Assignment13: Disjoint Paths Problem

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- Scene Reconstruction
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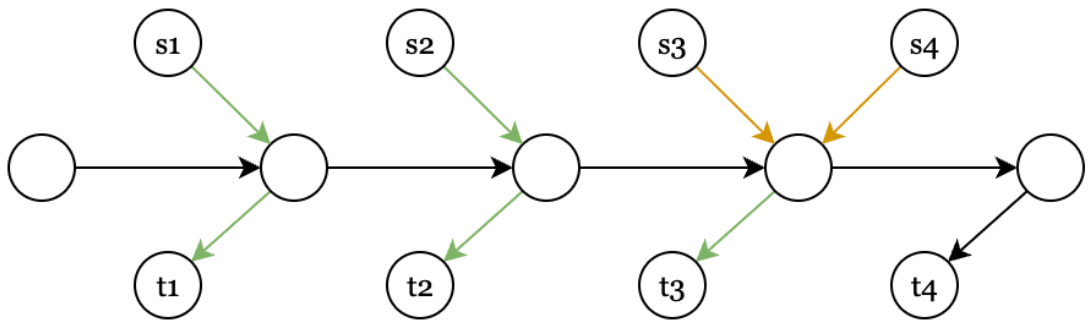
Task 13-1: Example 1

- Green edge will be choosen by algo. As for yellow edge, regardless of which edge is chosen by the algorithm, the final result will not change (will be 4).



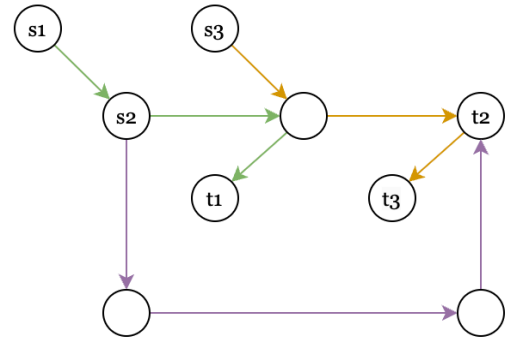
Task 13-1: Example 2

As shown right, $m = 9$ the optimal solution is 3.
However, because of the greedy algo choose $s2, t2$,
the other pairs are blocked, result comes to 1.

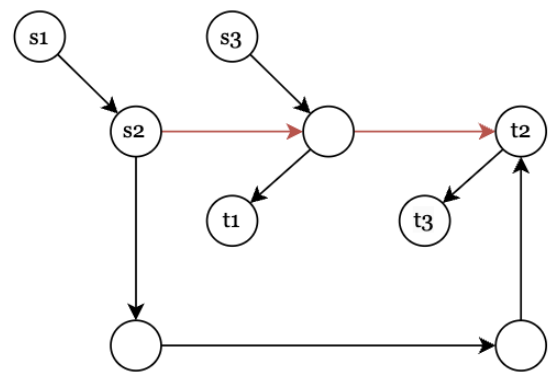
Since that, we have

$$\frac{|I^*|}{|I|} = 3 = \sqrt{m}$$

Which match the required $|I^*| \leq \sqrt{m}\ |I|$



Example 1



Example 2

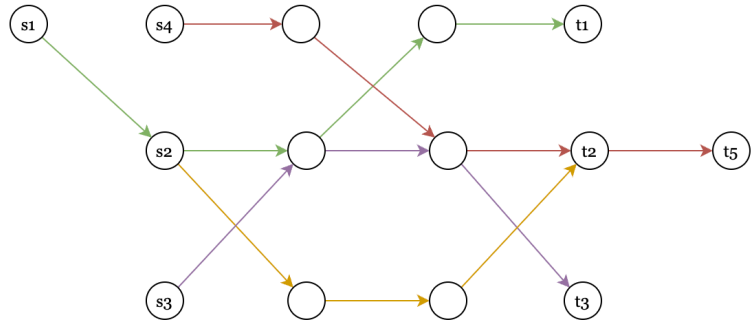
Task 13-1: Example 3

As shown right, $m = 14$.

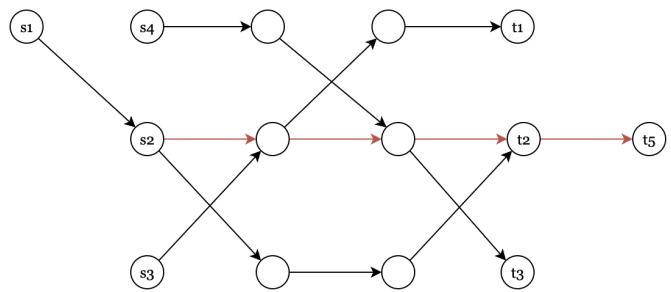
Optimal Solution $I^* = \{s1, t1\}, \{s2, t2\}, \{s3, t3\}, \{s4, t4\}, |I^*| = 4$.

However, greedy algo will choose $\{s2, t2\}$ which will block the other pairs, result comes to 1.

The ratio is $\frac{|I^*|}{|I|} = 4 > \sqrt{m}$, which match the required $|I^*| > \sqrt{m}\ |I|$



Example 3

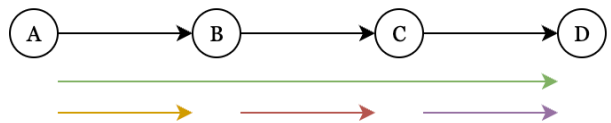


Example 4

Task 13-2 Example 1:

- Start-Target Pair(c=2)

1. $(A \rightarrow D)$: uses the path $A - B - C - D$.
2. $(A \rightarrow B)$: uses the edge $(A - B)$.
3. $(B \rightarrow C)$: uses $(B - C)$.
4. $(C \rightarrow D)$: uses $(C - D)$.



As shown, the optimal solution is 4, and greedy always get the optimal solution.

Task 13-2 Example 2: