第10章习题讲解

中国海洋大学

计算机系

习题十:1

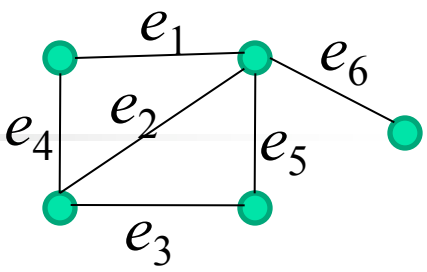
【关联矩阵的定义】

解

$$M(G)=\begin{bmatrix} -1 & 1 & 1 & 0 & 0 & 0 \\ 1 & -1 & 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 \\ 0 & 0 & 0 & 0 & -1 & 1 \end{bmatrix}$$

$$M(G)=\begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

习题十:2



[分析]利用定理10.3求解

解 写出图10.9的关联矩阵M(G)和基本关联矩阵$M_f(G)$.

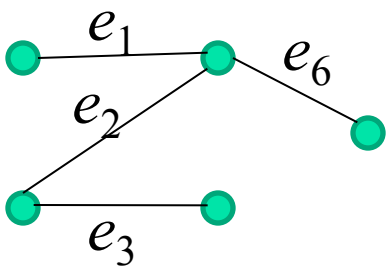
$$M(G)=\begin{bmatrix}1&0&0&1&0&0\\0&1&1&1&0&0\\0&0&1&0&1&0\\1&1&0&0&1&1\\0&0&0&0&0&1\end{bmatrix}$$

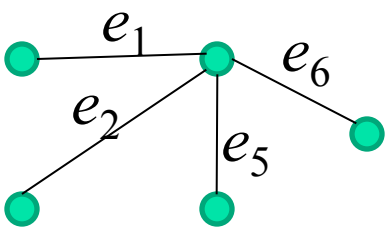
$$M_f(G)=\begin{bmatrix}0&1&1&1&0&0\\0&0&1&0&1&0\\1&1&0&0&1&1\\0&0&0&0&0&1\end{bmatrix}$$

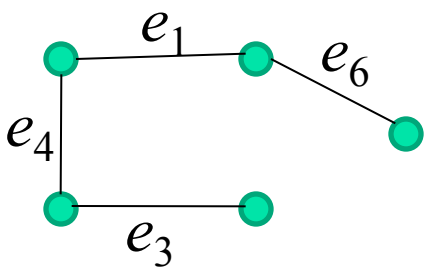
1,2,3,4	0	1,3,4,6	1
1,2,3,5	0	1,3,5,6	1
1,2,3,6	1	1,4,5,6	1
1,2,4,5	0	2,3,4,5	0
1,2,4,6	0	2,3,4,6	1
1,2,5,6	1	2,3,5,6	0
1,3,4,5	0	2,4,5,6	1
		3,4,5,6	1

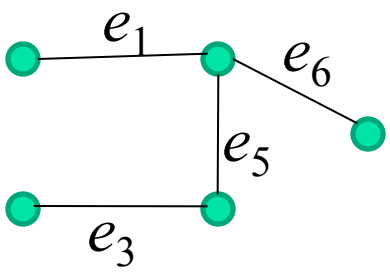
习题十:2(续)

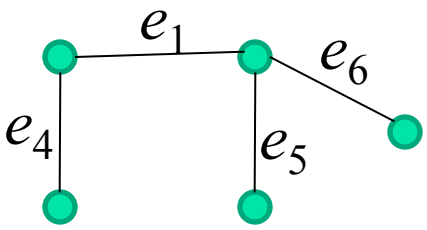
根据计算结果,画出所有生成树.

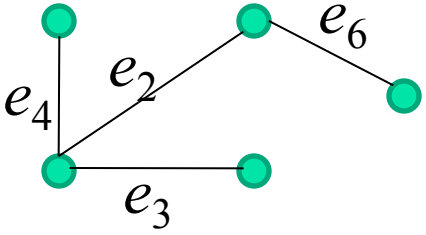


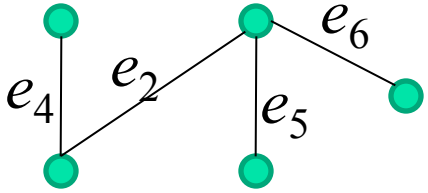


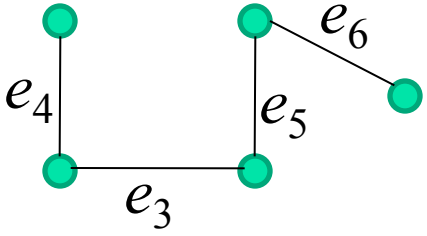












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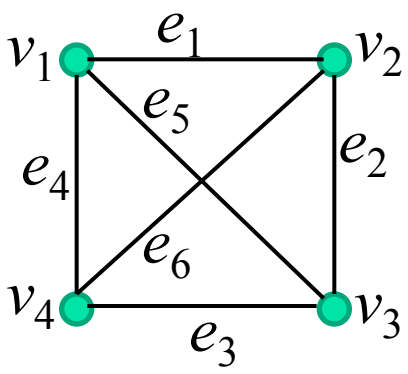
3.求标定的完全图K_4中的所有生成树。

解 标定的K_4如下图所示，其关联矩阵为

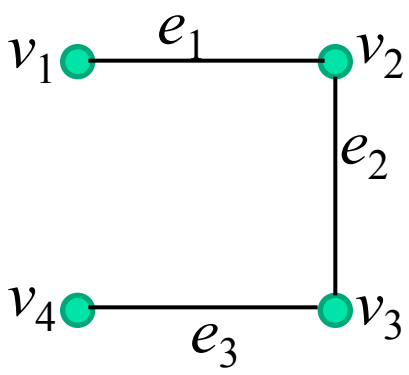


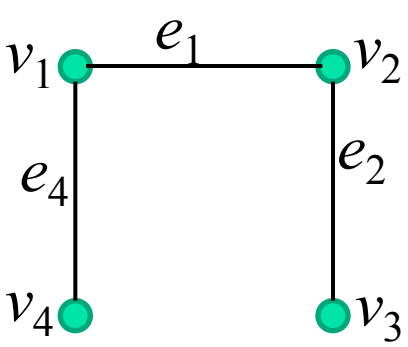
$$M(K_4)=\begin{bmatrix}1&0&0&1&1&0\\1&1&0&0&0&1\\0&1&1&0&1&0\\0&0&1&1&0&1\end{bmatrix}\quad M_f(K_4)=\begin{bmatrix}1&1&0&0&0&1\\0&1&1&0&1&0\\0&0&1&1&0&1\end{bmatrix}$$

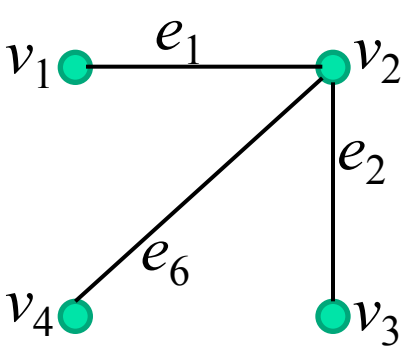
1,2,3	1	1,3,5	1	2,3,4	1	2,5,6	1
1,2,4	1	1,3,6	1	2,3,5	1	3,4,5	0
1,2,5	0	1,4,5	1	2,3,6	0	3,4,6	1
1,2,6	1	1,4,6	0	2,4,5	1	3,5,6	1
1,3,4	1	1,5,6	1	2,4,6	1	4,5,6	1

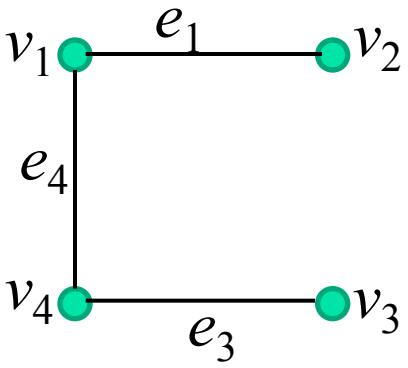
习题十:3(续)

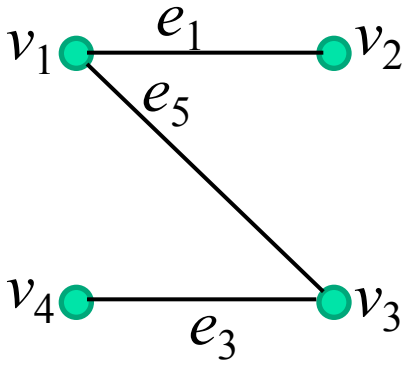
根据计算结果,画出所有生成树.

