FLOW USING FEW EDGES IN A BIPARTITE NETWORK

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1. PROBLEM STATEMENT

If we have a set of sources S with total capacity C and a set of sinks T with the same capacity C , but not necessarily the same cardinality, our problem MINEDGEFLOW asks whether there is an efficient way to find the minimum number of direct edges between sources and sinks and their required capacity, assuming flow = C .

Claim 1. *We have that $\text{PARTITION} \leq_p \text{MINEDGEFLOW}$*

In this claim, the hardness of PARTITION is known since [1]. Now, we prove our claim.

Proof. Consider a partition problem instance with input $a_1, \dots, a_n$. We create a complete bipartite graph with 2 source vertices each with capacity $\frac{1}{2} \sum_{i=1}^n a_i$, and n sink vertices, where the i th vertex has capacity a_i . Each edge has infinite capacity.

It is easy to verify there is a partition with equal sum if and only if the solution to our problem on G has n edges. $\square$

2. CONCLUSION

As long as we study a mathematical conjecture, we should encourage ourselves of having enough labouring hours on popular maths books. Then, reading some articles on theory of computing like [3] is a good practice. Only after that, could we think of the ultimate final for all mathematics sciences.

REFERENCES

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