

원 저

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A Study on the Characteristics of Prematurely Discharged Patients and the Model for Predicting Premature Discharge

Kyung - Jin Min¹⁾, Kyu - Moon Song²⁾, Kwang - Hwan Kim³⁾

Department of Public Health, Keimyung University¹⁾, Department of Statistics, Keimyung University²⁾, Dep. of Medical Record, Dankook University Hospital³⁾

Abstract

Background : We developed a model for predicting premature discharge and identifying related factors.

* :
Tel) 041-550-6871-2, E-mail) dkwang@isdmc.co.kr

Methods : Prediction model was developed by data mining techniques. Basic data were collected from the total discharge data base of a university hospital in Chungnam Province during the period from July 1, 1999 to June 30, 2000.

Results :

1. Among 22,873 patients, the number of patients discharged with usual discharge orders were 21,695 or 94.8%. The number of the prematurely discharged patients were 1,178 or 5.2%.
2. The primary reason for unusual discharge was transfer to other hospital. Move to a local hospital closer to their home and burdensome medical expenses were main reasons.
3. Predictability of each model was tested using the top 10 percent of patients with the highest probabilities of premature discharge. The neural network model was chosen as the most appropriate model for predicting prematurely discharged patients.
4. Ten percent of the total number of patients had been selected randomly to test the effectiveness of the neural network model. We have chosen the threshold of the neural network model as 0.7. The number of patients who were expected to discharge prematurely was 312. Among them, 241 had been discharged prematurely (77.2%).

Conclusion : Of the several data mining techniques used, the neural network model was the most effective, It can be used to identify and manage the patients who are expected to discharge prematurely.

Key Words : Data Mining, Patient Discharge, UHDDS

, 4 , 18 .

(가 , 17 ;) .

가 , 3.

10% , 40% , 30% 가 30%

40% ,

40%

1. , 30% ,

1999 7 1 2000 6 30 가

1 D .

22,873 , 1999 7 가

2000 7 가

가 1 .

2.

4.

UHDDS

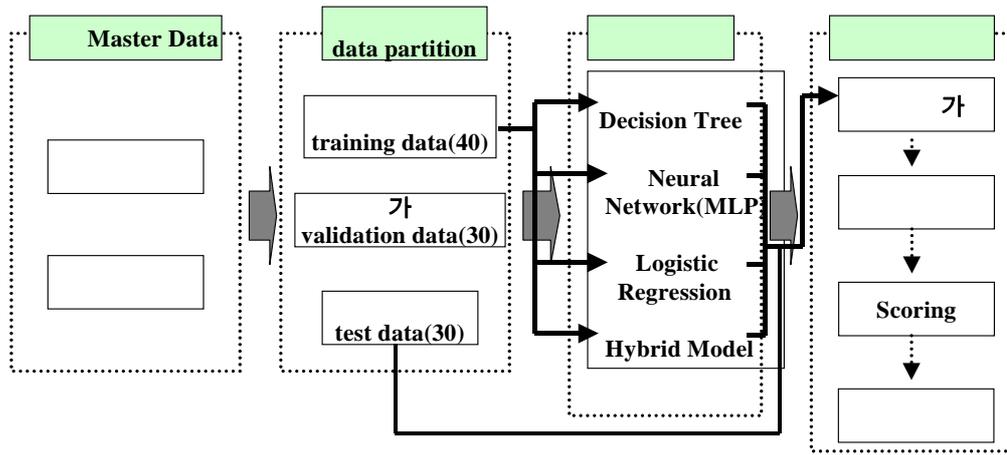
(11), (1), (12)

, , , 4 , , ,

20 5 , , , SAS(ver. Enterprise

, , 20 , 15 6.12) SAS

5 , , , Miner(ver. 3.01)



1.

5.

2.

1

2.1 가

가 .
(target patient)가 10%

가 ,
22,873 ,
(target patient)가 10%
2,289 , 가

1.

