48	4.6	3.2	1.4	0.2	setosa
49	5.3	3.7	1.5	0.2	setosa
50	5.0	3.3	1.4	0.2	setosa
51	7.0	3.2	4.7	1.4	versicolor
52	6.4	3.2	4.5	1.5	versicolor
53	6.9	3.1	4.9	1.5	versicolor
54	5.5	2.3	4.0	1.3	versicolor
55	6.5	2.8	4.6	1.5	versicolor
56	5.7	2.8	4.5	1.3	versicolor
57	6.3	3.3	4.7	1.6	versicolor
58	4.9	2.4	3.3	1.0	versicolor
59	6.6	2.9	4.6	1.3	versicolor
60	5.2	2.7	3.9	1.4	versicolor
61	5.0	2.0	3.5	1.0	versicolor
62	5.9	3.0	4.2	1.5	versicolor
63	6.0	2.2	4.0	1.0	versicolor
64	6.1	2.9	4.7	1.4	versicolor
65	5.6	2.9	3.6	1.3	versicolor
66	6.7	3.1	4.4	1.4	versicolor
67	5.6	3.0	4.5	1.5	versicolor
68	5.8	2.7	4.1	1.0	versicolor
69	6.2	2.2	4.5	1.5	versicolor
70	5.6	2.5	3.9	1.1	versicolor
71	5.9	3.2	4.8	1.8	versicolor
72	6.1	2.8	4.0	1.3	versicolor
73	6.3	2.5	4.9	1.5	versicolor
74	6.1	2.8	4.7	1.2	versicolor
75	6.4	2.9	4.3	1.3	versicolor
76	6.6	3.0	4.4	1.4	versicolor
77	6.8	2.8	4.8	1.4	versicolor
78	6.7	3.0	5.0	1.7	versicolor
79	6.0	2.9	4.5	1.5	versicolor
80	5.7	2.6	3.5	1.0	versicolor

81	5.5	2.4	3.8	1.1	versicolor
82	5.5	2.4	3.7	1.0	versicolor
83	5.8	2.7	3.9	1.2	versicolor
84	6.0	2.7	5.1	1.6	versicolor
85	5.4	3.0	4.5	1.5	versicolor
86	6.0	3.4	4.5	1.6	versicolor
87	6.7	3.1	4.7	1.5	versicolor
88	6.3	2.3	4.4	1.3	versicolor
89	5.6	3.0	4.1	1.3	versicolor
90	5.5	2.5	4.0	1.3	versicolor
91	5.5	2.6	4.4	1.2	versicolor
92	6.1	3.0	4.6	1.4	versicolor
93	5.8	2.6	4.0	1.2	versicolor
94	5.0	2.3	3.3	1.0	versicolor
95	5.6	2.7	4.2	1.3	versicolor
96	5.7	3.0	4.2	1.2	versicolor
97	5.7	2.9	4.2	1.3	versicolor
98	6.2	2.9	4.3	1.3	versicolor
99	5.1	2.5	3.0	1.1	versicolor
100	5.7	2.8	4.1	1.3	versicolor
101	6.3	3.3	6.0	2.5	virginica
102	5.8	2.7	5.1	1.9	virginica
103	7.1	3.0	5.9	2.1	virginica
104	6.3	2.9	5.6	1.8	virginica
105	6.5	3.0	5.8	2.2	virginica
106	7.6	3.0	6.6	2.1	virginica
107	4.9	2.5	4.5	1.7	virginica
108	7.3	2.9	6.3	1.8	virginica
109	6.7	2.5	5.8	1.8	virginica
110	7.2	3.6	6.1	2.5	virginica
111	6.5	3.2	5.1	2.0	virginica
112	6.4	2.7	5.3	1.9	virginica
113	6.8	3.0	5.5	2.1	virginica
114	5.7	2.5	5.0	2.0	virginica
115	5.8	2.8	5.1	2.4	virginica
116	6.4	3.2	5.3	2.3	virginica
117	6.5	3.0	5.5	1.8	virginica
118	7.7	3.8	6.7	2.2	virginica
119	7.7	2.6	6.9	2.3	virginica
120	6.0	2.2	5.0	1.5	virginica
121	6.9	3.2	5.7	2.3	virginica
122	5.6	2.8	4.9	2.0	virginica
123	7.7	2.8	6.7	2.0	virginica
124	6.3	2.7	4.9	1.8	virginica
125	6.7	3.3	5.7	2.1	virginica
126	7.2	3.2	6.0	1.8	virginica

127	6.2	2.8	4.8	1.8	virginica
128	6.1	3.0	4.9	1.8	virginica
129	6.4	2.8	5.6	2.1	virginica
130	7.2	3.0	5.8	1.6	virginica
131	7.4	2.8	6.1	1.9	virginica
132	7.9	3.8	6.4	2.0	virginica
133	6.4	2.8	5.6	2.2	virginica
134	6.3	2.8	5.1	1.5	virginica
135	6.1	2.6	5.6	1.4	virginica
136	7.7	3.0	6.1	2.3	virginica
137	6.3	3.4	5.6	2.4	virginica
138	6.4	3.1	5.5	1.8	virginica
139	6.0	3.0	4.8	1.8	virginica
140	6.9	3.1	5.4	2.1	virginica
141	6.7	3.1	5.6	2.4	virginica
142	6.9	3.1	5.1	2.3	virginica
143	5.8	2.7	5.1	1.9	virginica
144	6.8	3.2	5.9	2.3	virginica
145	6.7	3.3	5.7	2.5	virginica
146	6.7	3.0	5.2	2.3	virginica
147	6.3	2.5	5.0	1.9	virginica
148	6.5	3.0	5.2	2.0	virginica
149	6.2	3.4	5.4	2.3	virginica
150	5.9	3.0	5.1	1.8	virginica

```
> train_indices<-sample(c(1:nrow(iris)), data_rows)
> train_indices
                [1] 10 40 109 41 82 42 22 46 73                                  1 107 112 17 84 56 90 12
121 30
  [20] 16 98 127 18 61 97 20 62 123 55 144 129 105 70 59 89 49 67 88
  [39] 130 74 31 32 71 19 76 48 143 72 116 111    8 50 37 77 13 69 28
  [58] 108 120 102 58 63 4 132 114 149 96 86 39 36 34 79 140 68 150 11
[77] 66 113 119 52 117 139 53 135 136 93 137 35 78                                  6 26 21 25
80 126
[96]          9 60 29 141          5 146 142 85 64                          3 44 118 145 15 38 110 94
83      7
[115] 148 81 43 99 131 54
> test_data <- iris[-train_indices, ]
```

```
> test_data
   Sepal.Length Sepal.Width Petal.Length Petal.Width Species
2           4.9         3.0          1.4         0.2  setosa
14          4.3         3.0          1.1         0.1  setosa
23          4.6         3.6          1.0         0.2  setosa
24          5.1         3.3          1.7         0.5  setosa
```

27	5.0	3.4	1.6	0.4	setosa
33	5.2	4.1	1.5	0.1	setosa
45	5.1	3.8	1.9	0.4	setosa
47	5.1	3.8	1.6	0.2	setosa
51	7.0	3.2	4.7	1.4	versicolor
57	6.3	3.3	4.7	1.6	versicolor
65	5.6	2.9	3.6	1.3	versicolor
75	6.4	2.9	4.3	1.3	versicolor
87	6.7	3.1	4.7	1.5	versicolor
91	5.5	2.6	4.4	1.2	versicolor
92	6.1	3.0	4.6	1.4	versicolor
95	5.6	2.7	4.2	1.3	versicolor
100	5.7	2.8	4.1	1.3	versicolor
101	6.3	3.3	6.0	2.5	virginica
103	7.1	3.0	5.9	2.1	virginica
104	6.3	2.9	5.6	1.8	virginica
106	7.6	3.0	6.6	2.1	virginica
115	5.8	2.8	5.1	2.4	virginica
122	5.6	2.8	4.9	2.0	virginica
124	6.3	2.7	4.9	1.8	virginica
125	6.7	3.3	5.7	2.1	virginica
128	6.1	3.0	4.9	1.8	virginica
133	6.4	2.8	5.6	2.2	virginica
134	6.3	2.8	5.1	1.5	virginica
138	6.4	3.1	5.5	1.8	virginica
147	6.3	2.5	5.0	1.9	virginica

```
>
> model <- neuralnet(Species ~ Sepal.Length + Sepal.Width + Petal.Length +
+                                          Petal.Width, data = train_data, hidden = c(4,2),
linear.output = FALSE)
> model $call
neuralnet(formula = Species ~ Sepal.Length + Sepal.Width + Petal.Length + Petal.Width, data =
      train_data, hidden = c(4, 2), linear.output =
FALSE)

$response versicolor setosa virginica
1             FALSE     TRUE    FALSE
2             TRUE FALSE        FALSE
3             FALSE FALSE       TRUE
4             FALSE     TRUE    FALSE
5             TRUE FALSE        FALSE
6             FALSE FALSE       TRUE
          FALSE    TRUE      FALSE
```

