Dijkstra’s algorithm demo

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

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

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

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\[ 0 + 8 = 8 \]
\[ 0 + 16 = 16 \]
\[ 4 \]
\[ 8 \]
\[ 16 \]
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 $d(v) = \pi(v)$.
Dijkstra’s algorithm demo

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

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**4. Greedy Algorithms II**

- Dijkstra’s algorithm demo
- improved Dijkstra’s algorithm demo

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Improved Dijkstra’s algorithm demo

- Initialize $\pi(s) = 0$.
- Repeatedly choose $u \notin S$ 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

- 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

- Initialize $\pi(s) = 0$.
- Repeatedly choose $u \notin S$ 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 $S$

- for each edge $(u, v)$ leaving $u$, set $\pi(v) = \min \{ \pi(v), \pi(u) + \ell(u, v) \}$
- add $u$ to $S$