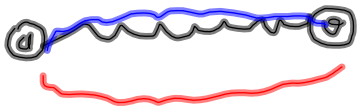
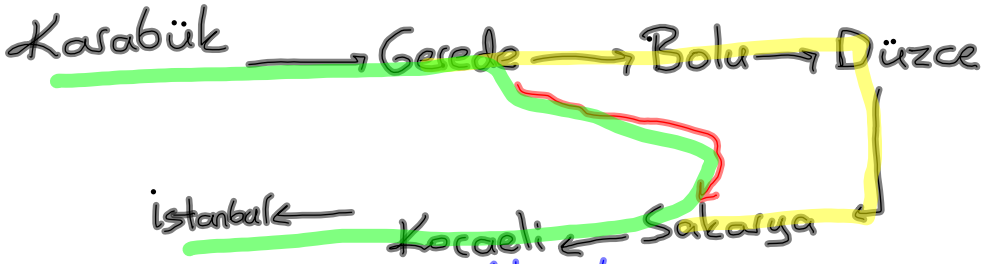
En kısa Yollar



$\delta(u,v)$, en kısa yolun ağırlığı

Optimal Altyapı

Teorem: En kısa yolun bir alt yolu en kısa bir yoldur.

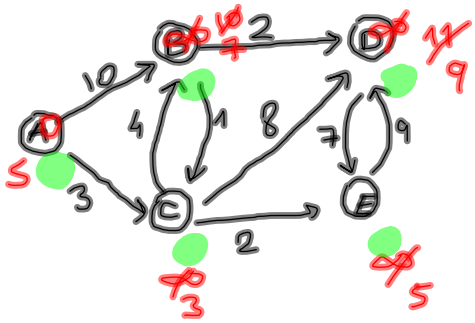


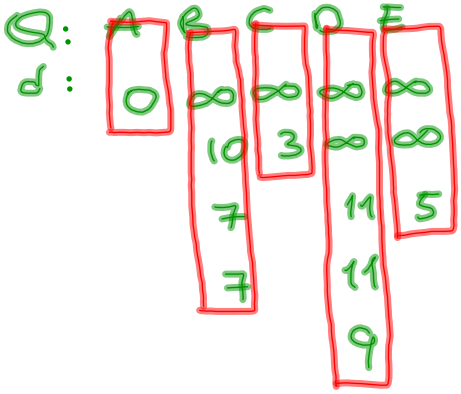
Dijkstra Algoritması

Bu alg. pozitif ağırlıklı veya negatif ağırlıklı çevrime sahip olmayan graflarda çalışır. Bir kaynaktan diğer tüm tepelere varsa en kısa yolları bulur.

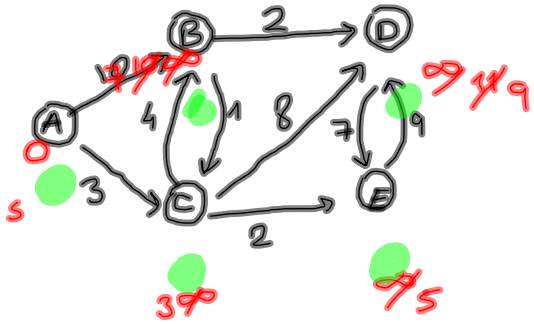
Dijkstra(G,s)

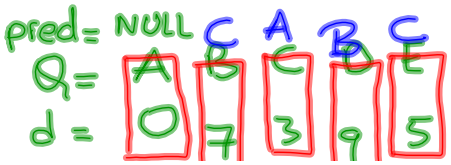
$d[s] \leftarrow 0$
for each $v \in V - \{s\}$
  do $d[v] \leftarrow \infty$; pred[s]= NULL
$S \leftarrow \emptyset$
$Q \leftarrow V$ ▷ Q is a priority queue maintaining $V - S$
while $Q \neq \emptyset$ pred[v]= NULL
  do $u \leftarrow$ EXTRACT-MIN(Q)
    $S \leftarrow S \cup \{u\}$
    for each $v \in Adj[u]$
      do if $d[v] > d[u] + w(u,v)$ *relaxation step*
        then $d[v] \leftarrow d[u] + w(u,v)$





pred[v]=u





Dijkstra(G,s)

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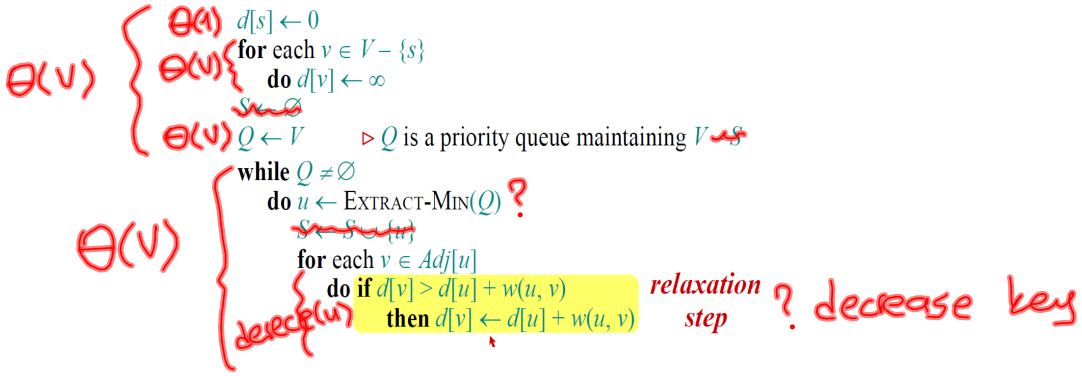
for each $v \in V - \{s\}$
  do $d[v] \leftarrow \infty$ pred[v]= NULL
$Q \leftarrow V$ ▷ Q is a priority queue maintaining V
while $Q \neq \emptyset$
  do $u \leftarrow$ EXTRACT-MIN(Q)

Dijkstra Algoritmasının Analizi



$$T(E,V) = \Theta(V) \cdot T_{extract\_min} + \Theta(E) \cdot T_{decrease\_key}$$

Q	$T_{extract\_min}$	$T_{decrease\_key}$	$T(E,V)$
dizi	$\Theta(V)$	$\Theta(1)$	$\Theta(V^2)$
ikili heap	$\Theta(\lg V)$	$O(\lg V)$	$\Theta(E \lg V)$