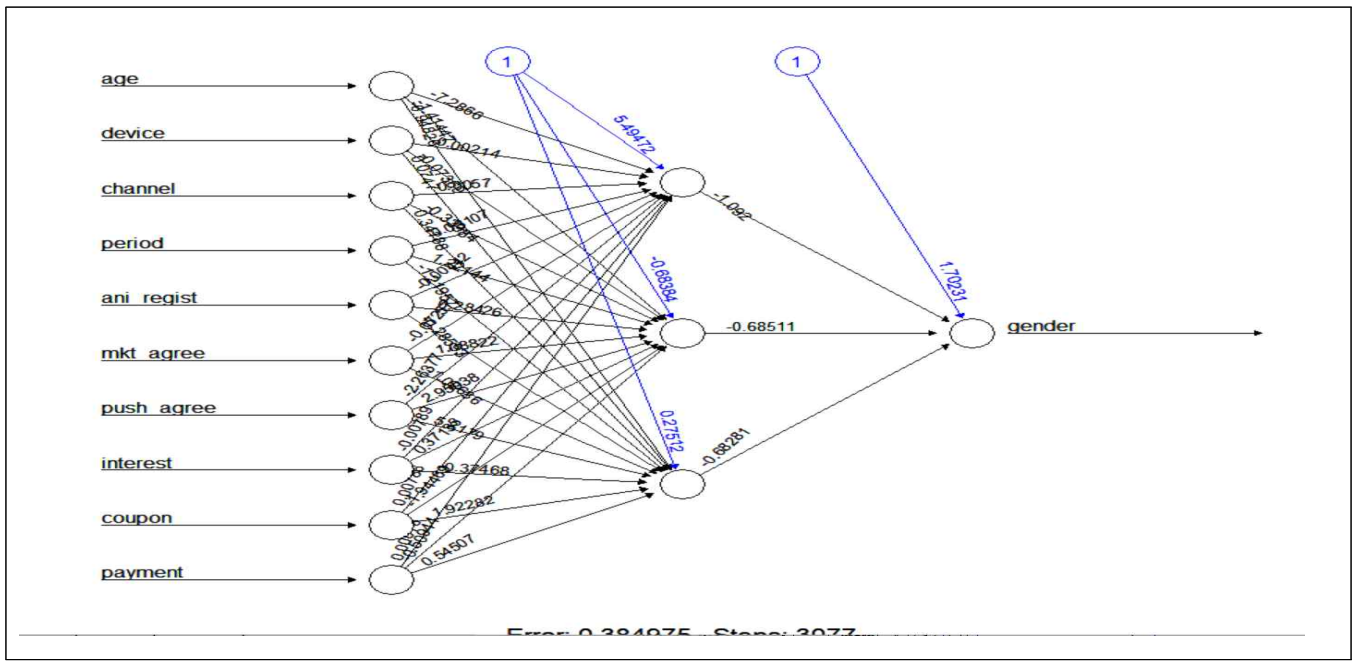
```
> setwd("C://Users/chacha/Desktop")
> install.packages("MASS")library(MASS)
> install.packages("MASS")

> pro_train <- read.csv("project_data_train_mapping.csv", header=T)
> str(pro_train)
'data.frame':    51901 obs. of  12 variables:
 $ id          : int  100000 100001 100002 100003 100004 100005 100006 100007 100008 100009 ...
 $ gender      : int  1 1 1 1 1 1 1 1 1 1 ...
 $ age         : num  1 1 1 1 1 1 1 1 1 1 ...
 $ device      : num  -1 -0.33 0.33 -0.33 -1 0.33 -1 -0.33 -1 -1 ...
 $ channel     : num  0.5 1 -1 1 1 0.5 1 -0.5 -1 0.5 ...
 $ period      : num  1 -0.67 0.67 -0.33 0 0 -0.67 -1 -1 -0.67 ...
 $ ani_regist: int  -1 -1 -1 -1 -1 -1 -1 -1 1 -1 ...
 $ mkt_agree : int  1 1 1 1 1 1 1 1 1 1 ...
 $ push_agree: int  1 1 1 1 1 1 -1 1 1 1 ...
 $ interest  : int  1 1 1 1 1 -1 1 -1 -1 -1 ...
