A Circle Packing Algorithm
Final Project of the Advanced AlgorithmII

Moran Kim

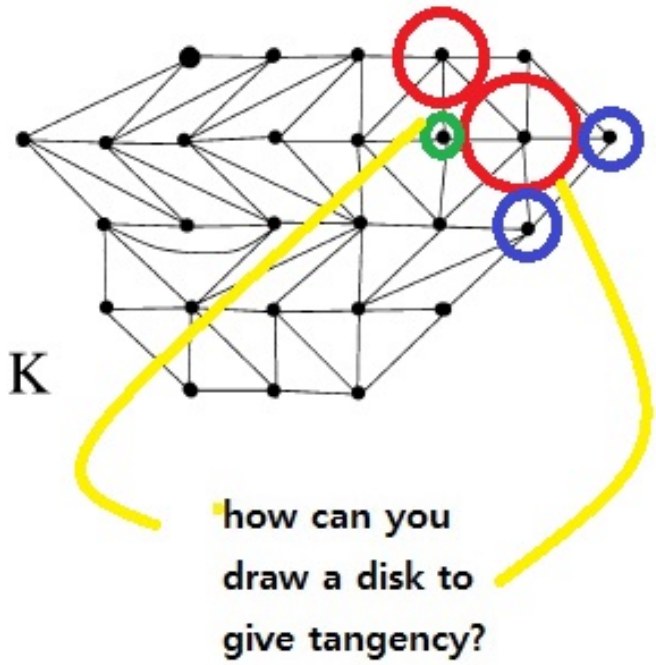
Ewha Womans University
December 17, 2015

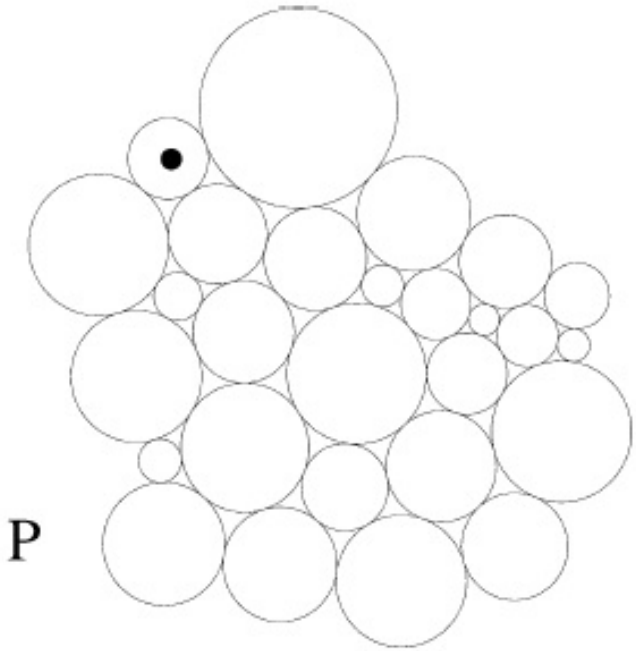
Contents

Contents

Contents

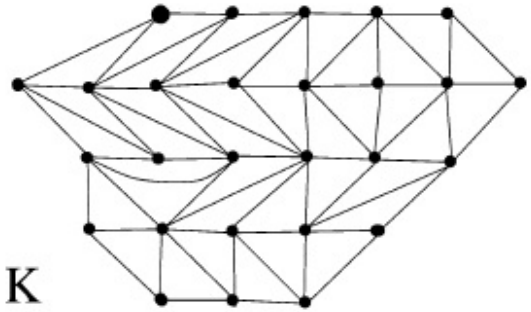
Given a complex K, consists of vertices and the information of the connection between two vertices,

