Delaunay Triangulation

Randomized Incremental Construction

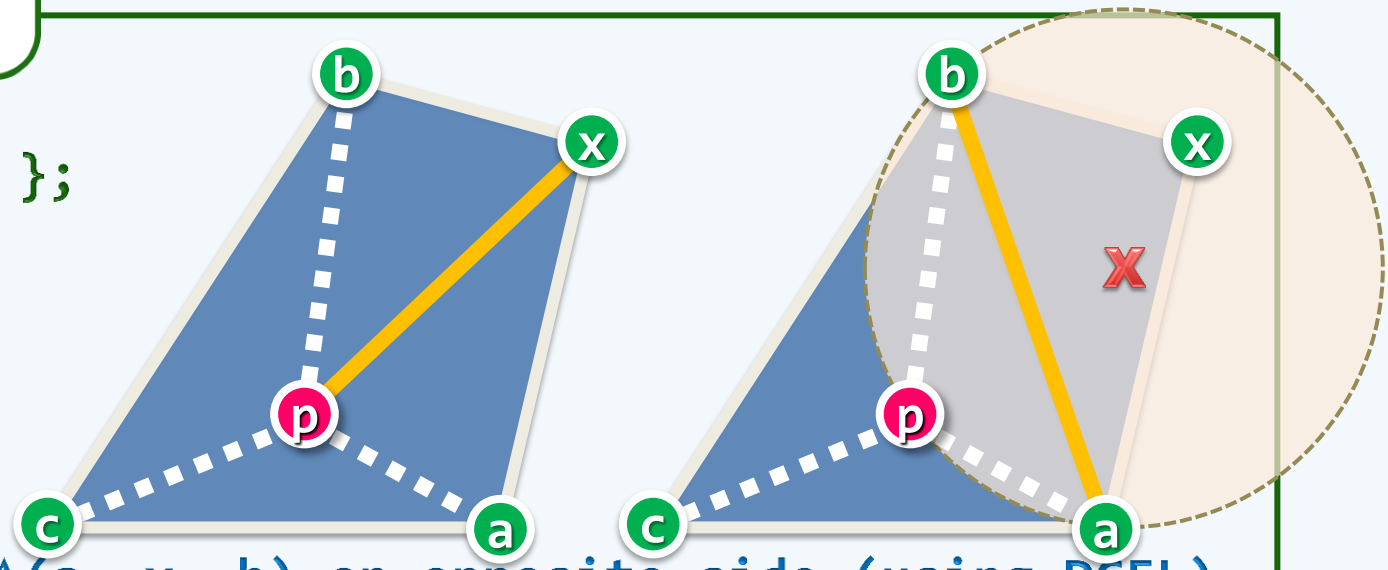
- Iterative Implementation

05-J-02

Junhui DENG

deng@tsinghua.edu.cn

swapTest (p, a, b, c)



❖ Queue Q = { (a,b), (b,c), (c,a) };

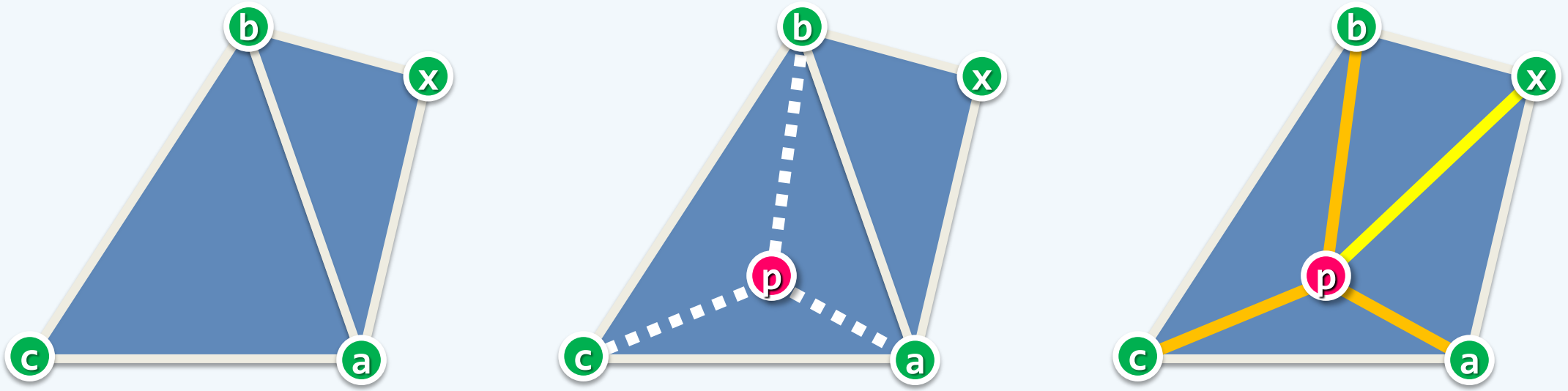
```
while ( ! empty( Q ) )
    (a, b) = Q.dequeue();
    x = rightSite(a, b); //find Δ(a, x, b) on opposite side (using DCEL)
    if ( ! x ) continue; //in case x doesn't exist
    if ( inCircle( p, a, b, x ) ) { //if x violates in-circle condition
        flipEdge( a, b, p, x ); //replace ab with px, and
        Q.enqueue( (a, x), (x, b) ); //insert the 2 new triangles
```

Basic Operations

❖ **Finding** the triangle containing the new point;

Inserting p into the triangle by introducing 3 new edges; and

Flipping an edge (if necessary)



❖ We will see that, with appropriate data structures (DCEL, buckets, etc.),

each of these operations can be performed in **expected-$O(1)$** time