Linear-Time Algorithm for Multiple Source Shortest Path with unit weights Planar Graph

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MaxFlow(G, c, s, t, f^∞)
for each vertex f ≠ f^{infty} of G*
   pred[f] ← the dart in T* whose head is f
for each dart d:
   Φ[d] ← dist_c( head of d in G*) − dist_c( tail of d in G*)
Let T be the tree formed by the edges not represented in T*
while t is reachable from s in T:
   while ∃ a nonresidual dart on the s to t path in T:
      let d̃ be the first non-residual dart
      let q be the head of d̃ in G*
      eject d̃ from T and insert rev(pred[q]) into T
      pred[q] ← d̃
   for each dart d on the s-to-t path in T:
      Φ[d] ← Φ[d] + 1
```

Given f^∞ be a boundary of G. And $d_1, d_2, \ldots, d_k$ be edges of boundary f^∞.

```
MSSP(G, c)
T ← tail(d_1) rooted shortest path tree
for i ← 1, 2, ..., k:
   λ ← −1 times the distance from tail(d_i) to
   remove the dart of T entering head(d_i) and
   while λ < c[rev(d_i)]:
      while there is an active dart d with slack
         d^+ ← the leafmost such dart in the du
         remove from T the dart d^- whose hea
         insert d^+ into T
      λ ← λ + 1
```