40% , 가 30% 가
가

22,873 ,
21,695 (94.8%) 1,178 (5.2%)

30%

2

2.2

가
(1).

20 , 20 , ,

(2).

1.

: N(%)

	11,482(52.9)	768(65.2)	12,250(53.6)
	10,213(47.1)	410(34.8)	10,623(46.4)
9	3,813(17.6)	76(6.5)	3,889(17.0)
10 19	1,201(5.5)	43(3.7)	1,244(5.4)
20 29	2,941(13.6)	146(12.4)	3,087(13.5)
30 39	3,158(14.6)	161(13.7)	3,319(14.5)
40 49	2,664(12.3)	158(13.4)	2,822(12.3)
50 59	2,885(13.3)	177(15.0)	3,062(13.4)
60	5,033(23.2)	417(35.4)	5,450(23.8)
	21,695(100.0)	1,178(100.0)	22,873(100.0)
	(94.8)	(5.2)	(100.0)

2.

: N(%)

	가 (training data)	(validation data)	(test data)	
	41(40.0)	31(30.0)	31(30.0)	103(100.0)
	874(40.0)	656(30.0)	656(30.0)	2,186(100.0)
	915(40.0)	687(30.0)	687(30.0)	2,289(100.0)

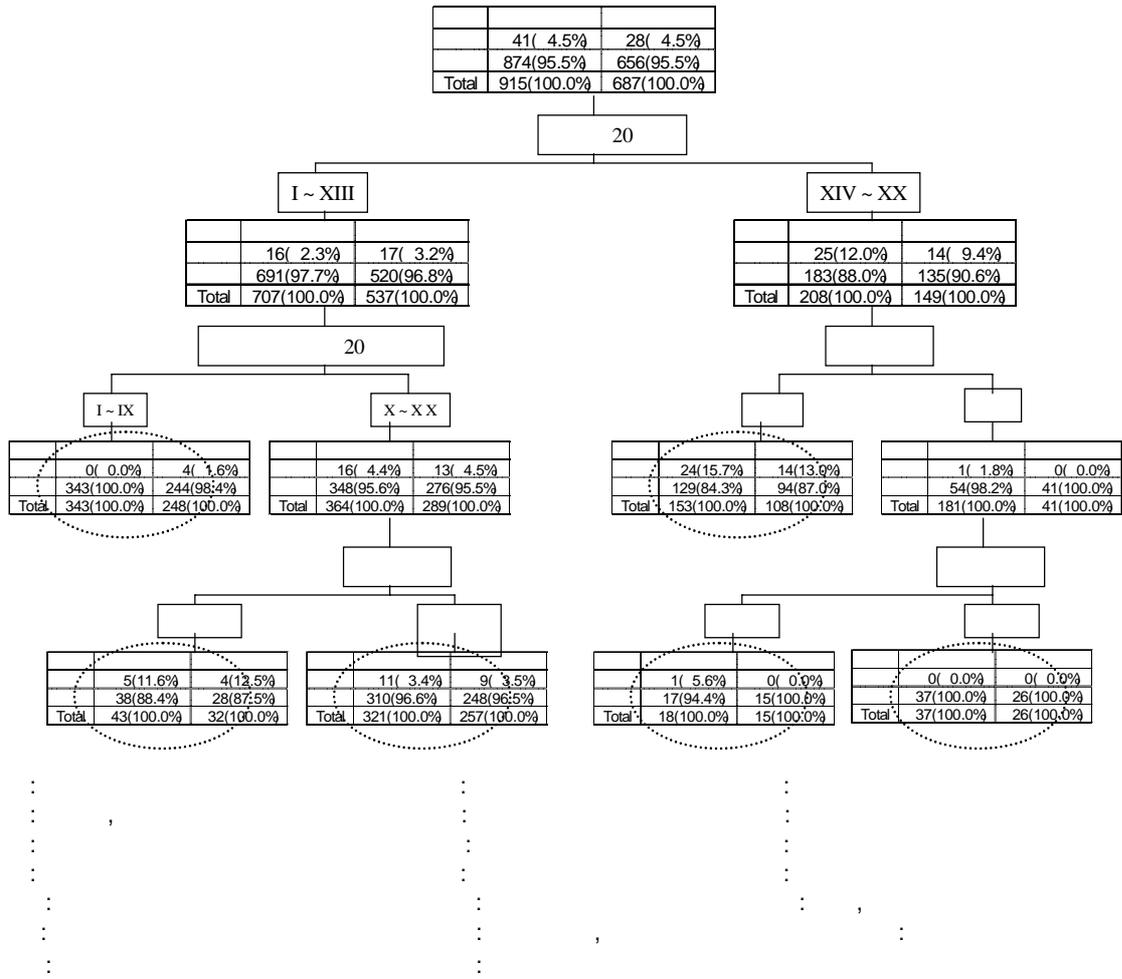
2.3

55.4% , 49.8%
(3).

3.

: N(%)

456(99.8)	1(0.2)	457(100.0)	341(99.4)	2(0.6)	343(100.0)
(52.8)	(1.9)	(49.9)	(49.9)	(66.7)	(49.9)
407(88.9)	51(11.1)	458(100.0)	343(99.7)	1(0.3)	344(100.0)
(47.2)	(98.1)	(50.1)	(50.1)	(33.3)	(50.1)
863(94.3)	52(5.7)	915(100.0)	684(99.6)	3(0.4)	687(100.0)
(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
		: 55.4%			: 49.8%



2.4

2.

73.0% , 71.8% (4).

4.

: N(%)

274(60.0)	183(40.0)	457(100.0)	213(62.1)	130(37.9)	343(100.0)	
(81.1)	(31.7)	(49.9)	(76.9)	(31.7)	(49.9)	
64(14.0)	394(86.0)	458(100.0)	64(18.6)	280(81.4)	344(100.0)	