 $ coupon      : int  1 -1 1 -1 1 -1 1 1 -1 1 ...
 $ payment     : int  1 1 1 1 1 1 1 1 -1 1 ...
> pro_train_r <- sample(1:nrow(pro_train),6000)
> head(pro_train_r)

[1] 16525  8380 45514  1645  2089 51271

> pro_train_sr <- pro_train[pro_train_r,]
> pro_train_sr

          id gender age device channel period ani_regist mkt_agree push_agree interest coupon payment
16525 116524      1   1  -0.33    -0.5  -0.67          1         1          1       -1     -1      -1
8380  108379      1   1  -0.33    -0.5  -1.00          1         1          1       -1     -1      -1
45514 145513      1   1  -0.33     0.5  -1.00          1         1          1       -1     -1      -1
1645  101644      1   1  -0.33     0.5  -1.00          1         1          1       -1     -1      -1
2089  102088      1   1  -0.33    -0.5  -1.00          1         1          1       -1     -1      -1
51271 151270      1   1  -0.33    -0.5  -1.00         -1         1          1        1     -1      -1
17328 117327      1   1  -0.33    -1.0  -1.00          1        -1         -1       -1     -1      -1
22796 122795      1   1  -0.33     0.5  -1.00          1         1          1       -1     -1      -1
. . .
32097 132096      1   1  -1.00     1.0   0.00          1        -1         -1       -1     -1      -1
34386 134385      1   1  -0.33     1.0  -1.00         -1         1          1       -1     -1      -1
25848 125847      1   1  -0.33    -0.5  -1.00         -1         1          1       -1     -1      -1
 [ reached 'max' / getOption("max.print") -- omitted 5917 rows ]

> dim(pro_train_sr)

[1] 6000   12
```

```
> pro_test <- read.csv("project_data_test_mapping.csv", header=T)
> str(pro_test)
'data.frame':	34654 obs. of  12 variables:
 $ id          : int  151901 151902 151903 151904 151905 151906 151907 151908 151909 151910 ...
 $ gender      : int  1 1 1 1 1 1 1 1 1 1 ...
