

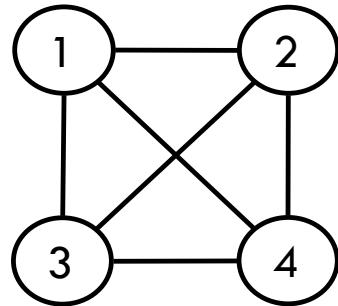
圖形的應用

資料結構
鍾宜玲

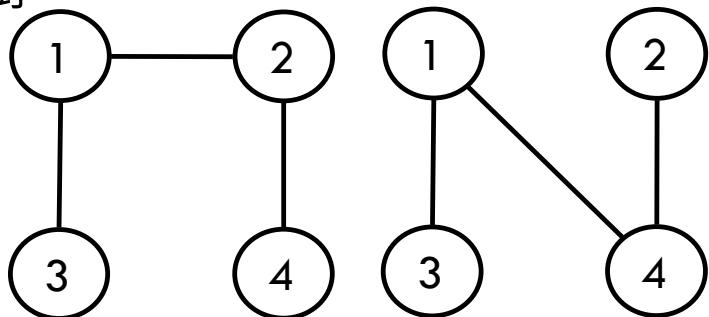
最小成本擴展樹 (MINIMUM COST SPANNING TREE)



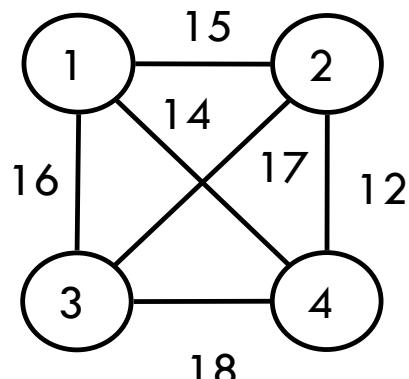
原圖



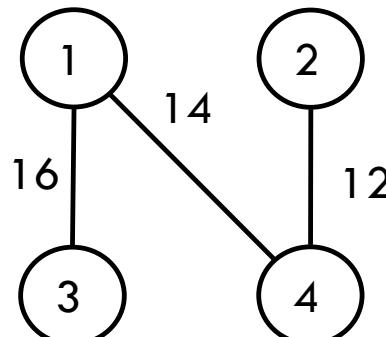
擴展樹



加權圖形



最小成本擴展樹



$$\text{成本} = 12 + 14 + 16 = 42$$

KRUSKAL 演算法



假設圖形G共n個頂點

擴展樹T的起始值為一空樹

1. 若擴展樹T中的邊數少於 $n - 1$ ，則

如果G中的邊皆已選過，則沒有擴展樹，程式結束。

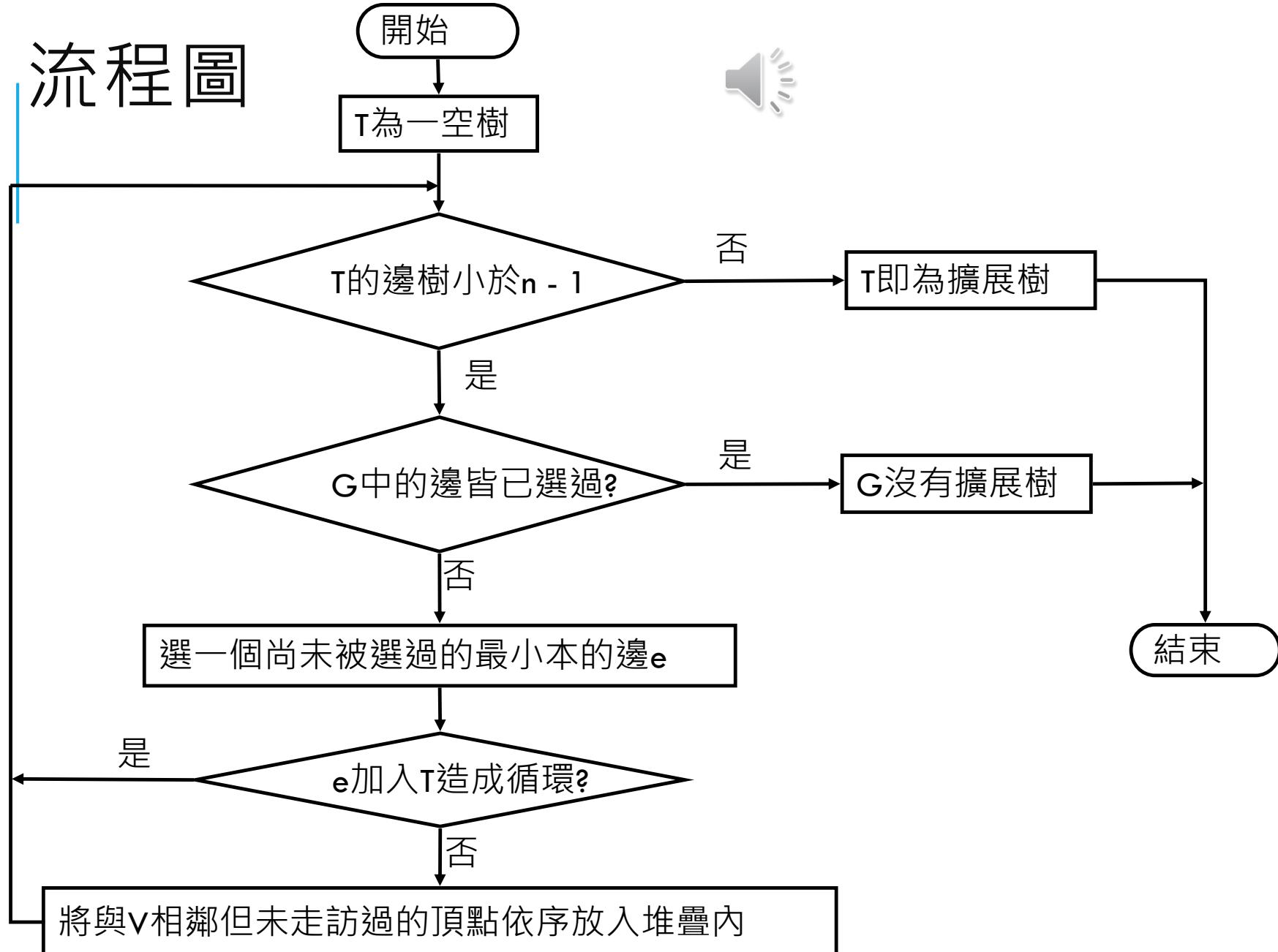
否則

在圖形G中選一個尚未被選過的最小成本的邊，

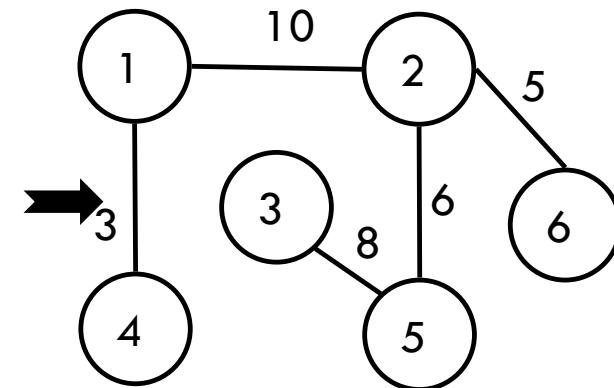