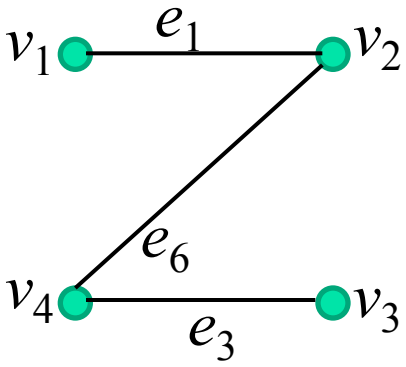


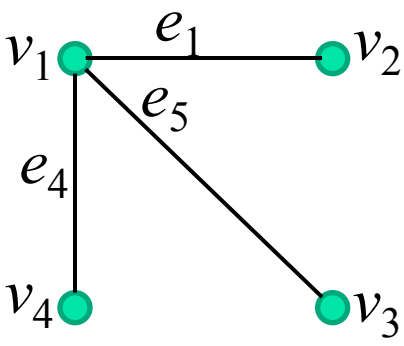


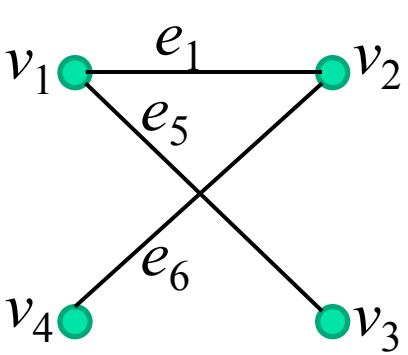




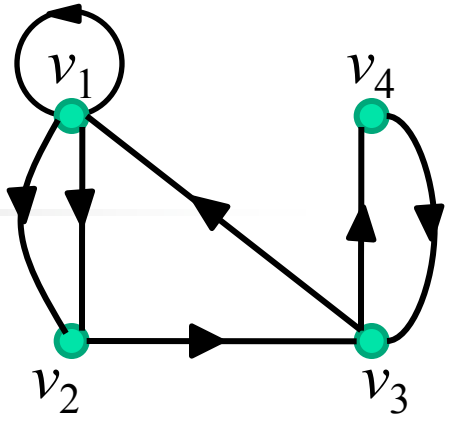








习题十:4



[分析]写出邻接矩阵A(D),求出A^2,A^3, A^4,P(D)

解

$$A=\begin{bmatrix}1&2&0&0\\0&0&1&0\\1&0&0&1\\0&0&1&0\end{bmatrix}\quad A^2=\begin{bmatrix}1&2&2&0\\1&0&0&1\\1&2&1&0\\1&0&0&1\end{bmatrix}\quad A^3=\begin{bmatrix}3&2&2&2\\1&2&1&0\\2&2&2&1\\1&2&1&0\end{bmatrix}\quad A^4=\begin{bmatrix}5&6&4&2\\2&2&2&1\\4&4&3&2\\2&2&2&1\end{bmatrix}$$

$$B_1=\begin{bmatrix}1&2&0&0\\0&0&1&0\\1&0&0&1\\0&0&1&0\end{bmatrix}\quad B_2=\begin{bmatrix}2&4&2&0\\1&0&1&1\\2&2&1&1\\1&0&1&1\end{bmatrix}\quad B_3=\begin{bmatrix}5&6&4&2\\2&2&2&1\\4&4&3&2\\2&2&2&1\end{bmatrix}\quad B_4=\begin{bmatrix}10&12&8&4\\4&4&4&2\\8&8&6&4\\4&4&4&2\end{bmatrix}$$

习题十:4(续)

根据以上计算可知,

(1) v_1到v_4长度为1,2,3,4的通路分别为0,0,2,2条;

(2) v_1到v_4长度小于等于3通路为2条;

(3) v_1到v_1长度为1,2,3,4的回路分别为1,1,3,5条;

(4) v_4到v_4长度小于等于3的回路为1条;

(5) D中长度为4的通路(不含回路)为33条;

(6) D中长度为4的回路为11条;

(7) D中长度小于等于4的通路为88条,其中22条回路;

(8) 可达矩阵 $P=\begin{bmatrix}1&1&1&1\\1&1&1&1\\1&1&1&1\\1&1&1&1\end{bmatrix}$