(18.9)	(68.3)	(50.1)	(23.1)	(68.3)	(50.1)	
338(36.9)	577(63.1)	915(100.0)	277(40.3)	411(59.7)	687(100.0)	
(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	
: 73.0%			: 71.8%			

2.5 가 4. 가
 72.8% , 66.4% (5). 4.1
 3. 가 가 66.9%,
 , 65.8% (7).
 73.0% 가 (6).

5. : N(%)

	303(66.3)	154(33.7)	457(100.0)	230(67.1)	113(32.9)	343(100.0)
	(76.1)	(29.8)	(49.9)	(66.1)	(33.3)	(49.9)
	95(20.7)	363(79.3)	458(100.0)	118(34.3)	226(65.7)	344(100.0)
	(23.9)	(70.2)	(50.1)	(33.9)	(66.7)	(50.1)
	398(43.5)	517(56.5)	915(100.0)	348(50.7)	339(49.3)	687(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
	: 72.8%			: 66.4%		

6.

	73.0%	71.8%
	55.4%	49.8%
	72.8%	66.4%

7. : N(%)

	305(66.7)	152(33.3)	457(100.0)	231(67.3)	112(32.7)	
	(66.9)	(33.1)	(49.9)	(65.3)	(33.6)	
	151(33.0)	307(67.0)	458(100.0)	123(35.8)	221(64.2)	
	(33.1)	(66.9)	(50.1)	(34.7)	(66.4)	
	456(49.8)	459(50.2)	915(100.0)	354(51.5)	333(48.5)	
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	
	: 66.9%			: 65.8%		

4..2

72.6% ,
71.2% (8).

$$f[+ \sum_{j,k} w_{kj} f_h(\sum_{i,j} w_{ji} x_i)]$$

$$f \frac{1}{(1 + \exp(-x))}$$

가

5.

MLP

(3).

가

73.0%

가

(9).

$$f[+ \sum_{j,k} w_{kj} f_h(\sum_{i,j} w_{ji} x_i)]$$

$$= f(13.697575 + \sum_{j,k} w_{kj} 0.9587143)$$

$$= f(7.579697) = 0.99$$

6.