	FALSE		
7	TRUE	FALSE	FALSE
8			
9		FALSE	TRUE
10	TRUE	FALSE	FALSE
11	FALSE	TRUE	FALSE
12	TRUE	FALSE	FALSE
13	FALSE	FALSE	TRUE
14	FALSE	FALSE	TRUE
15	FALSE	FALSE	TRUE
16	FALSE	FALSE	TRUE
17	FALSE	TRUE	FALSE
18	FALSE	FALSE	TRUE
19	FALSE	FALSE	TRUE
20	TRUE	FALSE	FALSE
21	FALSE	FALSE	TRUE
22	FALSE	FALSE	TRUE
23	FALSE	TRUE	FALSE
24	FALSE	FALSE	TRUE
25	FALSE	FALSE	TRUE
26	FALSE	FALSE	TRUE
27	FALSE	TRUE	FALSE
28	FALSE	FALSE	TRUE
29	TRUE	FALSE	FALSE
30	FALSE	TRUE	FALSE
31	FALSE	TRUE	FALSE
32	FALSE	TRUE	FALSE
33	FALSE	TRUE	FALSE
34	TRUE	FALSE	FALSE
35	TRUE	FALSE	FALSE
36	FALSE	TRUE	FALSE
37	FALSE	FALSE	TRUE
38	FALSE	FALSE	TRUE
39	FALSE	FALSE	TRUE
40	TRUE	FALSE	FALSE
41	TRUE	FALSE	FALSE
42	FALSE	TRUE	FALSE
43	TRUE	FALSE	FALSE
44	FALSE	TRUE	FALSE
45	TRUE	FALSE	FALSE
46	TRUE	FALSE	FALSE
47	TRUE	FALSE	FALSE
48	FALSE	TRUE	FALSE
49	TRUE	FALSE	FALSE
	FALSE	TRUE	FALSE

FALSE

50	FALSE	TRUE	FALSE
51	FALSE	FALSE	TRUE
52	FALSE	FALSE	TRUE
53	FALSE	TRUE	FALSE
54	FALSE	FALSE	TRUE
55			
56		FALSE	TRUE
57	TRUE	FALSE	FALSE
58	TRUE	FALSE	FALSE
59	TRUE	FALSE	FALSE
60	FALSE	TRUE	FALSE
61	FALSE	TRUE	FALSE
62	FALSE	TRUE	FALSE
63	TRUE	FALSE	FALSE
64	FALSE	FALSE	TRUE
65	TRUE	FALSE	FALSE
66	FALSE	FALSE	TRUE
67	FALSE	TRUE	FALSE
68	TRUE	FALSE	FALSE
69	TRUE	FALSE	FALSE
70	FALSE	TRUE	FALSE
71	FALSE	TRUE	FALSE
72	TRUE	FALSE	FALSE
73	FALSE	FALSE	TRUE
74	TRUE	FALSE	FALSE
75	FALSE	FALSE	TRUE
76	FALSE	FALSE	TRUE
77	FALSE	FALSE	TRUE
78	TRUE	FALSE	FALSE
79	TRUE	FALSE	FALSE
80	FALSE	TRUE	FALSE
81	FALSE	TRUE	FALSE
82	TRUE	FALSE	FALSE
83	TRUE	FALSE	FALSE
84	FALSE	TRUE	FALSE
85	FALSE	FALSE	TRUE
86	FALSE	FALSE	TRUE
87	TRUE	FALSE	FALSE
88	TRUE	FALSE	FALSE
89	FALSE	FALSE	TRUE
90	FALSE	TRUE	FALSE
91	TRUE	FALSE	FALSE
92	TRUE	FALSE	FALSE
	FALSE	TRUE	FALSE

FALSE

93	FALSE	TRUE	FALSE
94	FALSE	TRUE	FALSE
95	TRUE	FALSE	FALSE
96	FALSE	TRUE	FALSE
97	FALSE	FALSE	TRUE
98	FALSE	TRUE	FALSE
99	FALSE	TRUE	FALSE
100	FALSE	FALSE	TRUE
101	FALSE	TRUE	FALSE
102			

FALSE TRUE FALSE

FALSE

103		TRUE	FALSE	
104	FALSE	FALSE	TRUE	
105	TRUE	FALSE	FALSE	
106	TRUE	FALSE	FALSE	
107	TRUE	FALSE	FALSE	
108	FALSE	FALSE	TRUE	
109	FALSE	FALSE	TRUE	
110	TRUE	FALSE	FALSE	
111	FALSE	FALSE	TRUE	
112	TRUE	FALSE	FALSE	
113	FALSE	TRUE	FALSE	
114	FALSE	TRUE	FALSE	
115	FALSE	TRUE	FALSE	
116	FALSE	TRUE	FALSE	
117	TRUE	FALSE	FALSE	
118	FALSE	TRUE	FALSE	
119	FALSE	FALSE	TRUE	
120	FALSE	FALSE	TRUE	

$covariate

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width
55	6.5	2.8	4.6	1.5
37 5.5 3.5 1.3 0.2 146 6.7 3.0 5.2 2.3				
70 5.6 2.5 3.9 1.1				
45 5.1 3.8 1.9 0.4 124 6.3 2.7 4.9 1.8				
20 5.1 3.8 1.5 0.3				
76 6.6 3.0 4.4 1.4				
144 6.8 3.2 5.9 2.3 3 4.7 3.2 1.3 0.2 88 6.3 2.3 4.4 1.3				
10 4.9 3.1 1.5 0.1 136 7.7 3.0 6.1 2.3				
126	7.2	3.2	6.0	1.8
102	5.8	2.7	5.1	1.9
125 6.7 3.3 5.7 2.1 64 6.1 2.9 4.7 1.4 111 6.5 3.2 5.1 2.0				
122 5.6 2.8 4.9 2.0 32 5.4 3.4 1.5 0.4 147 6.3 2.5 5.0 1.9				
123 7.7 2.8 6.7 2.0 95 5.6 2.7 4.2 1.3 101 6.3 3.3 6.0 2.5				
149	6.2	3.4	5.4	2.3
143	5.8	2.7	5.1	1.9
94	5.0	2.3	3.3	1.0
150	5.9	3.0	5.1	1.8
11	5.4	3.7	1.5	0.2
83	5.8	2.7	3.9	1.2

54	5.5	2.3	4.0	1.3
57	6.3	3.3	4.7	1.6
61	5.0	2.0	3.5	1.0
48	4.6	3.2	1.4	0.2
29	5.2	3.4	1.4	0.2
69	6.2	2.2	4.5	1.5
130	7.2	3.0	5.8	1.6
115	5.8	2.8	5.1	2.4
145	6.7	3.3	5.7	2.5
17	5.4	3.9	1.3	0.4
50	5.0	3.3	1.4	0.2
96	5.7	3.0	4.2	1.2
35	4.9	3.1	1.5	0.2
93	5.8	2.6	4.0	1.2
49	5.3	3.7	1.5	0.2
12	4.8	3.4	1.6	0.2
14	4.3	3.0	1.1	0.1
60	5.2	2.7	3.9	1.4
18	5.1	3.5	1.4	0.3
97	5.7	2.9	4.2	1.3
109	6.7	2.5	5.8	1.8
134	6.3	2.8	5.1	1.5
62	5.9	3.0	4.2	1.5
113	6.8	3.0	5.5	2.1
75	6.4	2.9	4.3	1.3
119	7.7	2.6	6.9	2.3
41	5.0	3.5	1.3	0.3
27	5.0	3.4	1.6	0.4
25	4.8	3.4	1.9	0.2

89	5.6	3.0	4.1	1.3
100	5.7	2.8	4.1	1.3
91	5.5	2.6	4.4	1.2
19	5.7	3.8	1.7	0.3
137	6.3	3.4	5.6	2.4
46	4.8	3.0	1.4	0.3
103	7.1	3.0	5.9	2.1
85	5.4	3.0	4.5	1.5
6	5.4	3.9	1.7	0.4
44	5.0	3.5	1.6	0.6
86	6.0	3.4	4.5	1.6
71	5.9	3.2	4.8	1.8
36	5.0	3.2	1.2	0.2
104	6.3	2.9	5.6	1.8
42	4.5	2.3	1.3	0.3
139	6.0	3.0	4.8	1.8
118	7.7	3.8	6.7	2.2
106	7.6	3.0	6.6	2.1
9	4.4	2.9	1.4	0.2
43	4.4	3.2	1.3	0.2
84	6.0	2.7	5.1	1.6
66	6.7	3.1	4.4	1.4
39	4.4	3.0	1.3	0.2
7	4.6	3.4	1.4	0.3
72	6.1	2.8	4.0	1.3
117	6.5	3.0	5.5	1.8
108	7.3	2.9	6.3	1.8
4	4.6	3.1	1.5	0.2
38	4.9	3.6	1.4	0.1