 $ age         : num  1 1 1 1 1 1 1 1 1 1 ...
 $ device      : num  -0.33 -0.33 -0.33 -0.33 -0.33 -1 -0.33 -0.33 -0.33 -0.33 ...
 $ channel     : num  1 -0.5 1 0.5 -0.5 1 1 0.5 1 0.5 ...
 $ period      : num  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
 $ ani_regist: int  -1 1 1 1 1 1 1 1 1 1 ...
 $ mkt_agree : int  1 1 1 1 1 1 1 1 1 1 ...
 $ push_agree: int  1 1 1 1 1 1 1 1 1 1 ...
 $ interest  : int  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
 $ coupon      : int  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
 $ payment     : int  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
> pro_test_r <- sample(1:nrow(pro_test),4000)
> pro_test_sr <- pro_test[pro_test_r,]
> head(pro_test_sr)
```

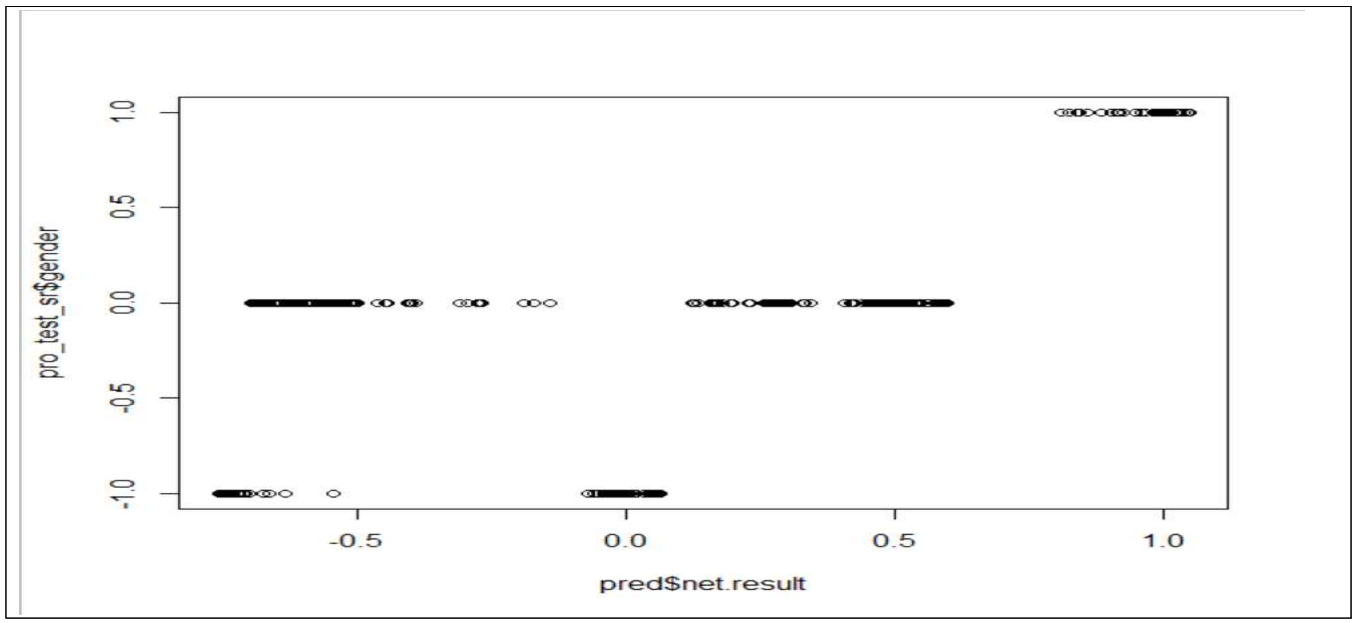
	id	gender	age	device	channel	period	ani_regist	mkt_agree	push_agree	interest	coupon	payment
7820	159720	1	1.00	-0.33	0.5	-1	1	1	1	-1	-1	-1
32655	184556	0	-0.34	-0.33	-0.5	-1	1	1	1	-1	-1	-1
22256	174156	-1	0.78	-1.00	0.0	-1	1	-1	-1	-1	1	1
21580	173480	-1	-0.12	-0.33	1.0	-1	1	1	1	-1	-1	-1
32431	184332	1	1.00	-0.33	-0.5	-1	1	-1	-1	-1	-1	-1
16465	168365	-1	0.32	-0.33	1.0	-1	1	1	1	-1	-1	-1

```
> dim(pro_test_sr)
[1] 4000   12
```

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




```
> pred <- compute(nn1,pro_test_sr[2:11])
> plot(pro_test_sr$gender~pred$net.result)
```

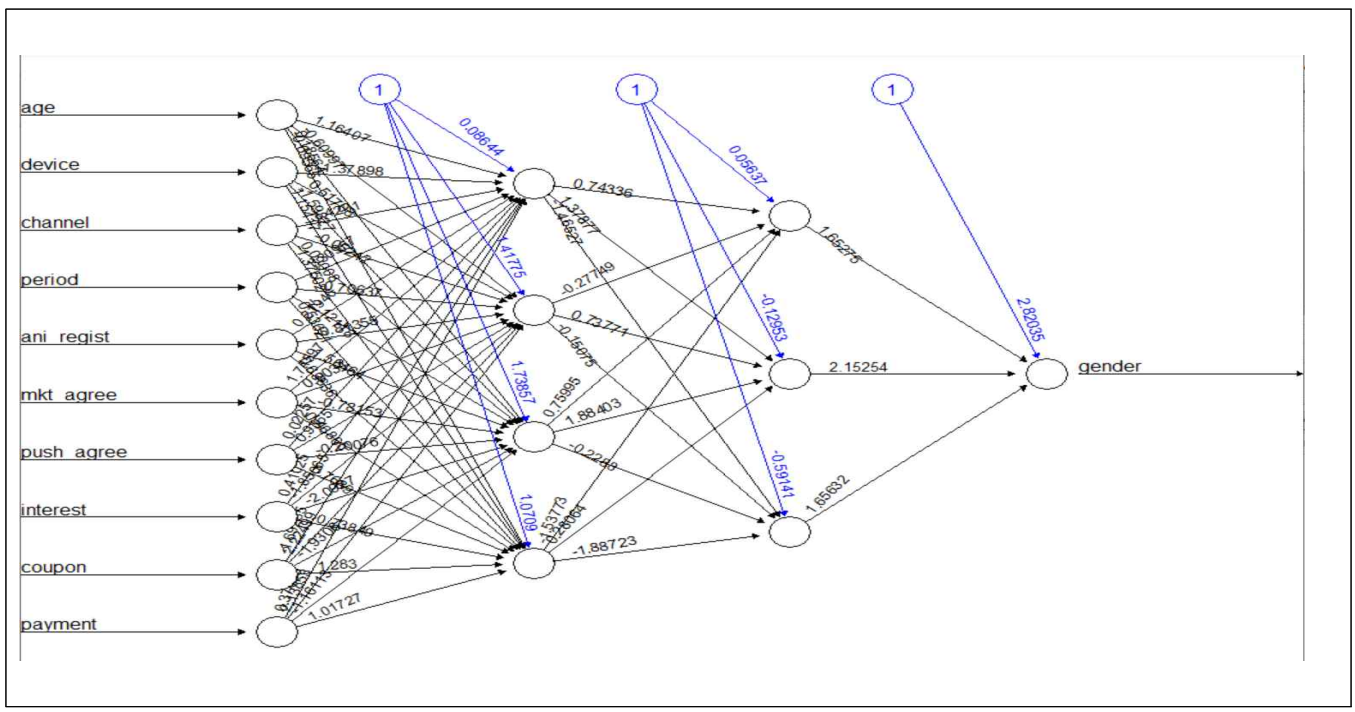



```
> pred1 <- as.data.frame(pred)
> install.packages("writexl")
> library(writexl)
```

```
> writexl::write_xlsx(pred1, path="pred1.xlsx")
```

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	neurons.V1	neurons.gender	neurons.age	neurons.device	neurons.channel	neurons.period	neurons.ani_regist	neurons.mkt_agree	neurons.push_agree	neurons.interest	neurons.coupon	neurons.1	neurons.2	neurons.3	neurons.4	net.result
