Data Mining 2013
Assignment 2: Graphical Models

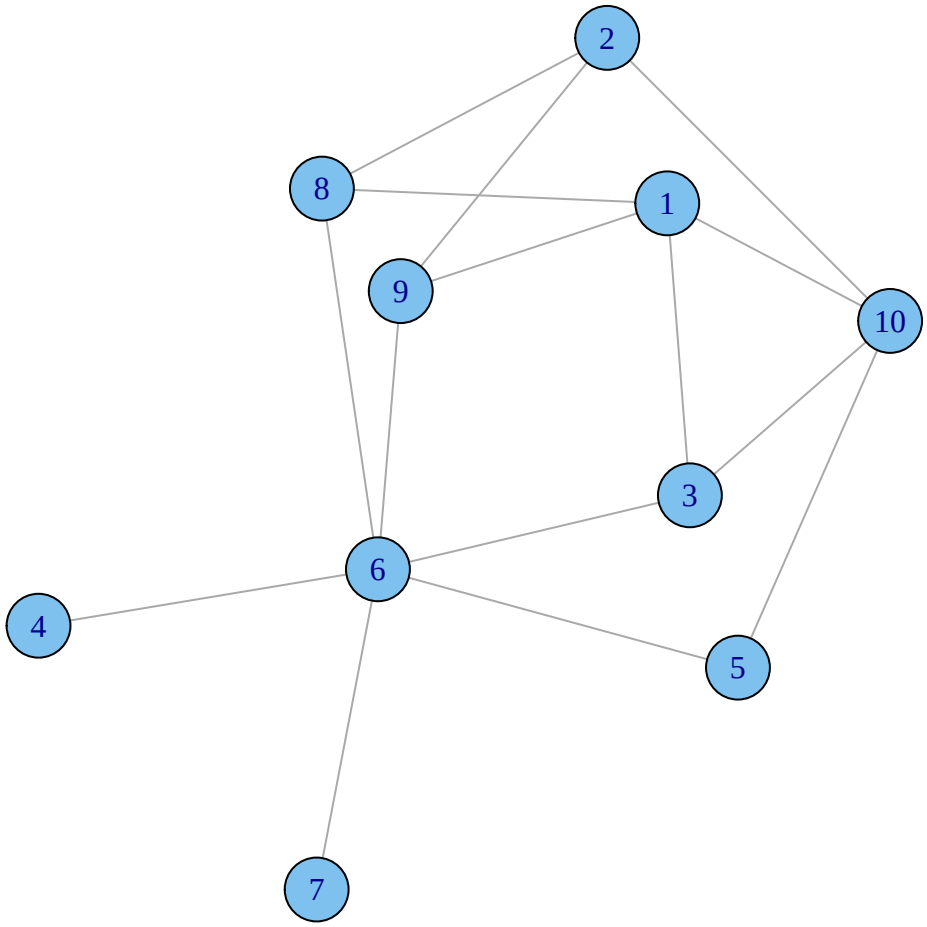
Part 2: Data Analysis

(c) *Perform a forward-backward search on this data set, starting from the empty graph (independence model). Use the BIC scoring function. List the cliques of the resulting model and draw the independence graph.*
The cliques of the graph are given in the table on the left. The table on the right gives a trace of the search process (was not required). We can read from that table that the model found has a BIC score of 15841.66.

	clique
1	1,3,10
2	1,8
3	1,9
4	2,8
5	2,9
6	2,10
7	3,6
8	4,6
9	5,6
10	6,7
11	6,8
12	6,9
13	5,10