138	6.4	3.1	5.5	1.8
65	5.6	2.9	3.6	1.3
5	5.0	3.6	1.4	0.2
2	4.9	3.0	1.4	0.2
87	6.7	3.1	4.7	1.5
82	5.5	2.4	3.7	1.0
40	5.1	3.4	1.5	0.2
77	6.8	2.8	4.8	1.4
128	6.1	3.0	4.9	1.8
67	5.6	3.0	4.5	1.5
92	6.1	3.0	4.6	1.4
131	7.4	2.8	6.1	1.9
74	6.1	2.8	4.7	1.2
56	5.7	2.8	4.5	1.3
59	6.6	2.9	4.6	1.3
120	6.0	2.2	5.0	1.5
23	4.6	3.6	1.0	0.2
13	4.8	3.0	1.4	0.1
33	5.2	4.1	1.5	0.1
107	4.9	2.5	4.5	1.7
127	6.2	2.8	4.8	1.8
24	5.1	3.3	1.7	0.5
116	6.4	3.2	5.3	2.3
34	5.5	4.2	1.4	0.2
68	5.8	2.7	4.1	1.0
58	4.9	2.4	3.3	1.0
73	6.3	2.5	4.9	1.5
80	5.7	2.6	3.5	1.0
8	5.0	3.4	1.5	0.2

99	5.1	2.5	3.0	1.1
121	6.9	3.2	5.7	2.3
133	6.4	2.8	5.6	2.2

$model.list
$model.list$response
[1] "versicolor" "setosa" "virginica"

$model.list$variables
[1] "Sepal.Length" "Sepal.Width" "Petal.Length" "Petal.Width"

$err.fct function (x, y) {
    1/2 * (y - x)^2
}
<bytecode: 0x5774ac69d0d8>
<environment: 0x5774ad1e7bf0>
attr(,"type") [1] "sse"

$act.fct function
(x) {
    1/(1 + exp(-x))
}
<bytecode: 0x5774ac6aa000>
<environment: 0x5774ad1e7758>
attr(,"type") [1] "logistic"

$linear.output [1]
FALSE

$data

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

55 6.5 2.8 4.6 1.5 versicolor 37 5.5 3.5 1.3 0.2 setosa 146 6.7 3.0 5.2 2.3 virginica
70 5.6 2.5 3.9 1.1 versicolor 45 5.1 3.8 1.9 0.4 setosa 124 6.3 2.7 4.9 1.8 virginica 20 5.1 3.8
1.5 0.3 setosa 76 6.6 3.0 4.4 1.4 versicolor
144 6.8 3.2 5.9 2.3 virginica 3 4.7 3.2 1.3 0.2 setosa
88 6.3 2.3 4.4 1.3 versicolor 10 4.9 3.1 1.5 0.1 setosa
136 7.7 3.0 6.1 2.3 virginica

126	7.2	3.2	6.0	1.8	virginica
102	5.8	2.7	5.1	1.9	virginica
125	6.7	3.3	5.7	2.1	virginica
64	6.1	2.9	4.7	1.4	versicolor
111	6.5	3.2	5.1	2.0	virginica
122	5.6	2.8	4.9	2.0	virginica
32	5.4	3.4	1.5	0.4	setosa
147	6.3	2.5	5.0	1.9	virginica
123	7.7	2.8	6.7	2.0	virginica
95	5.6	2.7	4.2	1.3	versicolor
101	6.3	3.3	6.0	2.5	virginica
149	6.2	3.4	5.4	2.3	virginica
143	5.8	2.7	5.1	1.9	virginica
94	5.0	2.3	3.3	1.0	versicolor
150	5.9	3.0	5.1	1.8	virginica
11	5.4	3.7	1.5	0.2	setosa
83	5.8	2.7	3.9	1.2	versicolor
54	5.5	2.3	4.0	1.3	versicolor
57	6.3	3.3	4.7	1.6	versicolor
61	5.0	2.0	3.5	1.0	versicolor
48	4.6	3.2	1.4	0.2	setosa
29	5.2	3.4	1.4	0.2	setosa
69	6.2	2.2	4.5	1.5	versicolor
130	7.2	3.0	5.8	1.6	virginica
115	5.8	2.8	5.1	2.4	virginica
145	6.7	3.3	5.7	2.5	virginica
17	5.4	3.9	1.3	0.4	setosa
50	5.0	3.3	1.4	0.2	setosa
96	5.7	3.0	4.2	1.2	versicolor
35	4.9	3.1	1.5	0.2	setosa
93	5.8	2.6	4.0	1.2	versicolor
49	5.3	3.7	1.5	0.2	setosa

12	4.8	3.4	1.6	0.2	setosa
14	4.3	3.0	1.1	0.1	setosa
60	5.2	2.7	3.9	1.4	versicolor
18	5.1	3.5	1.4	0.3	setosa
97	5.7	2.9	4.2	1.3	versicolor
109	6.7	2.5	5.8	1.8	virginica
134	6.3	2.8	5.1	1.5	virginica
62	5.9	3.0	4.2	1.5	versicolor
113	6.8	3.0	5.5	2.1	virginica
75	6.4	2.9	4.3	1.3	versicolor
119	7.7	2.6	6.9	2.3	virginica
41	5.0	3.5	1.3	0.3	setosa
27	5.0	3.4	1.6	0.4	setosa
25	4.8	3.4	1.9	0.2	setosa
89	5.6	3.0	4.1	1.3	versicolor
100	5.7	2.8	4.1	1.3	versicolor
91	5.5	2.6	4.4	1.2	versicolor
19	5.7	3.8	1.7	0.3	setosa
137	6.3	3.4	5.6	2.4	virginica
46	4.8	3.0	1.4	0.3	setosa
103	7.1	3.0	5.9	2.1	virginica
85	5.4	3.0	4.5	1.5	versicolor
6	5.4	3.9	1.7	0.4	setosa
44	5.0	3.5	1.6	0.6	setosa
86	6.0	3.4	4.5	1.6	versicolor
71	5.9	3.2	4.8	1.8	versicolor
36	5.0	3.2	1.2	0.2	setosa
104	6.3	2.9	5.6	1.8	virginica
42	4.5	2.3	1.3	0.3	setosa
139	6.0	3.0	4.8	1.8	virginica
118	7.7	3.8	6.7	2.2	virginica
106	7.6	3.0	6.6	2.1	virginica
9	4.4	2.9	1.4	0.2	setosa
43	4.4	3.2	1.3	0.2	setosa
84	6.0	2.7	5.1	1.6	versicolor
66	6.7	3.1	4.4	1.4	versicolor
39	4.4	3.0	1.3	0.2	setosa
7	4.6	3.4	1.4	0.3	setosa
72	6.1	2.8	4.0	1.3	versicolor
117	6.5	3.0	5.5	1.8	virginica
108	7.3	2.9	6.3	1.8	virginica
4	4.6	3.1	1.5	0.2	setosa
38	4.9	3.6	1.4	0.1	setosa
138	6.4	3.1	5.5	1.8	virginica
65	5.6	2.9	3.6	1.3	versicolor

5	5.0	3.6	1.4	0.2	setosa
2	4.9	3.0	1.4	0.2	setosa
87	6.7	3.1	4.7	1.5	versicolor
82	5.5	2.4	3.7	1.0	versicolor
40	5.1	3.4	1.5	0.2	setosa
77	6.8	2.8	4.8	1.4	versicolor
128	6.1	3.0	4.9	1.8	virginica
67	5.6	3.0	4.5	1.5	versicolor
92	6.1	3.0	4.6	1.4	versicolor
131	7.4	2.8	6.1	1.9	virginica
74	6.1	2.8	4.7	1.2	versicolor
56	5.7	2.8	4.5	1.3	versicolor
59	6.6	2.9	4.6	1.3	versicolor
120	6.0	2.2	5.0	1.5	virginica
23	4.6	3.6	1.0	0.2	setosa
13	4.8	3.0	1.4	0.1	setosa
33	5.2	4.1	1.5	0.1	setosa
107	4.9	2.5	4.5	1.7	virginica

127 6.2 2.8 4.8 1.8 virginica 24 5.1 3.3 1.7 0.5 setosa 116 6.4 3.2 5.3 2.3 virginica 34 5.5 4.2 1.4 0.2 setosa 68 5.8 2.7 4.1 1.0 versicolor

