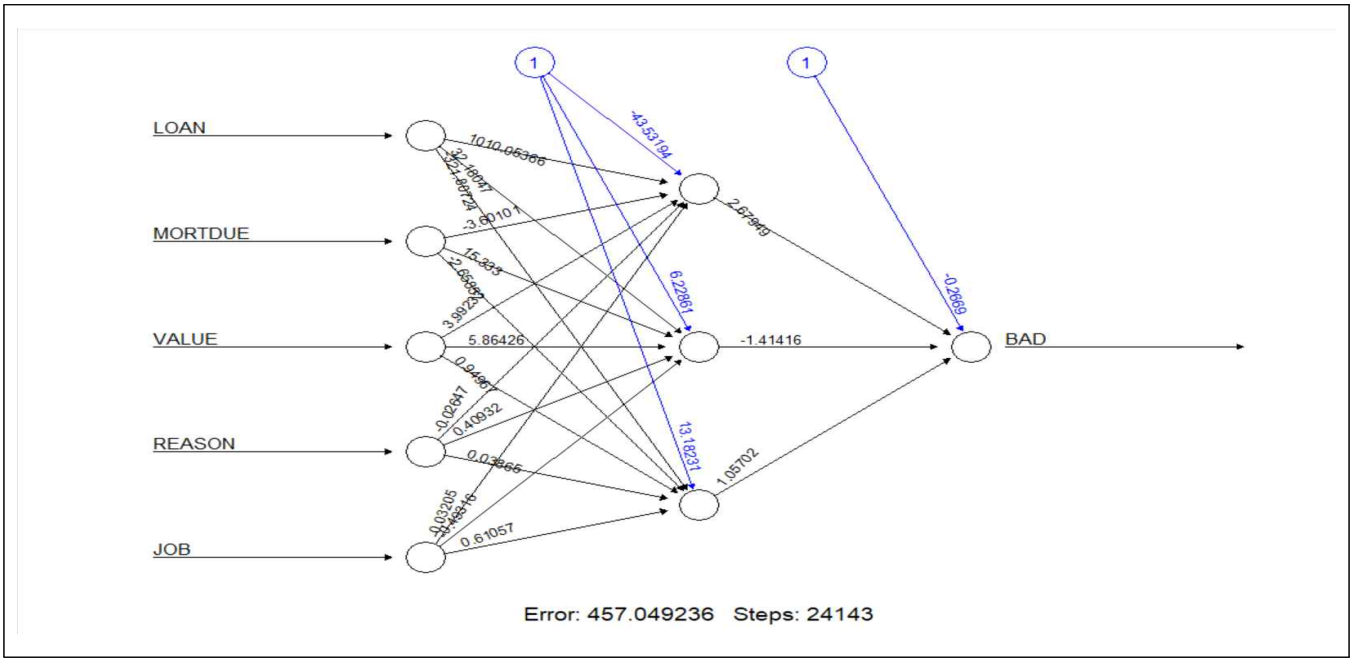
```
> setwd("C://Users/chacha/Desktop")
> htrain <- read.csv("hmeqN_train_map.csv", header=T)
> str(htrain)
```

```
'data.frame':    2000 obs. of  7 variables:
 $ ID      : int  4952 5546 938 277 5204 5762 2354 2896 76 4700 ...
 $ BAD     : int  1 1 1 1 1 1 1 1 1 1 ...
 $ LOAN    : num  0.4231 0.657 -0.0237 -0.113 0.4757 ...
 $ MORTDUE: num  0.0488 1.6498 -0.2351 -0.0274 -0.0143 ...
 $ VALUE   : num  0.02527 1.00538 -0.10021 -0.00984 0.04683 ...
 $ REASON : int  -1 -1 -1 0 -1 -1 -1 -1 0 -1 ...
 $ JOB     : num  -0.67 -1 0.67 -1 -0.33 0.67 -1 0.67 0.67 -0.33 ...
```

```
> htest <- read.csv("hmeqN_test_map.csv", header=T)
> str(htest)
```

```
'data.frame':    378 obs. of  7 variables:
 $ ID      : int  5632 675 3234 3537 3804 926 462 2229 4770 184 ...
