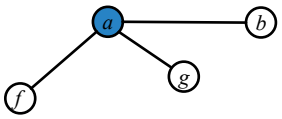
Übung 6
Aufgabe 42)

Dijkstra-Algorithmus

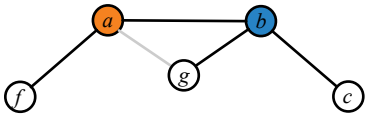
(Kürzester Weg im Graphen)

P = { (a,0) }



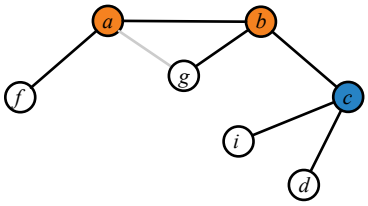
P = { (f,9), (g,15), (b,2) }

d(a) = 0
d(b) = 2
d(c) = inf
d(d) = inf
d(e) = inf
d(f) = 9
d(g) = 15
d(h) = inf
d(i) = inf



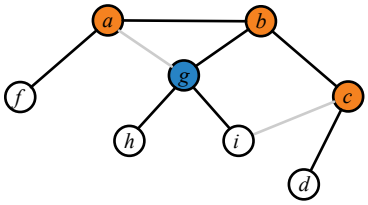
P = { (f,9), (g,8), (c,6) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = inf
d(e) = inf
d(f) = 9
d(g) = 8
d(h) = inf
d(i) = inf



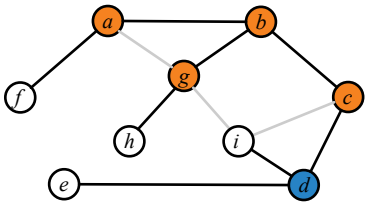
P = { (f,9), (g,8), (i,21), (d,8) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = inf
d(f) = 9
d(g) = 8
d(h) = inf
d(i) =21



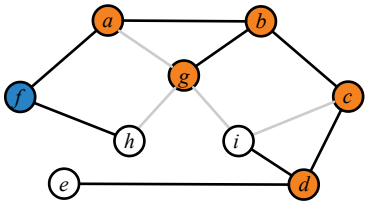
P = { (f,9) (i,10), (d,8), (h,23) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = inf
d(f) = 9
d(g) = 8
d(h) = 23
d(i) =10



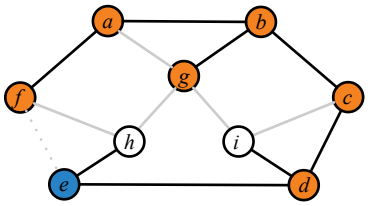
P = { (f,9) (i,10), (h,23), (e,9) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = 9
d(f) = 9
d(g) = 8
d(h) = 23
d(i) =10



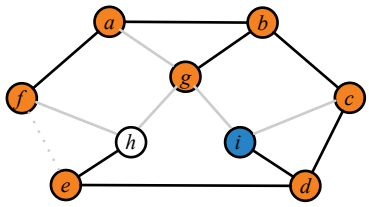
P = { (i,10), (h,20), (e,9) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = 9
d(f) = 9
d(g) = 8
d(h) = 20
d(i) =10



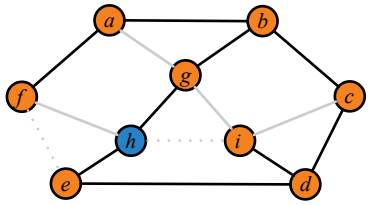
P = { (i,10), (h,12) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = 9
d(f) = 9
d(g) = 8
d(h) = 12
d(i) =10



P = { (h,12) }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = 9
d(f) = 9
d(g) = 8
d(h) = 12
d(i) =10



P = { }

d(a) = 0
d(b) = 2
d(c) = 6
d(d) = 8
d(e) = 9
d(f) = 9
d(g) = 8
d(h) = 12
d(i) =10

done(Knoten) = true

aktuell betrachteter Knoten

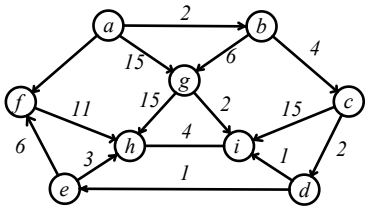
= 8 **updatet**

(g,8) **removemin(P)**

Update nicht nötig

Kürzeseter Weg von a nach h: (a, b, c, d, e, h)

Usprünglicher Graph



Algorithmus 95 `Dijkstra`(V, E, l, s)

```
for all v ∈ V do
  g(v) := ∞
  parent(v) := nil
  done(v) := false
g(s) := 0
Init(P)
Update(P, s, 0)
while u := RemoveMin(P) ≠ nil do
  done(u) := true
  for all v ∈ N⁺(u) do
    if done(v) = false ∧ g(u) + l(u,v) < g(v) then
      g(v) := g(u) + l(u,v)
      Update(P, v, g(v))
      parent(v) := u
```

`Init`(P): Initialisiert P als leere Menge.

`Update`(P, u, d): Erniedrigt den Wert von u auf d (nur wenn der aktuelle Wert größer als d ist). Ist u noch nicht in P enthalten, wird u mit dem Wert d in P eingefügt.

`RemoveMin`(P): Gibt ein Element aus P mit dem kleinsten Wert zurück und entfernt es aus P. Ist P leer, wird `nil` zurückgegeben.

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