

Flow problems

Friday, November 3, 2023

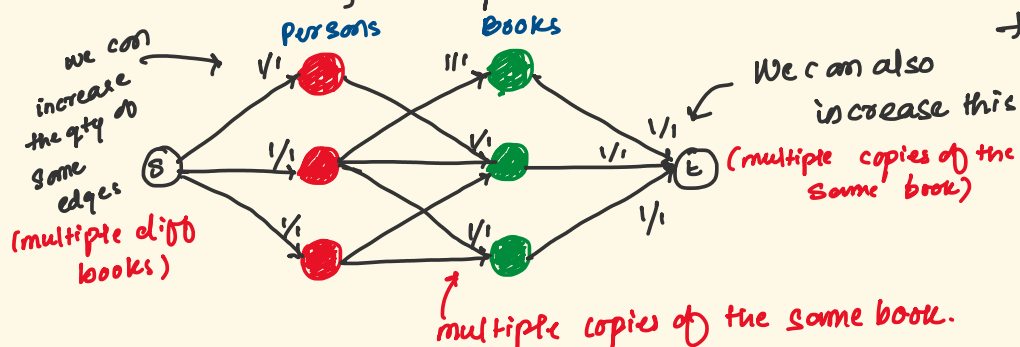
7:02 AM

Bipartite graph

- A graph whose vertices can be split into two independent groups U & V .
- Every edge connects U & V .
- The graph is two colorable.
- eg. matching applicants to jobs.

Maximum cardinality Matching

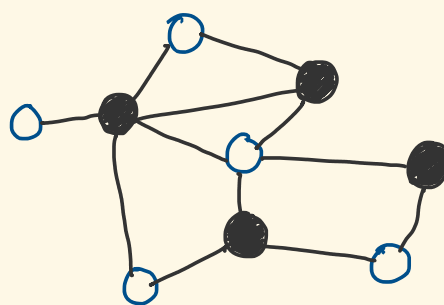
- Maximizing the pairs that we can match.



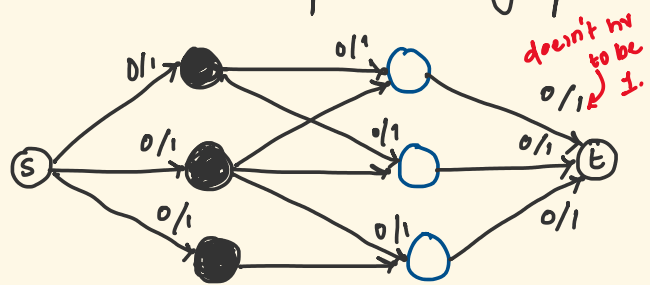
- We convert into a max flow problem.

Owl & mice problem

- Mice are in a field & there's a hungry owl abt to make a move.
- There are also holes scattered on the field, having a capacity for no. of mice.
- Every mouse is capable of running a radius of r b4 getting caught.
- What is max no. of mice that can hide b4 being caught.



- This is a bipartite graph.



- Max flow problem.
↳ Ford fulkerson problem

Elementary Math problem

- Ellen is a math teacher preparing n ($1 \leq n \leq 2500$) questions for math exam. In each Q, students hv to (+, -, *) numbers.
- Decide for each pair which of the 3 operators students should perform

$$1 \boxed{-} 5 = \boxed{-4}$$

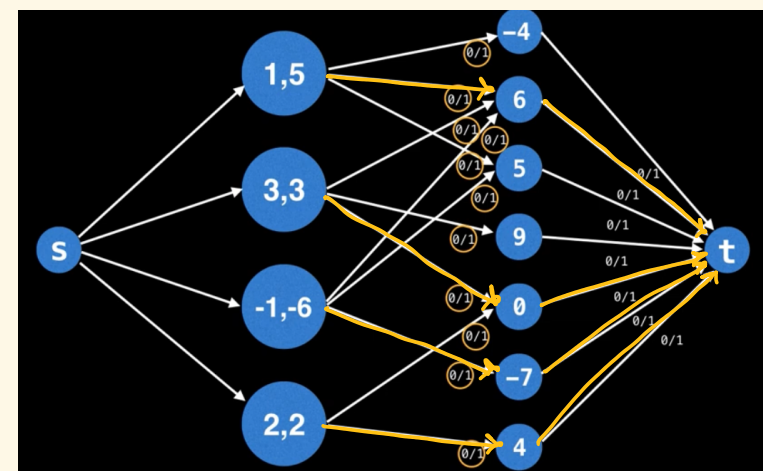
$$3 \boxed{-} 3 = \boxed{0}$$

$$4 \boxed{+} 5 = \boxed{9}$$

$$-1 \boxed{*} -6 = \boxed{6}$$

Decide the operators such that all answers are unique.

Mapping it into a flow problem.



we can also get the operans with the answers.

operator pairs
(a,b)

Results

- We need to make sure that answers are only assigned to one pair.
- \therefore we have capacity of 1 for answer to 't'.