 $ BAD     : int  1 1 1 1 1 1 1 1 1 1 ...
 $ LOAN    : num  0.7563 -0.0527 0.1924 0.2266 0.2635 ...
 $ MORTDUE: num  0.2667 -0.1457 0.031 -0.013 -0.0327 ...
 $ VALUE   : num  0.19292 0.01992 0.03216 0.00278 0.12148 ...
 $ REASON : int  0 0 -1 -1 -1 -1 0 -1 -1 -1 ...
 $ JOB     : num  -1 -1 0.67 -0.33 0.67 0.67 0 -1 0 0.67 ...
```

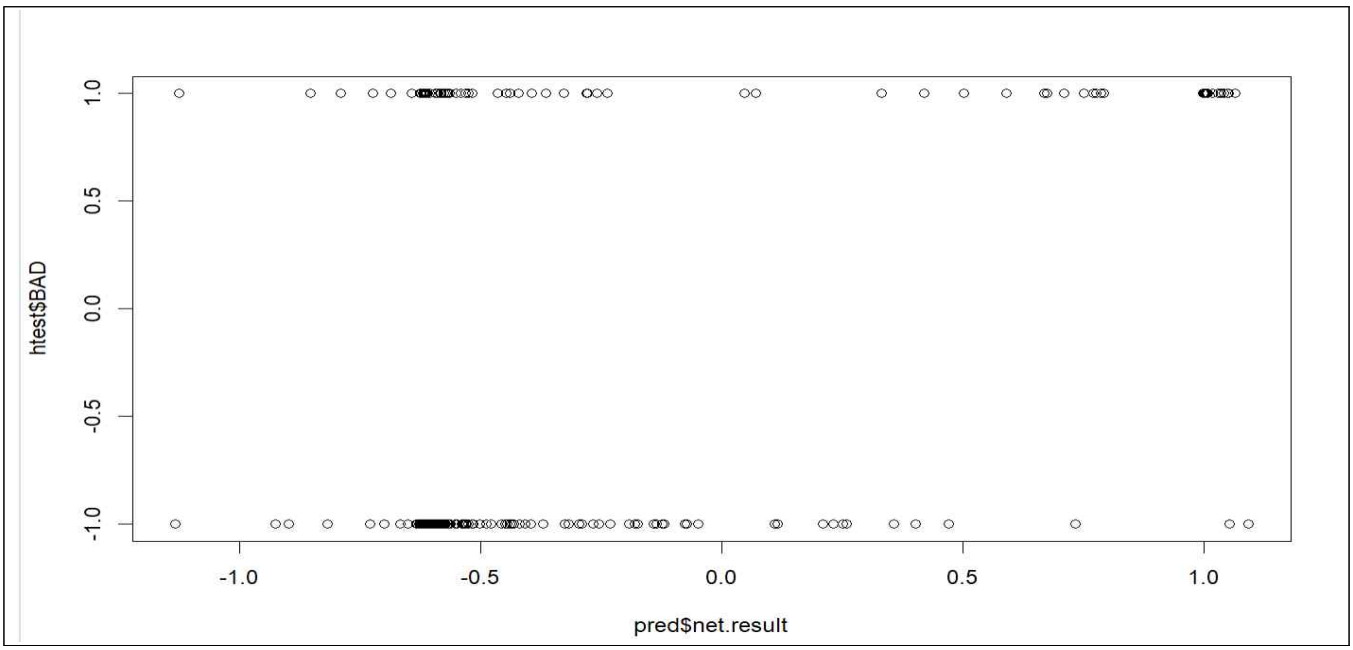
```
> install.packages("neuralnet")
> library(neuralnet)
> nn1 <- neuralnet(BAD~.-ID, data=htrain,
+                  algorithm="rprop+",act.fct='logistic',
+                  linear.output=TRUE,
+                  hidden=3)
> plot(nn1)
```



```
> pred <- compute(nn1,htest[3:7])
> print(pred)
```

```
$net.result
                [,1]
  [1,]  0.99842801
  [2,] -0.55085962
  [3,]  0.99843418
. . .