58	4.9	2.4	3.3	1.0 versicolor
73	6.3	2.5	4.9	1.5 versicolor

80 5.7 2.6 3.5 1.0 versicolor 8 5.0 3.4 1.5 0.2 setosa

99	5.1	2.5	3.0	1.1 versicolor
121	6.9	3.2	5.7	2.3 virginica
133	6.4	2.8	5.6	2.2 virginica

$exclude
NULL

$net.result
$net.result[[1]]

	[,1]	[,2]	[,3]

55 5.510968e-62 1.000000e+00 3.495000e-34

37 1.000000e+00 2.383741e-03 1.114457e-81 146

1.118932e-73 2.935025e-19 1.000000e+00 70 2.605431e-61

1.000000e+00 3.863890e-38

45 1.000000e+00 2.377365e-03 1.120145e-81 124

1.773171e-69 2.862667e-06 1.000000e+00 20

1.000000e+00 2.381823e-03 1.116163e-81

76 3.677713e-61 1.000000e+00 5.118417e-39 144

1.463396e-74 5.437448e-22 1.000000e+00 3

1.000000e+00 2.380866e-03 1.117016e-81 88 3.457192e-
62 1.000000e+00 5.382853e-33
10 1.000000e+00 2.381766e-03 1.116214e-81 136 3.331727e-
74 6.925302e-21 1.000000e+00
126 7.865024e-72 1.511826e-13 1.000000e+00
102 9.312413e-74 1.663398e-19 1.000000e+00
125 2.102869e-73 2.065557e-18 1.000000e+00 64
1.993266e-63 1.000000e+00 9.952266e-26 111 3.434009e-
69 2.210669e-05 1.000000e+00
122 9.005676e-74 1.499720e-19 1.000000e+00 32
1.000000e+00 2.380331e-03 1.117494e-81 147 1.438490e-
72 7.901908e-16 1.000000e+00
123 3.784652e-74 1.027164e-20 1.000000e+00 95
3.240998e-62 1.000000e+00 7.861003e-33 101 6.144976e-
75 3.714824e-23 1.000000e+00
149 4.892277e-74 2.272109e-20 1.000000e+00
143 9.312413e-74 1.663398e-19 1.000000e+00
94 3.999636e-61 1.000000e+00 3.129118e-39
150 5.530746e-72 5.088361e-14 1.000000e+00 11
1.000000e+00 2.383744e-03 1.114455e-81
83 3.727793e-61 1.000000e+00 4.728126e-39
54 1.533889e-62 1.000000e+00 6.320193e-31
57 4.629354e-62 1.000000e+00 9.714613e-34
61 1.444481e-61 1.000000e+00 1.228269e-36
48 1.000000e+00 2.379590e-03 1.118155e-81
29 1.000000e+00 2.382865e-03 1.115236e-81
69 5.320708e-65 1.000000e+00 1.683079e-16 130 2.494088e-
69 8.222171e-06 1.000000e+00
115 6.244517e-75 3.904102e-23 1.000000e+00
145 8.733447e-75 1.101758e-22 1.000000e+00 17
1.000000e+00 2.382163e-03 1.115861e-81
50 1.000000e+00 2.381995e-03 1.116010e-81
96 2.112806e-61 1.000000e+00 1.320693e-37
35 1.000000e+00 2.380569e-03 1.117281e-81
93 2.699288e-61 1.000000e+00 3.139726e-38
49 1.000000e+00 2.383462e-03 1.114705e-81
12 1.000000e+00 2.379818e-03 1.117952e-81
14 1.000000e+00 2.380630e-03 1.117227e-81
60 3.797882e-62 1.000000e+00 3.101985e-33

18 1.000000e+00 2.381570e-03 1.116388e-81

97 1.296262e-61 1.000000e+00 2.317567e-36 109 1.009941e-73 2.137785e-19 1.000000e+00

134 3.958197e-68 4.073568e-02 9.973322e-01 62 1.711760e-61 1.000000e+00 4.538435e-37 113 3.010026e-73 6.262526e-18 1.000000e+00 75 3.644473e-61 1.000000e+00 5.398333e-39 119 7.328586e-75 6.405154e-23 1.000000e+00 41 1.000000e+00 2.381509e-03 1.116443e-81

27 1.000000e+00 2.378303e-03 1.119306e-81

25 1.000000e+00 2.375997e-03 1.121371e-81

89 2.065120e-61 1.000000e+00 1.509885e-37 100 1.742567e-61 1.000000e+00 4.087682e-37 91 2.555245e-64 1.000000e+00 1.697219e-20

19 1.000000e+00 2.383281e-03 1.114866e-81 137 1.398345e-74 4.724127e-22 1.000000e+00 46 1.000000e+00 2.378657e-03 1.118989e-81 103 7.521713e-74 8.593353e-20 1.000000e+00 85 9.793317e-66 9.999991e-01 3.440845e-12 6 1.000000e+00 2.381301e-03 1.116629e-81 44 1.000000e+00 2.374023e-03 1.123144e-81

86 9.135104e-62 1.000000e+00 1.804253e-35

71 3.197331e-67 9.644949e-01 1.783242e-03

36 1.000000e+00 2.382250e-03 1.115784e-81 104 1.885182e-73 1.473200e-18 1.000000e+00

42 1.000000e+00 2.372951e-03 1.124109e-81 139 3.600903e-68 3.071988e-02 9.984664e-01

118 8.136661e-74 1.095758e-19 1.000000e+00

106 2.782045e-74 3.965194e-21 1.000000e+00 9 1.000000e+00 2.377055e-03 1.120423e-81 43 1.000000e+00 2.378855e-03 1.118812e-81

84 2.043611e-71 2.897591e-12 1.000000e+00

66 4.184693e-61 1.000000e+00 2.400089e-39

39 1.000000e+00 2.378378e-03 1.119239e-81 7 1.000000e+00 2.378537e-03 1.119097e-81 72 4.032466e-61 1.000000e+00 2.982650e-39 117 3.228895e-72 9.632137e-15 1.000000e+00

108 2.395985e-73 3.092477e-18 1.000000e+00 4 1.000000e+00 2.378452e-03 1.119172e-81 38 1.000000e+00 2.383060e-03 1.115063e-81 138 2.946197e-72 7.255337e-15 1.000000e+00 65 4.536115e-61 1.000000e+00 1.495731e-39

5 1.000000e+00 2.382572e-03 1.115496e-81 2 1.000000e+00 2.380773e-03 1.117099e-81 87 1.820233e-61 1.000000e+00 3.165331e-37

82 3.631450e-61 1.000000e+00 5.512860e-39

40 1.000000e+00 2.382220e-03 1.115809e-81

77 7.494639e-62 1.000000e+00 5.759926e-35 128 9.652789e-69 5.400823e-04 9.999993e-01 67 2.319426e-64 1.000000e+00 2.994661e-20

92 2.493843e-62 1.000000e+00 3.655124e-32 131 4.621612e-73 2.358749e-17 1.000000e+00 74 5.468321e-63 1.000000e+00 2.676857e-28

56 1.085553e-63 1.000000e+00 3.512515e-24

59 2.268084e-61 1.000000e+00 8.713283e-38 120 1.475580e-71 1.058328e-12 1.000000e+00 23 1.000000e+00 2.382464e-03 1.115592e-81

13 1.000000e+00 2.381590e-03 1.116371e-81

33 1.000000e+00 2.384281e-03 1.113977e-81 107 3.782582e-73 1.269407e-17 1.000000e+00

127 3.178755e-68 2.109730e-02 9.992613e-01 24 1.000000e+00 2.375779e-03 1.121566e-81 116 5.121451e-74 2.617690e-20 1.000000e+00 34 1.000000e+00 2.384853e-03 1.113469e-81

68 3.018805e-61 1.000000e+00 1.629166e-38

58 3.956279e-61 1.000000e+00 3.335658e-39

73 2.990162e-67 9.566758e-01 2.639065e-03

80 4.889727e-61 1.000000e+00 9.631498e-40 8 1.000000e+00 2.381778e-03 1.116204e-81 99 8.423283e-46 1.000000e+00 4.222135e-48 121 3.158893e-74 5.873416e-21 1.000000e+00

133 1.159636e-74 2.647944e-22 1.000000e+00

$weights
$weights[[1]]
$weights[[1]][[1]]
[,1] [,2] [,3] [,4]
[1,] 2.954165 -0.1889898 2.9590994 -0.5822692 [2,] 3.632602 -1.2922141 -0.3148418 -0.5708703 [3,] 4.266830 0.2061764 0.6226494 -1.5850129 [4,] 5.528042 1.4646955 0.6562208 1.9048024
[5,] 3.716274 0.5999010 -2.4618863 0.1547923

$weights[[1]][[2]]

[,1] [,2]

[1,] 1.109641 -8.291534

[2,] 1.081212 -8.107311 [3,] -6.425414

348.463875

[4,] 7.201311 -136.626766

[5,] -5.840216 350.993181

$weights[[1]][[3]]

