4. Greedy Algorithms II

- Dijkstra's algorithm demo
- improved Dijkstra's algorithm demo
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Dijkstra's algorithm demo

- Initialize $S = \{ s \}$, $d(s) = 0$.
- Repeatedly choose unexplored node $v$ which minimizes

$$
\pi(v) = \min_{e = (u, v) : u \in S} d(u) + \ell_e,
$$

add $v$ to $S$; set $d(v) = \pi(v)$. 

![Graph example for Dijkstra's algorithm](image)
Dijkstra's algorithm demo

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![Graph Diagram]

- $0 + 4 = 4$
- $0 + 8 = 8$
- $0 + 16 = 16$
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![Diagram of Dijkstra's algorithm demonstration](image-url)
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Improved Dijkstra's algorithm demo

- Initialize $\pi(s) = 0$.
- Repeatedly choose $u \not\in S$ with minimum $\pi(v)$.
  - for each edge $(u, v)$ leaving $u$, set $\pi(v) = \min \{ \pi(v), \pi(u) + \ell(u, v) \}$
  - add $u$ to $S$
Improved Dijkstra's algorithm demo

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