2	1	1	1	-0.33	0.5	-1	1	1	1	-1	-1	1	0.015434485	0.99412218	0.005788169	1.000420241
3	1	0	-0.34	-0.33	-0.5	-1	1	1	1	-1	-1	1	0.959269856	0.995603091	0.94890335	-0.67522827
4	1	-1	0.78	-1	0	-1	1	-1	-1	-1	1	1	0.999999686	0.482628083	0.335897334	0.050306939
5	1	-1	-0.12	-0.33	1	-1	1	1	1	-1	-1	1	0.999969558	0.999825404	0.999683201	-0.75723798
6	1	1	1	-0.33	-0.5	-1	1	-1	-1	-1	-1	1	0.603193939	0.060985366	3.68801E-07	1.001842874
7	1	-1	0.32	-0.33	1	-1	1	1	1	-1	-1	1	0.999969587	0.999819652	0.999693442	-0.75724106
8	1	1	1	-0.33	0.5	-1	1	1	1	-1	-1	1	0.015434485	0.99412218	0.005788169	1.000420241
9	1	-1	-0.78	-0.33	1	-1	1	1	1	1	-1	1	0.999969991	0.991935015	0.999992885	-0.75204412
10	1	1	1	-0.33	1	-1	1	-1	-1	-1	-1	1	0.591987082	0.288631388	5.9199E-08	0.858118408
11	1	1	1	-0.33	-0.5	-1	1	-1	-1	-1	-1	1	0.603193939	0.060985366	3.68801E-07	1.001842874
12	1	1	1	-0.33	1	-1	-1	1	1	-1	-1	1	0.017532704	0.97248056	0.027035286	0.998448097
13	1	1	1	-0.33	1	-1	1	1	1	-1	-1	1	0.015200179	0.99679998	0.00315402	1.000640143
14	1	0	0.1	-0.33	1	-1	1	1	1	-1	-1	1	0.957447854	0.999270325	0.754934468	-0.54330685
15	1	1	1	-1	0.5	-1	-1	-1	-1	-1	-1	1	0.629257171	0.030427753	7.60776E-07	0.994317001
16	1	0	-0.56	-1	1	-1	-1	-1	-1	-1	-1	1	0.999589102	0.210592218	0.000383039	0.466222871
17	1	1	1	-0.33	1	-1	1	1	1	-1	-1	1	0.015200179	0.99679998	0.00315402	1.000640143
18	1	0	-0.56	-0.33	1	-1	-1	-1	-1	-1	-1	1	0.999590669	0.175222888	0.000481594	0.490385738
19	1	1	1	-0.33	1	-1	1	1	1	-1	-1	1	0.015200179	0.99679998	0.00315402	1.000640143
20	1	-1	1	-0.33	-1	-1	-1	1	1	-1	-1	1	0.999975316	0.981127994	0.999997105	-0.74464883

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



FN

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	neurons.device	neurons.channel	neurons.period	neurons.ani_regist	neurons.mkt_agree	neurons.push_agree	neurons.interest	neurons.coupon	neurons.1	neurons.2	neurons.3	neurons.4	net.result	Y-hat	payment	if correct, 1	Accuracy
