4. Greedy Algorithms

- Edmonds branching algorithm demo
Edmonds branching algorithm demo

input digraph $G = (V, E)$
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Phase 1: find cheapest edge entering each node
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Phase 1: replace costs with reduced costs
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Phase 1: find 0-cost directed cycle $C$ and contract
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Phase 2: digraph $G'$
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Phase 2: find cheapest edge entering each node
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Phase 2: replace cost with reduced costs
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Phase 2: find 0-cost directed cycle and contract
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Phase 3: digraph $G''$
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Phase 3: find cheapest edge entering each node
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Phase 3: it's an arborescence!
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Phase 2': uncontract node and take all but one edge of cycle

don't take this edge
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Phase 1': uncontract node and take all but one edge of cycle

![Diagram](image-url)
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stop: no more nodes to uncontract
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min-cost arborescence

![Diagram of a min-cost arborescence with labeled edges and nodes, demonstrating the Edmonds branching algorithm.]