[,1] [,2] [,3]

[1,] 4.167595 -106.7679 4.606187 [2,] 32.574117

100.7418 -191.027388

[3,] -175.539255 53.5948 96.154620

$generalized.weights

$generalized.weights[[1]]

	[,1]	[,2]	[,3]	[,4]	[,5]
55	5.4232733	5.1065348	-9.4551159	-6.3836547	NaN
37	NaN	NaN	NaN	NaN	4.219762e-04
146	5.7349465	7.6354918	-9.1360788	-15.8227539	1.773645e+01
70	1.7985531	1.5684620	-3.1994660	-1.5530637	NaN
45	NaN	NaN	NaN	NaN	4.707113e-03
124	17.3387736	16.1886914	-27.5197672	-29.8777340	5.362356e+01
20	NaN	NaN	NaN	NaN	1.994012e-03
76	0.8292691	0.8124906	-1.4807435	-0.9333301	NaN
144	1.2699087	2.1265668	-1.8537187	-5.2766376	3.927442e+00
3	NaN	NaN	NaN	NaN	2.157148e-03
88	5.9501457	5.3600832	-10.2007922	-6.9866782	NaN
10	NaN	NaN	NaN	NaN	2.153037e-03
136	3.2077081	3.0536206	-3.9755415	-9.7330155	9.920467e+00
126	10.3374634	6.8133408	-15.2883909	-14.3305554	3.197063e+01
102	3.7804899	4.5575405	-5.8671922	-9.7295641	1.169191e+01
125	5.0236544	6.4081259	-8.2977439	-12.0451017	1.553664e+01
64	12.3112844	10.0010233	-21.2064443	-11.1964723	3.807506e+01
111	17.3826314	20.1175837	-29.9764659	-31.6228434	5.375920e+01
122	3.8433524	5.8401720	-6.5656191	-10.9181296	1.188632e+01
32	NaN	NaN	NaN	NaN	9.333903e-04
147	9.2244959	8.5330512	-13.2668571	-20.6714683	2.852856e+01
123	2.3035792	1.2641637	-2.4149915	-6.1181178	7.124271e+00
95	6.9693328	5.8722325	-12.1480644	-6.3784046	NaN
101	0.1395644	0.7648629	-0.2059326	-1.9836847	4.316304e-01
149	2.8117543	5.7344743	-5.3915607	-9.7380844	8.695902e+00

143	3.7804899	4.5575405	-5.8671922	-9.7295641	1.169191e+01
94	0.6549725	0.5734253	-1.1528904	-0.6159937	NaN
150	9.3917696	10.5658231	-16.2968922	-15.9130633	2.904589e+01
11	NaN	NaN	NaN	NaN	1.076333e-03
83	0.8332002	0.7444354	-1.4685909	-0.8162174	NaN
54	8.2799735	7.2869798	-14.2166918	-9.1867425	2.560744e+01
57	6.0118262	5.3337244	-10.4554758	-6.3007409	NaN
61	3.2343471	2.8558036	-5.7258883	-2.9871684	NaN
48	NaN	NaN	NaN	NaN	3.141977e-03
29	NaN	NaN	NaN	NaN	1.127074e-03
69	15.3648873	12.7835851	-24.1240422	-23.2781667	4.751893e+01
130	16.8286316	8.8192754	-24.6211262	-18.2593139	5.204585e+01
115	0.4385983	1.0514374	-0.6965604	-2.4604753	1.356451e+00
145	0.8458168	1.7852066	-1.3819394	-3.9602017	2.615854e+00
17	NaN	NaN	NaN	NaN	6.746084e-04
50	NaN	NaN	NaN	NaN	1.601060e-03
96	2.4424916	1.8847786	-4.2313335	-1.8697528	NaN
35	NaN	NaN	NaN	NaN	2.279071e-03
93	1.6802091	1.5153301	-2.9860490	-1.5944668	NaN
49	NaN	NaN	NaN	NaN	1.295839e-03
12	NaN	NaN	NaN	NaN	3.453364e-03
14	NaN	NaN	NaN	NaN	2.574543e-03
60	6.4363451	5.7920051	-11.1947199	-6.9592548	NaN
18	NaN	NaN	NaN	NaN	1.459549e-03
97	3.6759868	3.0292114	-6.3973488	-3.2201823	NaN
109	3.9047091	2.2435805	-4.6598063	-8.5830338	1.207608e+01
134	18.4416476	12.8615358	-29.4287607	-19.6222684	5.703441e+01
62	2.8416247	2.5136640	-4.8648042	-3.2386670	NaN
113	6.5111338	7.1074475	-9.8086953	-15.8607253	2.013696e+01
75	0.8723983	0.8237542	-1.5626865	-0.8815928	NaN
119	0.3604397	0.5461369	-0.1907871	-2.5622342	1.114731e+00
41	NaN	NaN	NaN	NaN	1.401245e-03
27	NaN	NaN	NaN	NaN	2.822338e-03
25	NaN	NaN	NaN	NaN	6.186050e-03
89	2.4543504	1.9359435	-4.2093830	-2.1447475	NaN
100	2.8846762	2.4429687	-5.0203523	-2.7015280	NaN
91	15.2001223	11.4777349	-25.9740916	-12.2677862	4.700936e+01
19	NaN	NaN	NaN	NaN	1.016794e-03
137	1.1308799	2.7850830	-2.1219743	-5.3577570	3.497468e+00
46	NaN	NaN	NaN	NaN	2.270214e-03
103	3.9050767	3.7177791	-5.2698266	-10.2890384	1.207722e+01
85	16.7039571	16.7423329	-30.5636154	-17.1251862	5.166027e+01
6	NaN	NaN	NaN	NaN	1.929869e-03
44	NaN	NaN	NaN	NaN	3.307903e-03
86	4.2921893	3.6618926	-7.3466814	-4.5385909	NaN

71	17.5900041	20.0578786	-32.0139735	-25.1059058	5.440054e+01
36	NaN	NaN	NaN	NaN	9.409593e-04
104	4.3837474	3.8659868	-6.5311850	-8.4991406	1.355760e+01
42	NaN	NaN	NaN	NaN	3.026565e-03
139	18.1500092	19.5292061	-31.6493845	-27.8255356	5.613247e+01
118	3.0380432	3.4803251	-4.7408703	-7.2404754	9.395745e+00
106	1.9099248	1.4613785	-2.1064396	-5.7929933	5.906817e+00
9	NaN	NaN	NaN	NaN	4.232503e-03
43	NaN	NaN	NaN	NaN	3.601212e-03
84	11.5944996	8.8049204	-18.0540359	-15.8739419	3.585827e+01
66	0.5047915	0.4912189	-0.8959206	-0.5789363	NaN
39	NaN	NaN	NaN	NaN	3.491292e-03
7	NaN	NaN	NaN	NaN	3.503106e-03

	[,6]	[,7]	[,8]	[,9]	[,10]
55	NaN	NaN	NaN	-3.180420e+01	-2.994672e+01
37	1.021083e-03	-6.209966e-05	-0.004599573	-8.001542e-04	-1.936184e-03
146	2.361426e+01	-2.825512e+01	-48.934971977	NaN	NaN
70	NaN	NaN	NaN	-1.054742e+01	-9.198076e+00
45	6.151559e-04	-5.103240e-03	-0.006659244	-8.925660e-03	-1.166463e-03
124	5.006671e+01	-8.511028e+01	-92.402756504	-1.016814e+02	-9.493683e+01
20	6.935554e-04	-1.922107e-03	-0.004841868	-3.781059e-03	-1.315125e-03
76	NaN	NaN	NaN	-4.863159e+00	-4.764764e+00
144	6.576825e+00	-5.732989e+00	-16.319037312	NaN	NaN
3	1.007755e-03	-2.169336e-03	-0.005595723	-4.090399e-03	-1.910912e-03
88	NaN	NaN	NaN	-3.489399e+01	-3.143363e+01
10	9.184176e-04	-2.407563e-03	-0.004472999	-4.082604e-03	-1.741510e-03
136	9.443921e+00	-1.229514e+01	-30.101260704	NaN	NaN
126	2.107159e+01	-4.728235e+01	-44.320055133	NaN	NaN
102	1.409509e+01	-1.814544e+01	-30.090586475	NaN	NaN
125	1.981839e+01	-2.566240e+01	-37.251841180	NaN	NaN
64	3.093013e+01	-6.558509e+01	-34.627288131	-7.219820e+01	-5.864992e+01
111	6.221758e+01	-9.270810e+01	-97.799849724	-1.019386e+02	-1.179774e+02
122	1.806188e+01	-2.030547e+01	-33.766458842	NaN	NaN
32	1.697299e-03	-4.170100e-04	-0.007667088	-1.769901e-03	-3.218430e-03
147	2.639014e+01	-4.103036e+01	-63.930572850	NaN	NaN
123	3.909674e+00	-7.468835e+00	-18.921480009	NaN	NaN
95	NaN	NaN	NaN	-4.087090e+01	-3.443707e+01
101	2.365489e+00	-6.368871e-01	-6.134934192	NaN	NaN
149	1.773499e+01	-1.667446e+01	-30.116937404	NaN	NaN
143	1.409509e+01	-1.814544e+01	-30.090586475	NaN	NaN
94	NaN	NaN	NaN	-3.841016e+00	-3.362791e+00
150	3.267688e+01	-5.040134e+01	-49.214271569	NaN	NaN
11	6.985015e-04	-9.375129e-04	-0.003838093	-2.040950e-03	-1.324503e-03
83	NaN	NaN	NaN	-4.886212e+00	-4.365661e+00