2	-0.33	0.5	-1	1	1	1	-1	-1	1	0.015434485	0.99412218	0.005788169	1.000420241	1	-1	0	0.46125
3	-0.33	-0.5	-1	1	1	1	-1	-1	1	0.959269856	0.995603091	0.94890335	-0.67522827	-1	-1	1	
4	-1	0	-1	1	-1	-1	-1	1	1	0.999999686	0.482628083	0.335897334	0.050306939	1	1	1	
5	-0.33	1	-1	1	1	1	-1	-1	1	0.999969558	0.999825404	0.999683201	-0.75723798	-1	-1	1	
6	-0.33	-0.5	-1	1	-1	-1	-1	-1	1	0.603193939	0.060985366	3.68801E-07	1.001842874	1	-1	0	
7	-0.33	1	-1	1	1	1	-1	-1	1	0.999969587	0.999819652	0.999693442	-0.75724106	-1	-1	1	
8	-0.33	0.5	-1	1	1	1	-1	-1	1	0.015434485	0.99412218	0.005788169	1.000420241	1	-1	0	
9	-0.33	1	-1	1	1	1	1	-1	1	0.999969991	0.991935015	0.999992885	-0.75204412	-1	-1	1	
10	-0.33	1	-1	1	-1	-1	-1	-1	1	0.591987082	0.288631388	5.9199E-08	0.858118408	1	-1	0	
11	-0.33	-0.5	-1	1	-1	-1	-1	-1	1	0.603193939	0.060985366	3.68801E-07	1.001842874	1	-1	0	
12	-0.33	1	-1	-1	1	1	-1	-1	1	0.017532704	0.97248056	0.027035286	0.998448097	1	-1	0	
13	-0.33	1	-1	1	1	1	-1	-1	1	0.015200179	0.99679998	0.00315402	1.000640143	1	-1	0	
14	-0.33	1	-1	1	1	1	-1	-1	1	0.957447854	0.999270325	0.754934468	-0.54330685	-1	-1	1	
15	-1	0.5	-1	-1	-1	-1	-1	-1	1	0.629257171	0.030427753	7.60776E-07	0.994317001	1	-1	0	
16	-1	1	-1	-1	-1	-1	-1	-1	1	0.999589102	0.210592218	0.000383039	0.466222871	1	-1	0	
17	-0.33	1	-1	1	1	1	-1	-1	1	0.015200179	0.99679998	0.00315402	1.000640143	1	-1	0	
18	-0.33	1	-1	-1	-1	-1	-1	-1	1	0.999590669	0.175222888	0.000481594	0.490385738	1	-1	0	
19	-0.33	1	-1	1	1	1	-1	-1	1	0.015200179	0.99679998	0.00315402	1.000640143	1	-1	0	
20	-0.33	-1	-1	-1	1	1	-1	-1	1	0.999975316	0.981127994	0.999997105	-0.74464883	-1	-1	1	
21	-0.33	-1	-1	1	1	1	-1	-1	1	0.959890657	0.991801053	0.972017835	-0.68908421	-1	-1	1	
22	-0.33	0.5	-1	1	1	1	-1	-1	1	0.015434485	0.99412218	0.005788169	1.000420241	1	-1	0	