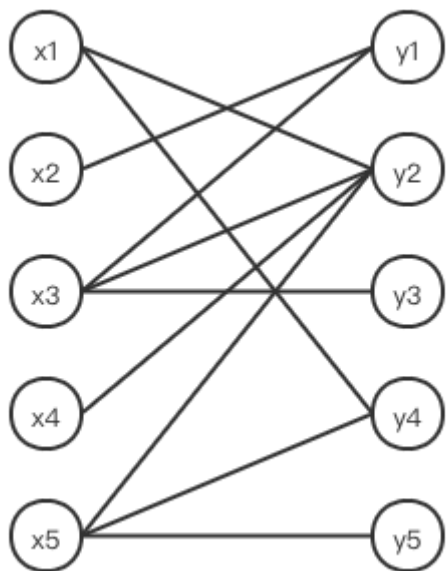


图论 - 匹配

练习1

匈牙利算法求完美匹配



初始匹配 $M = \{x_1y_1, x_5y_4\}$

1. $x_2, S = \{x_2\}, T = \emptyset, N(S) = \{y_1\}$
取 y_1 , y_1 饱和, $P = x_2y_1$
2. $x_3, S = \{x_3\}, T = \emptyset, N(S) = \{y_1, y_2, y_3\}$
取 y_1 , y_1 饱和
 $S = x_2, x_3, T = \{y_1\}$
取 $y_2 \in N(S) \setminus T$, y_2 饱和
 $S = x_1, x_2, x_3, T = \{y_1, y_2\}$
取 $y_3 \in N(S) \setminus T$, y_3 不饱和, $P = x_3y_3$ 可扩
3. $x_4, S = \{x_4\}, T = \emptyset, N(S) = \{y_2\}$
取 y_2 , y_2 饱和
 $S = x_1, x_4, T = \{y_2\}, N(S) = \{y_2, y_4\}$
取 $y_4 \in N(S) \setminus T$, y_4 饱和
 $S = x_1, x_4, x_5, T = \{y_2, y_4\}, N(S) = \{y_2, y_4, y_5\}$
取 $y_5 \in N(S) \setminus T$, y_5 不饱和

$P = x_4y_2, x_1y_4, x_5y_5$ 可扩

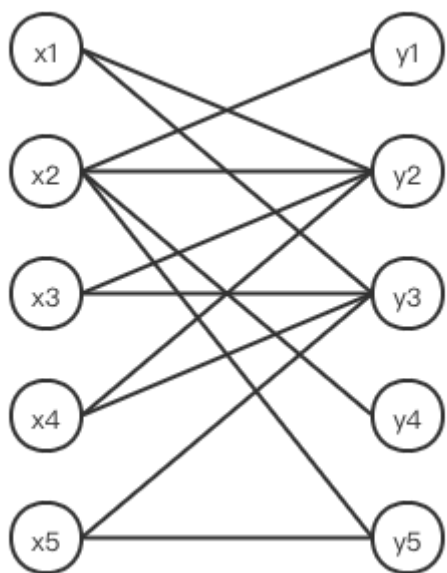
$M = M \triangle E(P) = x_1y_4, x_2y_1, x_3y_3, x_4y_2, x_5y_5$

所有该图有完美匹配。

练习2

用改进的匈牙利算法求偶图的最大匹配

p121 注4



初始匹配 $M = \emptyset$

1. x_1 ,

$S = \{x_1, x_2, x_3, x_4, x_5\}$

$T = \emptyset$

$N(S) = \{y_1, y_2, y_3, y_4, y_5\}$

取 $y_1 \in N(S) \setminus T$, y_1 不饱和

$P = x_2y_1$

2. x_1 ,

$S = \{x_1, x_3, x_4, x_5\}$

$T = \emptyset$

$N(S) = \{y_2, y_3, y_4, y_5\}$

取 $y_2 \in N(S) \setminus T$, y_2 不饱和

$P = x_1y_2$

3. x_3 ,

$$S = \{x_3, x_4, x_5\}$$

$$T = \emptyset$$

$$N(S) = \{y_2, y_3, y_5\}$$

取 $y_2 \in N(S) \setminus T$, y_2 饱和

$$S = \{x_1, x_3, x_4, x_5\}$$

$$T = \{y_2\}$$

$$N(S) = \{y_2, y_3, y_4, y_5\}$$

取 $y_3 \in N(S) \setminus T$, y_3 不饱和

$$P = x_1 y_3$$

4. x_3 ,

$$S = \{x_3, x_4, x_5\}$$

$$T = \emptyset$$

$$N(S) = \{y_2, y_3, y_5\}$$

取 $y_2 \in N(S) \setminus T$, y_2 不饱和

$$P = x_3 y_2$$

5. x_4 ,

$$S = \{x_4, x_5\}$$

$$T = \emptyset$$

$$N(S) = \{y_2, y_3, y_5\}$$

取 $y_2 \in N(S) \setminus T$, y_2 饱和

$$S = \{x_3, x_4, x_5\}$$

$$T = \{y_2\}$$

$$N(S) = \{y_2, y_3, y_4, y_5\}$$

取 $y_3 \in N(S) \setminus T$, y_3 饱和

$$S = \{x_1, x_3, x_4, x_5\}$$

$$T = \{y_2, y_3\}$$

$$N(S) = \{y_2, y_3, y_4, y_5\}$$

6. x_5

$$S = \{x_1, x_3, x_4, x_5\}$$

$$T = \{y_2, y_3\}$$

$$N(S) = \{y_2, y_3, y_5\}$$

取 $y_5 \in N(S) \setminus T$, y_5 不饱和

$$P = x_5 y_5$$

此时

$$S = \{x_1, x_3, x_4\}$$

$$T = \{y_2, y_3\}$$

$$N(S) = \{y_2, y_3\}$$

$$T = N(S)$$

算法结束

$$M = M \triangle E(P) = x_2y_1, x_3y_2, x_1y_3, x_5y_5$$