99

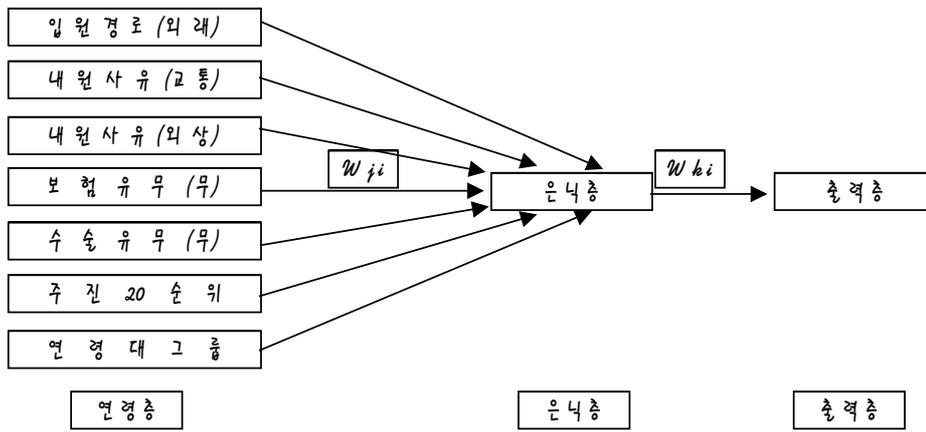
8.

: N(%)

	300(65.6)	157(34.4)	457(100.0)	238(67.3)	105(32.7)	343(100.0)
	(76.1)	(30.1)	(49.9)	(74.1)	(29.4)	(49.9)
	94(20.5)	364(79.5)	458(100.0)	83(24.1)	251(72.9)	344(100.0)
	(23.9)	(69.9)	(50.1)	(25.9)	(70.6)	(50.1)
	394(43.1)	521(56.9)	915(100.0)	321(46.7)	356(53.3)	687(100.0)
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
	: 72.6%			: 71.2%		

9.

/	73.0%	71.8%
	66.9%	65.8%
	72.6%	71.2%



3 MLP

7. threshold 241 (77.2%)
14.8 가 (10).

threshold 8.
threshold 0.7

5.2% ,
thre-
shold 0.7 , 312

10. threshold

threshold	(/)	(/)
0.90	5.5%(25/458)	73.5%(25/ 34)
0.85	8.3%(38/458)	67.9%(38/ 56)
0.80	16.6%(76/458)	71.7%(76/106)
0.75	49.8%(228/458)	80.3%(228/284)
0.70	52.6%(241/458)	77.2%(241/312)
0.65	66.6%(305/458)	76.3%(305/400)
0.60	80.6%(369/458)	78.4%(381/486)
0.55	83.2%(381/458)	71.7%(386/538)
0.50	86.0%(394/458)	70.9%(395/557)

(19)

가 가 ,

(20)

(13). 가

(3)

(21)

가, Park

(22)

1.

(23) DB

22,873 , 21,695 (24)

1,178 5.2% 가

(14) 가 3.6%,

(15) 가 3.1% ,

(4)

가 11.2%,

(16) 1 21,652 가 가

가 6.6%

가 (25).

가

2.

가

()가 (

) (explanation)

(17), Greg (prediction)

Ellen(18) (26). Han(27)

(24)

(5)

3.

가 55.4% , 가 , 가 49.8% . 가 , 가 73.0% , (29) 가 71.8% . 가 72.8% , 5. Scoring 66.4% . 가 55.4%, 73.0% 가 72.8% . 가 5.2% , threshold 0.7 312 241 (77.2%) 가 14.8 가 (28). 가 66.9%, 65.8% . 가 72.6%, 가 71.2% . 가 1999 7 1 2000 6 30 1 D

4.

가 73.0% 가 1. 22,873 , 21,695 (94.8%) 1,178(5.2%) ,

가

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