[376,] -0.61862570
[377,] -0.60338153
[378,] -0.57756737
```

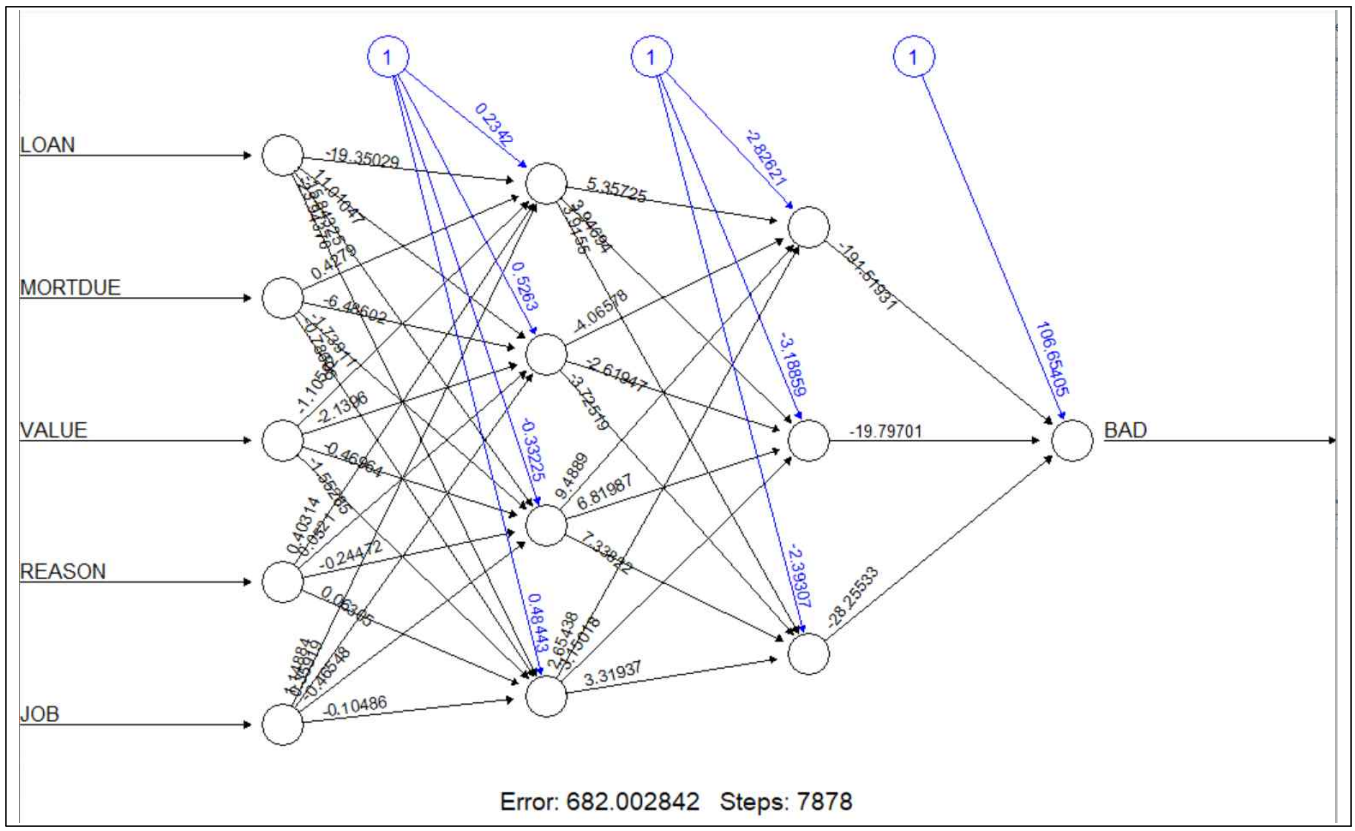
```
> plot(htest$BAD~pred$net.result)
```




```
> pred1 <- as.data.frame(pred)
> install.packages("writexl")
> library(writexl)
> writexl::write_xlsx(pred1, path="pred1.xlsx")
```

	A	B	C	D	E	F	G	H	I	J	K
1	ıeurons.V	urons.LOA	ons.MORT	urons.VAL	rons.REA	eurons.JO	neurons.1	neurons.2	neurons.3	neurons.4	net.result
2	1	0.756258	0.266743	0.192917	0	-1	1	1	1	3.4E-101	0.998428
3	1	-0.0527	-0.14573	0.019917	0	-1	1	1.79E-42	0.948249	1	-0.55086
4	1	0.192358	0.031027	0.032159	-1	0.67	1	1	0.999996	9.54E-22	0.998434
5	1	0.226614	-0.01301	0.002783	-1	-0.33	1	1	0.999998	9.24E-27	0.998431
6	1	0.263505	-0.03269	0.121481	-1	0.67	1	1	0.999999	1.4E-31	0.998429
7	1	-0.02635	-0.11549	-0.06091	-1	0.67	1	4.1E-31	0.925044	1	-0.51804
8	1	-0.08169	-0.14983	0.003522	0	0	1	3.18E-55	0.789707	1	-0.32665
9	1	0.097497	-0.10483	-0.00125	-1	-1	1	1	0.999605	8.66E-09	0.998987
10	1	0.395257	-0.03942	-0.11341	-1	0	1	1	1	2.93E-50	0.998428
11	1	-0.13175	-0.1954	-0.1067	-1	0.67	1	2.65E-77	0.085277	1	0.669524
12	1	0.289855	0.237092	0.130594	-1	-0.67	1	1	1	6.32E-36	0.998428
13	1	0.105402	0.363114	0.184887	-1	-0.33	1	1	1	3.52E-10	0.998428
14	1	-0.13966	-0.20093	-0.08716	0	-1	1	1.02E-80	0.203518	1	0.502314

```
> nn1 <- neuralnet(BAD~.-ID, data=htrain,
+                  algorithm="rprop+",act.fct='logistic',