54	2.253642e+01	-4.396791e+01	-28.411804165	-4.855701e+01	-4.273371e+01
57	NaN	NaN	NaN	-3.525571e+01	-3.127905e+01
61	NaN	NaN	NaN	-1.896748e+01	-1.674755e+01
48	9.164066e-04	-3.396466e-03	-0.005825422	-5.957838e-03	-1.737697e-03
29	9.412628e-04	-9.571273e-04	-0.004665985	-2.137165e-03	-1.784829e-03
69	3.953575e+01	-7.460834e+01	-71.992299399	-9.010572e+01	-7.496795e+01
130	2.727534e+01	-7.614567e+01	-56.470511968	-9.868969e+01	-5.171969e+01
115	3.251776e+00	-2.154250e+00	-7.609502803	NaN	NaN
145	5.521102e+00	-4.273919e+00	-12.247700914	NaN	NaN
17	1.224273e-03	-1.623595e-04	-0.006039539	-1.279197e-03	-2.321475e-03
50	9.695645e-04	-1.534557e-03	-0.005016434	-3.035941e-03	-1.838495e-03
96	NaN	NaN	NaN	-1.432373e+01	-1.105308e+01
35	1.176482e-03	-2.442609e-03	-0.005662212	-4.321589e-03	-2.230854e-03
93	NaN	NaN	NaN	-9.853405e+00	-8.886490e+00
49	6.589273e-04	-1.200844e-03	-0.003875175	-2.457178e-03	-1.249462e-03
12	6.713689e-04	-3.819302e-03	-0.005197065	-6.548292e-03	-1.273054e-03
14	8.990175e-04	-2.737468e-03	-0.005332578	-4.881867e-03	-1.704723e-03
60	NaN	NaN	NaN	-3.774525e+01	-3.396659e+01
18	1.075849e-03	-1.226111e-03	-0.005710599	-2.767607e-03	-2.040032e-03
97	NaN	NaN	NaN	-2.155743e+01	-1.776448e+01
109	6.938713e+00	-1.441137e+01	-26.544716481	NaN	NaN
134	3.977682e+01	-9.101422e+01	-60.685716211	-1.081491e+02	-7.542509e+01
62	NaN	NaN	NaN	-1.666440e+01	-1.474111e+01
113	2.198118e+01	-3.033532e+01	-49.052405932	NaN	NaN
75	NaN	NaN	NaN	-5.116085e+00	-4.830818e+00
119	1.689036e+00	-5.900465e-01	-7.924212183	NaN	NaN
41	1.099612e-03	-1.121071e-03	-0.005863358	-2.657050e-03	-2.085091e-03
27	1.386876e-03	-2.765358e-03	-0.007767670	-5.351737e-03	-2.629805e-03
25	6.069873e-04	-7.262199e-03	-0.006199536	-1.173003e-02	-1.150974e-03
89	NaN	NaN	NaN	-1.439327e+01	-1.135313e+01
100	NaN	NaN	NaN	-1.691687e+01	-1.432653e+01
91	3.549715e+01	-8.032998e+01	-37.940536637	-8.913948e+01	-6.730994e+01
19	8.473310e-04	-8.124062e-04	-0.004389938	-1.928052e-03	-1.606715e-03
137	8.613416e+00	-6.562622e+00	-16.569915164	NaN	NaN
46	1.722257e-03	-2.221704e-03	-0.007870390	-4.304795e-03	-3.265756e-03
103	1.149796e+01	-1.629797e+01	-31.820870814	NaN	NaN
85	5.177895e+01	-9.452398e+01	-52.962999570	-9.795855e+01	-9.818360e+01
6	8.669698e-04	-1.781121e-03	-0.005493665	-3.659431e-03	-1.643954e-03
44	2.309409e-03	-2.794839e-03	-0.012541803	-6.272468e-03	-4.379118e-03
86	NaN	NaN	NaN	-2.517108e+01	-2.147477e+01
71	6.203293e+01	-9.900950e+01	-77.644941291	-1.031547e+02	-1.176273e+02
36	1.197004e-03	-6.481656e-04	-0.005536143	-1.784254e-03	-2.269767e-03
104	1.195632e+01	-2.019897e+01	-26.285260526	NaN	NaN
42	4.138874e-03	-3.577416e-03	-0.013156511	-5.738994e-03	-7.848162e-03

139 6.039790e+01 -9.788193e+01 -86.055930109 -1.064388e+02 -1.145269e+02

118 1.076359e+01 -1.466207e+01 -22.392591340 NaN NaN

106 4.519600e+00 -6.514578e+00 -17.915968692 NaN NaN

9 1.386678e-03 -4.841721e-03 -0.007284916 -8.025702e-03 -2.629429e-03 43 8.472447e-04 -3.886149e-03 -0.006161523 -6.828643e-03 -1.606551e-03

84 2.723094e+01 -5.583565e+01 -49.093281052 NaN NaN

66 NaN NaN NaN -2.960295e+00 -2.880700e+00

39 1.176524e-03 -3.812804e-03 -0.006753081 -6.620212e-03 -2.230933e-03

7 9.118833e-04 -3.644098e-03 -0.006721129 -6.642613e-03 -1.729119e-03

[,11] [,12]

55 5.544851e+01 3.743625e+01

37 1.177538e-04 8.721742e-03

146 NaN NaN

70 1.876292e+01 9.107774e+00

45 9.676800e-03 1.262730e-02 124

1.613867e+02 1.752147e+02 20

3.644713e-03 9.181184e-03

76 8.683660e+00 5.473414e+00

144 NaN NaN

3 4.113511e-03 1.061065e-02 88

5.982144e+01 4.097262e+01

10 4.565238e-03 8.481731e-03

136 NaN NaN

126 NaN NaN

102 NaN NaN

125 NaN NaN

64 1.243629e+02 6.566050e+01

111 1.757937e+02 1.854487e+02

122 NaN NaN

32 7.907373e-04 1.453838e-02

147 NaN NaN

123 NaN NaN

95 7.124101e+01 3.740546e+01

101 NaN NaN

149 NaN NaN

143 NaN NaN

94 6.761001e+00 3.612429e+00

150 NaN NaN

11 1.777718e-03 7.277819e-03

83 8.612393e+00 4.786619e+00

54 8.337225e+01 5.387466e+01

57 6.131501e+01 3.695001e+01

61 3.357885e+01 1.751793e+01

48 6.440402e-03 1.104621e-02

29 1.814911e-03 8.847673e-03

69 1.414728e+02 1.365123e+02

130 1.443879e+02 1.070798e+02

115 NaN NaN

145 NaN NaN

17 3.078671e-04 1.145222e-02

50 2.909838e-03 9.512197e-03

96 2.481420e+01 1.096496e+01

35 4.631692e-03 1.073673e-02

93 1.751136e+01 9.350578e+00

49 2.277048e-03 7.348133e-03

12 7.242186e-03 9.854710e-03

14 5.190805e-03 1.011167e-02

60 6.565023e+01 4.081180e+01

18 2.324961e-03 1.082848e-02

97 3.751656e+01 1.888441e+01

109 NaN NaN

134 1.725818e+02 1.150727e+02 62 2.852912e+01 1.899281e+01

113 NaN NaN

75 9.164206e+00 5.170006e+00

119 NaN NaN

41 2.125783e-03 1.111814e-02

27 5.243690e-03 1.472911e-02

25 1.377063e-02 1.175560e-02

89 2.468547e+01 1.257764e+01 100 2.944131e+01 1.584282e+01 91 1.523223e+02 7.194311e+01

19 1.540490e-03 8.324230e-03

137 NaN NaN

46 4.212811e-03 1.492389e-02

103 NaN NaN

85 1.792370e+02 1.004288e+02 6 3.377374e-03 1.041713e-02 44 5.299593e-03 2.378185e-02