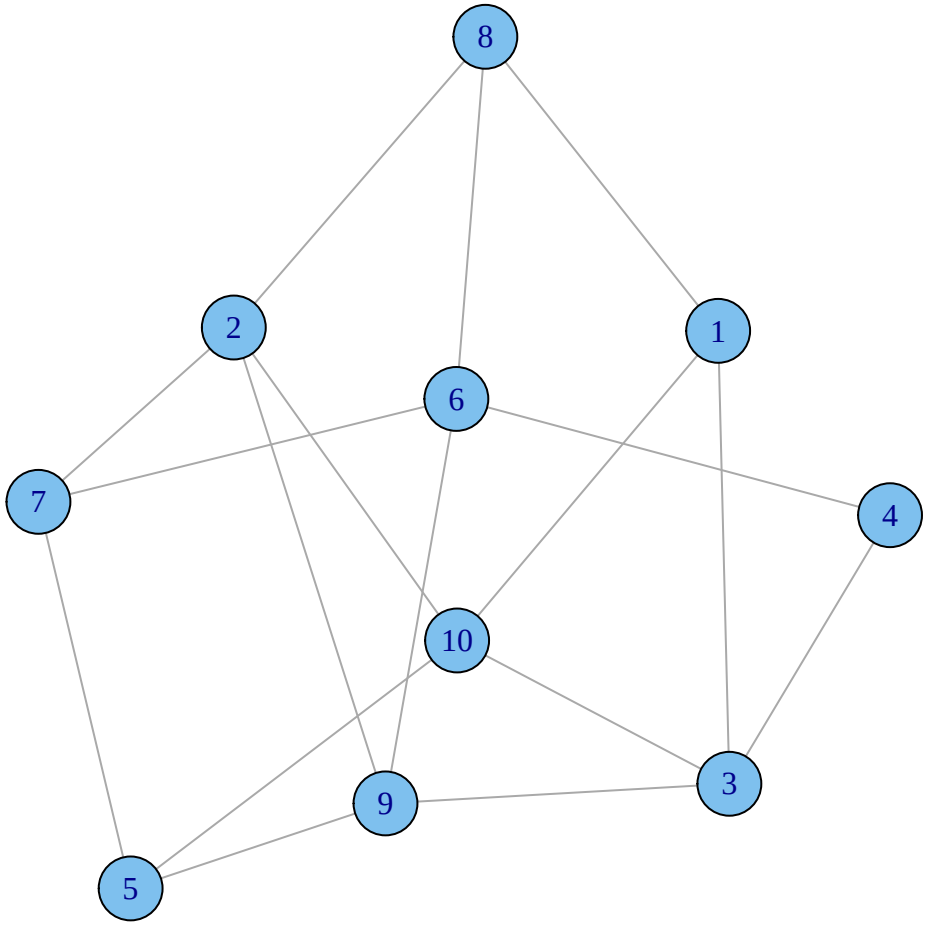
	edge	action	score
1	none	none	23068.14
2	6-9	added	20139.73
3	1-8	added	18561.18
4	6-7	added	17313.90
5	1-3	added	16947.05
6	2-8	added	16706.60
7	5-6	added	16466.82
8	3-10	added	16227.81
9	2-9	added	16024.58
10	1-9	added	15936.67
11	2-10	added	15899.67
12	1-10	added	15878.31
13	5-10	added	15857.81
14	4-6	added	15847.04
15	3-6	added	15843.36
16	6-8	added	15841.66

The independence graph looks like this (graph drawn with `igraph` package):



(e) *Perform a forward-backward search on this data set, starting from the complete graph (saturated model). Use the BIC scoring function. List the cliques of the resulting model and draw the independence graph. How does it compare to the model you found under (c)?*

The independence graph looks like this (graph drawn with `igraph` package):



The cliques are:

	clique
1	2,7
2	2,8
3	2,9
4	2,10
5	1,3,10
6	3,4
7	3,9
8	5,7
9	5,9
10	5,10
11	4,6
12	6,7
13	6,8
14	6,9
15	1,8

The BIC score of this model is 15850.53.

(f) *Perform a forward-backward search with AIC scoring on this data set, starting from the complete graph and empty graph. Give the cliques of the models you find, and the score of the models. Are they the same?*
Yes, they are the same. The cliques are:

	clique
1	2,7
2	1,2,8
3	1,2,9
4	1,2,10
5	1,3,9
6	1,3,10
7	3,6,9
8	1,4,8
9	1,4,10
10	4,5,6
11	4,5,10
12	4,6,8
13	5,6,7
14	5,6,9

The AIC score is 14278.21.