+                  linear.output=FALSE,
+                  hidden=c(4,3))
> plot(nn1)
```



FN

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	neurons.V	urons.LO	ons.MORT	urons.VAL	rons.REA	seurons.JO	neurons.1	neurons.2	neurons.3	neurons.4	net.result	Y-hat	BAD	if correct,1	accuracy
2	1	0.756258	0.266743	0.192917	0	-1	1	1	1	3.4E-101	0.998428	1	1	1	316
3	1	-0.0527	-0.14573	0.019917	0	-1	1	1.79E-42	0.948249	1	-0.55086	-1	1	0	83.5978836
4	1	0.192358	0.031027	0.032159	-1	0.67	1	1	0.999996	9.54E-22	0.998434	1	1	1	
5	1	0.226614	-0.01301	0.002783	-1	-0.33	1	1	0.999998	9.24E-27	0.998431	1	1	1	
6	1	0.263505	-0.03269	0.121481	-1	0.67	1	1	0.999999	1.4E-31	0.998429	1	1	1	
7	1	-0.02635	-0.11549	-0.06091	-1	0.67	1	4.1E-31	0.925044	1	-0.51804	-1	1	0	
8	1	-0.08169	-0.14983	0.003522	0	0	1	3.18E-55	0.789707	1	-0.32665	-1	1	0	
9	1	0.097497	-0.10483	-0.00125	-1	-1	1	1	0.999605	8.66E-09	0.998987	1	1	1	
10	1	0.395257	-0.03942	-0.11341	-1	0	1	1	1	2.93E-50	0.998428	1	1	1	
11	1	-0.13175	-0.1954	-0.1067	-1	0.67	1	2.65E-77	0.085277	1	0.669524	1	1	1	
12	1	0.289855	0.237092	0.130594	-1	-0.67	1	1	1	6.32E-36	0.998428	1	1	1	
13	1	0.105402	0.363114	0.184887	-1	-0.33	1	1	1	3.52E-10	0.998428	1	1	1	
14	1	-0.13966	-0.20093	-0.08716	0	-1	1	1.02E-80	0.203518	1	0.502314	1	1	1	
15	1	-0.03689	-0.15045	-0.09363	-1	-0.33	1	1E-35	0.874242	1	-0.4462	-1	1	0	
16	1	0.83531	0.000838	1.843683	0	0.67	1	1	1	8.3E-111	0.998428	1	1	1	