86 4.308382e+01 2.661608e+01

71 1.877425e+02 1.472309e+02

36 1.229056e-03 1.049767e-02

104 NaN NaN

42 6.783520e-03 2.494747e-02 139 1.856044e+02 1.631798e+02

118 NaN NaN

106 NaN NaN

9 9.180905e-03 1.381371e-02 43 7.368942e-03 1.168352e-02

84 NaN NaN

66 5.254030e+00 3.395110e+00

39 7.229866e-03 1.280524e-02

7 6.909964e-03 1.274465e-02

[reached getOption("max.print") -- omitted 37 rows] $startweights

$startweights[[1]]

$startweights[[1]][[1]]

[,1] [,2] [,3] [,4]

[1,] -1.0458348 0.77423195 -0.9602864 0.6787051 [2,] -0.3673978 -1.68289827 -1.1898026 -0.7665335 [3,] 0.2668296 0.06191503 -0.7462531 -0.2843683 [4,] 1.5280424 0.75299000 1.2208441 0.7467765

[5,] -0.2837257 -0.83605244 -0.3181927 -1.6039578

$startweights[[1]][[2]]

[,1] [,2]

[1,] 0.00651497 -0.5233031 [2,] -0.02191388 -0.3390795

[3,] -0.74364067 -1.2128671 [4,] 1.51092366 -1.0569400

[5,] -1.13580406 0.8177532

$startweights[[1]][[3]]

[,1] [,2] [,3]

[1,] 0.3348667 -1.020637 0.4856726 [2,] 1.8163913
2.275452 0.1071237

[3,] 0.3894724 1.425514 0.9289246

$result.matrix [,1]

error 1.003216e+00 reached.threshold 9.744090e-

03 steps 1.157700e+04

Intercept.to.1layhid1 2.954165e+00

Sepal.Length.to.1layhid1 3.632602e+00

Sepal.Width.to.1layhid14.266830e+00

Petal.Length.to.1layhid1 5.528042e+00

Petal.Width.to.1layhid1 3.716274e+00 Intercept.to.1layhid2

-1.889898e-01 Sepal.Length.to.1layhid2 -1.292214e+00

Sepal.Width.to.1layhid22.061764e-01

Petal.Length.to.1layhid2 1.464695e+00

Petal.Width.to.1layhid2 5.999010e-01 Intercept.to.1layhid3

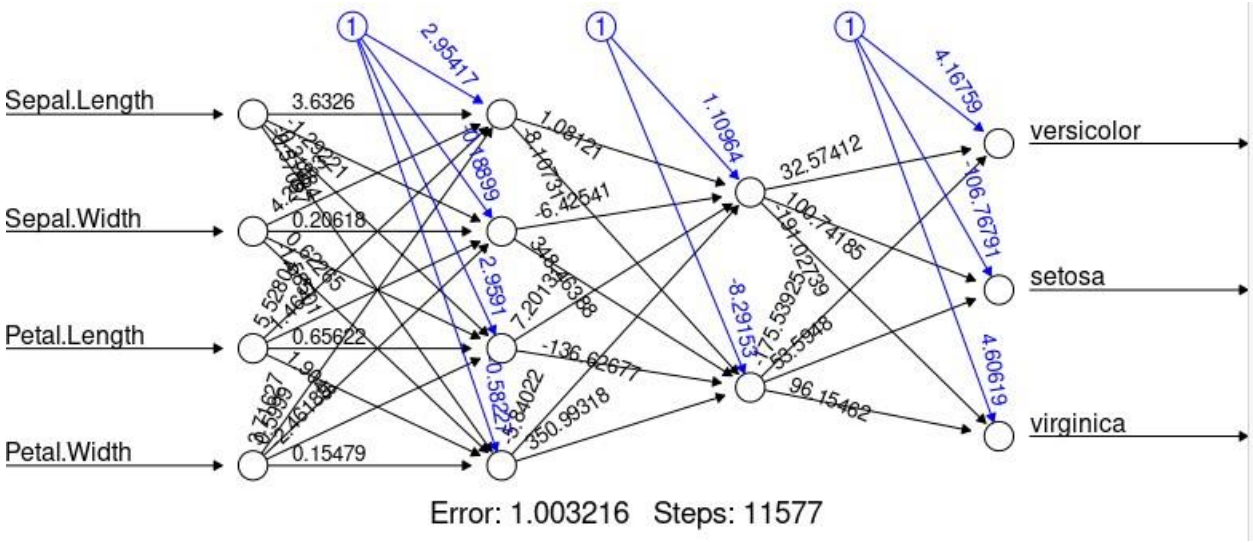
2.959099e+00 Sepal.Length.to.1layhid3 -3.148418e-01

Sepal.Width.to.1layhid36.226494e-01

Petal.Length.to.1layhid3 6.562208e-01

Petal.Width.to.1layhid3 -2.461886e+00
Intercept.to.1layhid4 -5.822692e-01
Sepal.Length.to.1layhid4 -5.708703e-01
Sepal.Width.to.1layhid4 -1.585013e+00
Petal.Length.to.1layhid4 1.904802e+00
Petal.Width.to.1layhid4 1.547923e-01
Intercept.to.2layhid1 1.109641e+00
1layhid1.to.2layhid1 1.081212e+00
1layhid2.to.2layhid1 -6.425414e+00
1layhid3.to.2layhid1 7.201311e+00
1layhid4.to.2layhid1 -5.840216e+00
Intercept.to.2layhid2 -8.291534e+00
1layhid1.to.2layhid2 -8.107311e+00
1layhid2.to.2layhid2 3.484639e+02
1layhid3.to.2layhid2 -1.366268e+02
1layhid4.to.2layhid2 3.509932e+02
Intercept.to.versicolor 4.167595e+00
2layhid1.to.versicolor 3.257412e+01
2layhid2.to.versicolor -1.755393e+02
Intercept.to.setosa -1.067679e+02
2layhid1.to.setosa 1.007418e+02

2layhid2.to.setosa 5.359480e+01
Intercept.to.virginica 4.606187e+00
2layhid1.to.virginica -1.910274e+02
2layhid2.to.virginica 9.615462e+01
attr(,"class")
[1] "nn"




```
> pred <- predict(model, test_data)
> pred
                  [,1]                  [,2]                  [,3]
2             1.000000e+00 2.380773e-03 1.117099e-81
```

14 1.000000e+00 2.380630e-03 1.117227e-81
23 1.000000e+00 2.382464e-03 1.115592e-81
24 1.000000e+00 2.375779e-03 1.121566e-81
27 1.000000e+00 2.378303e-03 1.119306e-81
33 1.000000e+00 2.384281e-03 1.113977e-81
45 1.000000e+00 2.377365e-03 1.120145e-81
47 1.000000e+00 2.382340e-03 1.115703e-81
51 3.841502e-61 1.000000e+00 3.964263e-39
57 4.629354e-62 1.000000e+00 9.714613e-34
65 4.536115e-61 1.000000e+00 1.495731e-39
75 3.644473e-61 1.000000e+00 5.398333e-39
87 1.820233e-61 1.000000e+00 3.165331e-37
91 2.555245e-64 1.000000e+00 1.697219e-20
92 2.493843e-62 1.000000e+00 3.655124e-32
95 3.240998e-62 1.000000e+00 7.861003e-33 100 1.742567e-
61 1.000000e+00 4.087682e-37
101 6.144976e-75 3.714824e-23 1.000000e+00
103 7.521713e-74 8.593353e-20 1.000000e+00
104 1.885182e-73 1.473200e-18 1.000000e+00
106 2.782045e-74 3.965194e-21 1.000000e+00
115 6.244517e-75 3.904102e-23 1.000000e+00
122 9.005676e-74 1.499720e-19 1.000000e+00
124 1.773171e-69 2.862667e-06 1.000000e+00
125 2.102869e-73 2.065557e-18 1.000000e+00
128 9.652789e-69 5.400823e-04 9.999993e-01
133 1.159636e-74 2.647944e-22 1.000000e+00
134 3.958197e-68 4.073568e-02 9.973322e-01
138 2.946197e-72 7.255337e-15 1.000000e+00
147 1.438490e-72 7.901908e-16 1.000000e+00

```
> labels<-c("setosa", "versicolor", "virginica")
> labels
[1] "setosa"                    "versicolor" "virginica"
> prediction_label <- data.frame(max.col(pred)) %>%
+                 mutate(pred=labels[max.col.pred.]) %>%
+           select(2) %>%
+           unlist()
> table(test_data$Species, prediction_label) prediction_label
```

```
                setosa versicolor virginica setosa        8
     0          0 versicolor       0          9          0 virginica
     0          0          13
> prediction_label
```

```
     pred1      pred2      pred3      pred4      pred5
"setosa"   "setosa"   "setosa"   "setosa"   "setosa"
     pred6      pred7      pred8      pred9     pred10
```

