# Hungarian Algorithm匈牙利算法

Hungarian algorithm is method to solve maximal matching problem in bipartite graph. The theory is difficult to understand, but I will illustrate the procedure this algorithm.

In a bipartite graph, left side is set A, right side is set B. The element in A can choose only 1 element in B from its connected candidates. Once mapping, the two connected elements cannot be reused. We want to calculate the maximal mappings in this bipartite.

For example, the bipartite is listed as follows:



The maximal mappings is 3 as listed as follows:



The Hungarian algorithm is a methodology to find the maximal mapping. The detail is listed as follows:

1） When A1 and A2 comes seperately



2) When A3 comes,



3) When A4 comes,



The A4 search path is as follows:



For general situation,



For Ai comes, where i belong 1 to n.

For j = 1 to m

If (connection[i][j]==1) // has connection.

{

If （Bj is used） // remember Fig A4: Step 4, “B2 doesnot work”

// if Bj is used, then from this start point to backtrace, it means previously search from Bj is proved to be not working.

Continue;

If (Bj is not used) // we only process the first time.

{

Set Bj to used.

If Bj is not assigned to any point in A,

{

Bj assigned to Ai

Return found;

}

Else if Bj is assigned to point P in A

{

Can P found another connected point in B? (recurse process)

If yes, Bj assigned to Ai and return found

If no, continue;

}

}

}

Return NotFound;