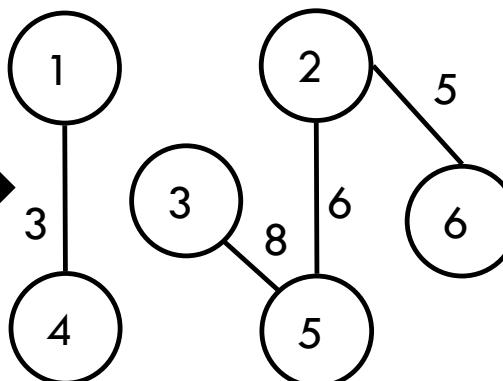
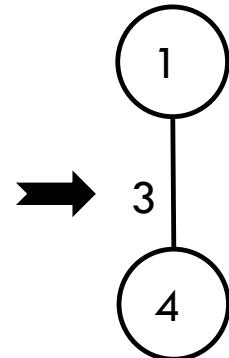
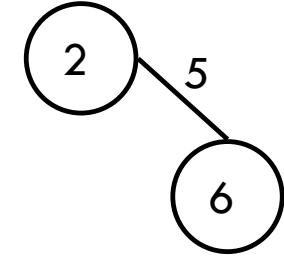
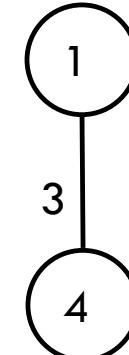
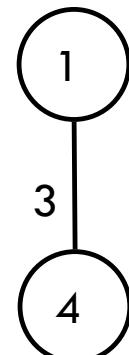
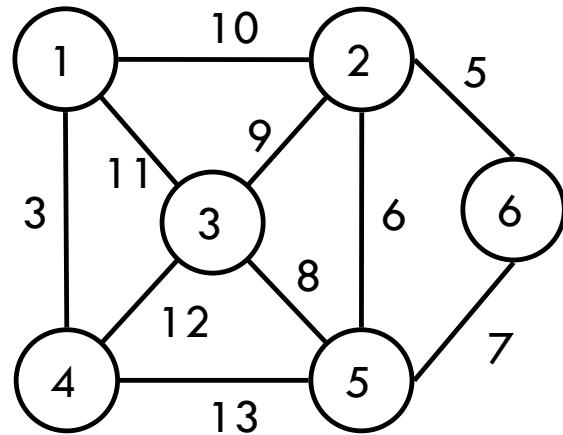
若此邊加入擴展樹T中不會造成循環，則加入。

2. 重複以上步驟直到擴展樹T中的邊數等於 $n - 1$ 。

流程圖



用KRUSKAL演算法求最小成本擴展樹





求最小成本擴展數的過程

擴展樹的邊數	入選的邊	成本	是否加入擴展樹中
0	(1,4)	3	是
1	(2,6)	5	是
2	(2,5)	6	是
3	(5,6)	7	造成循環不加入
3	(3,5)	8	是
4	(2,3)	9	造成循環不加入
4	(1,2)	10	是

5 ==> 擴展樹的邊數 = 頂點數減1，故結束。

成本= $3 + 5 + 6 + 8 + 10 = 32$