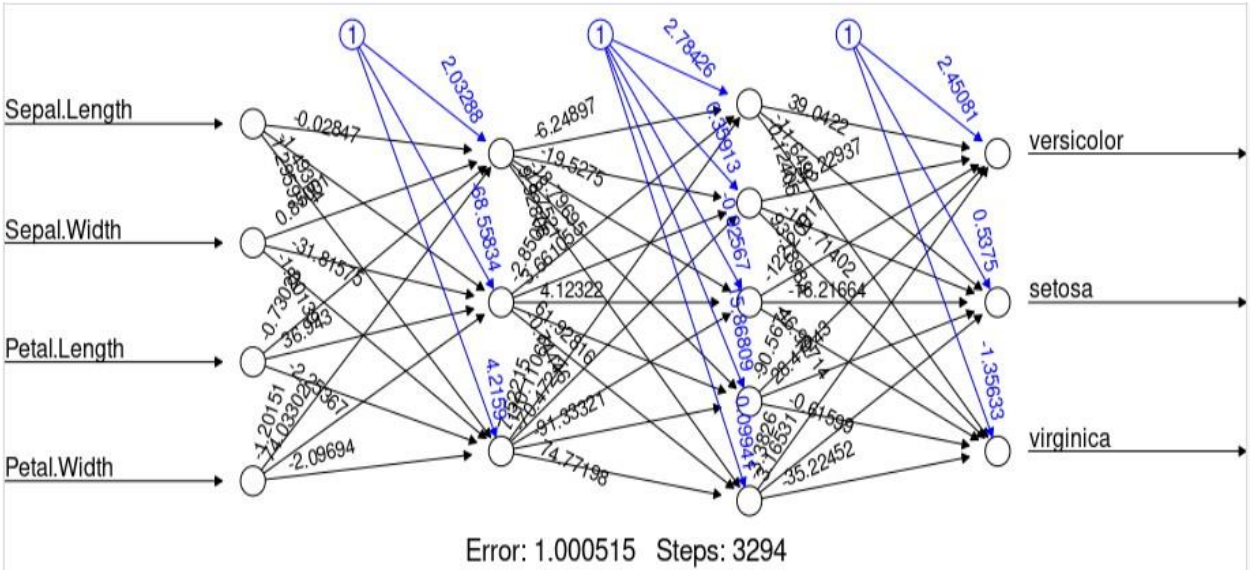
"setosa" "setosa" "setosa" "versicolor" "versicolor" pred11 pred12 pred13 pred14 pred15
"versicolor" "versicolor" "versicolor" "versicolor" "versicolor" pred16 pred17 pred18 pred19
pred20
"versicolor" "versicolor" "virginica" "virginica" "virginica" pred21 pred22 pred23 pred24 pred25
"virginica" "virginica" "virginica" "virginica" "virginica" pred26 pred27 pred28 pred29 pred30
"virginica" "virginica" "virginica" "virginica" "virginica"

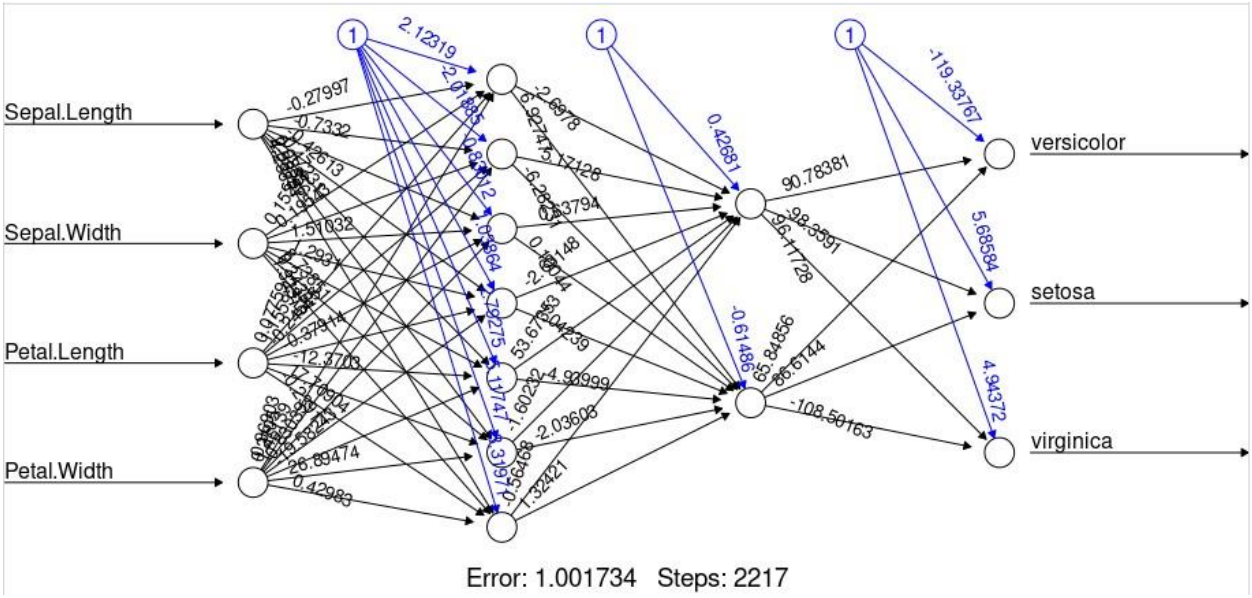
```
>
> check = as.numeric(test_data$Species) == max.col(pred)
> check
 [1] TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE [13] TRUE TRUE TRUE
TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE
[25] TRUE TRUE TRUE TRUE TRUE TRUE
> accuracy <- (sum(check)/nrow(test_data))*100
> print(accuracy) [1] 100
```

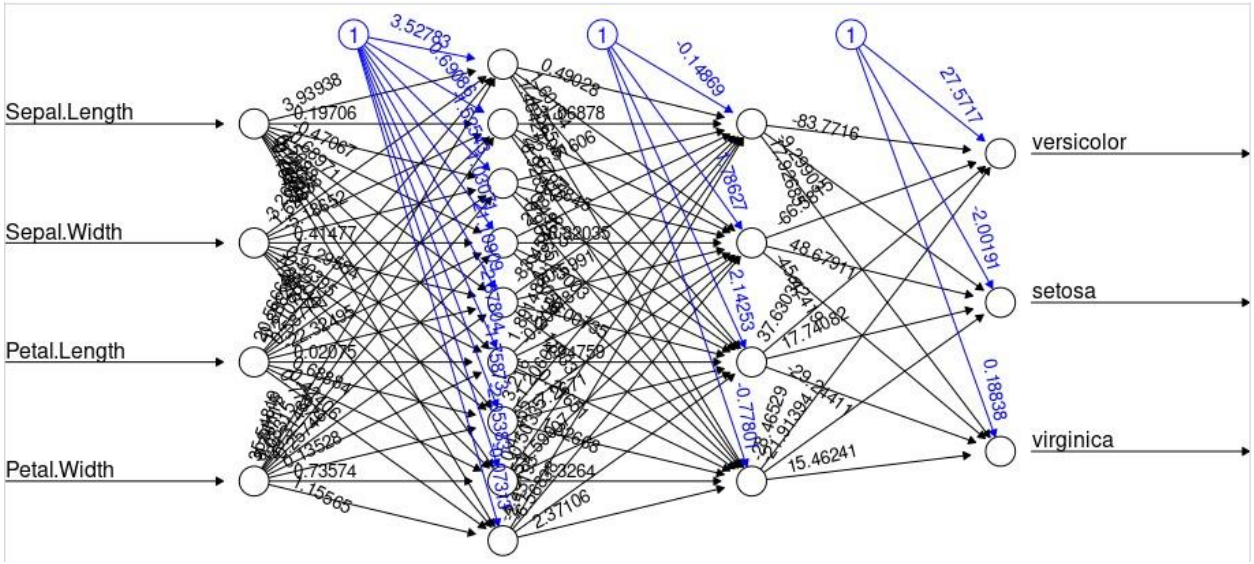
TABLE ANALYSIS

The table below i tried for different other layers and the accuracy it gives

layers	accuracy
4-2	100
3-5	100
7-2	100
9-4	100


Sepal.Length
Sepal.Width
Petal.Length
Petal.Width
versicolor
setosa
virginica
Error: 1.000515 Steps: 3294


Sepal.Length
Sepal.Width
Petal.Length
Petal.Width
versicolor
setosa
virginica
Error: 1.001734 Steps: 2217



ANALYSIS

I noticed this analysis of the iris dataset ...since it's a simple dataset,the results I got were 100 % accurate because simple models achieve high accuracy.

The iris dataset is also deemed to be balanced which means that the classes in the dataset iris are well distributed hence the reason I get 100% in all types of hidden layers.