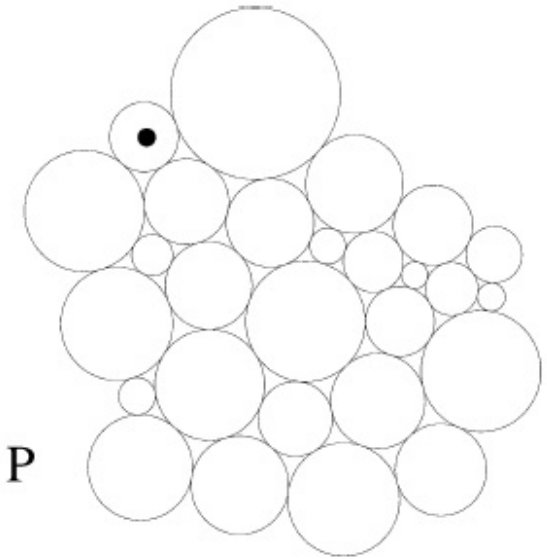




we are looking for a configuration P of circles realizing a pattern of

Input and Output data

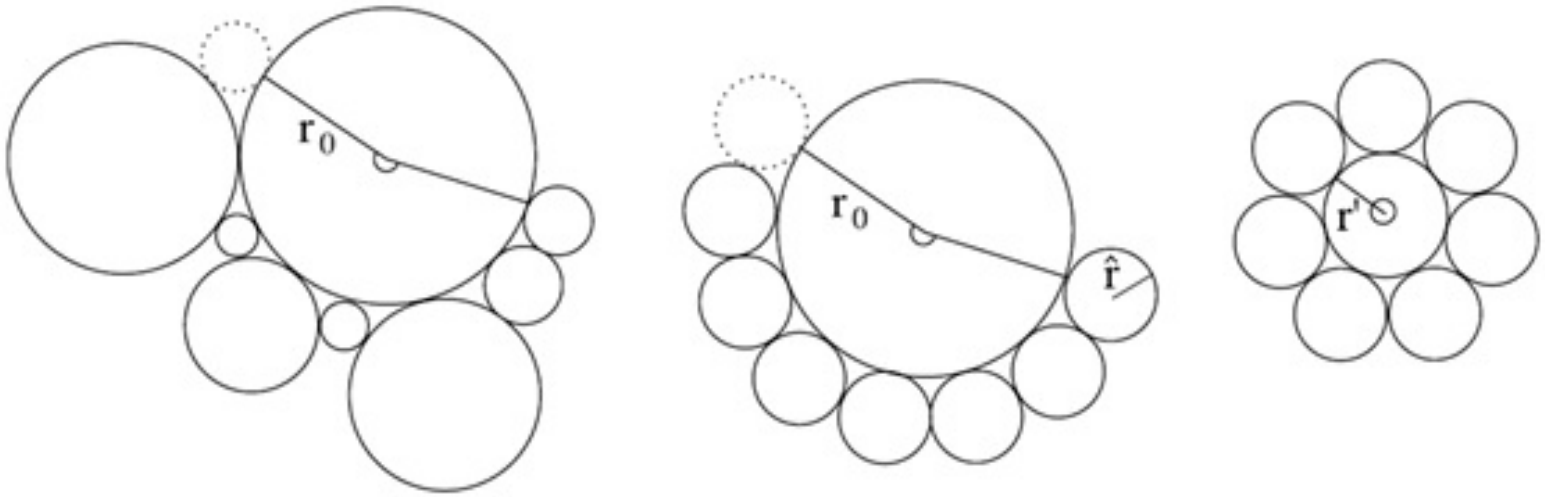




•Input data are set of vertices and the connection information between two vertices(not triangles) and the appropriate boundary conditions.

•Output data are radii of the corresponding circle packing for K.

Contents



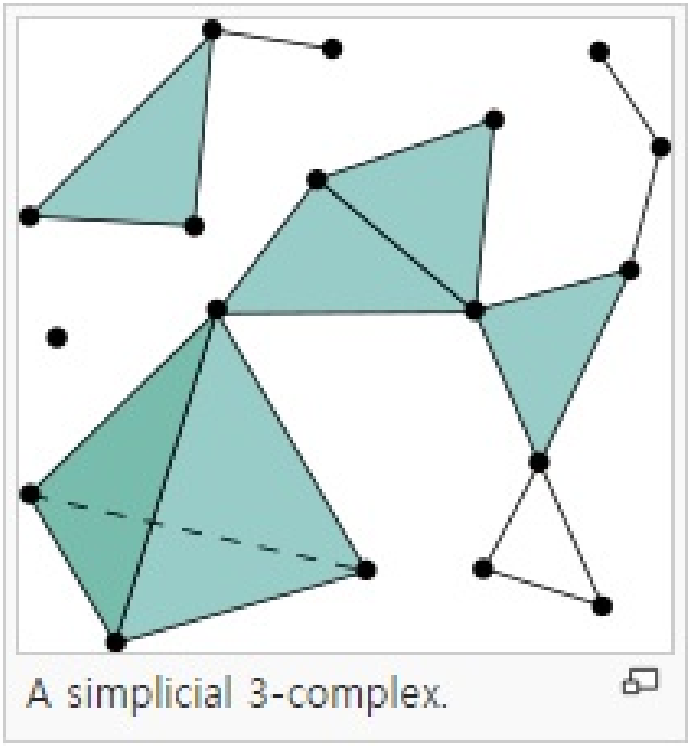
The Process of the Uniform Neighbor Model Algorithm

Step1. Given a value for r(radius of a center disk), determine $\hat{r}$ so that $\hat{\theta}(r;\hat{r})=\theta(r;r_j)$.

Step2. Solve for a new value for r(call it u) so that $\hat{\theta}(u;\hat{r}) = A(r)$.

Some restrictions

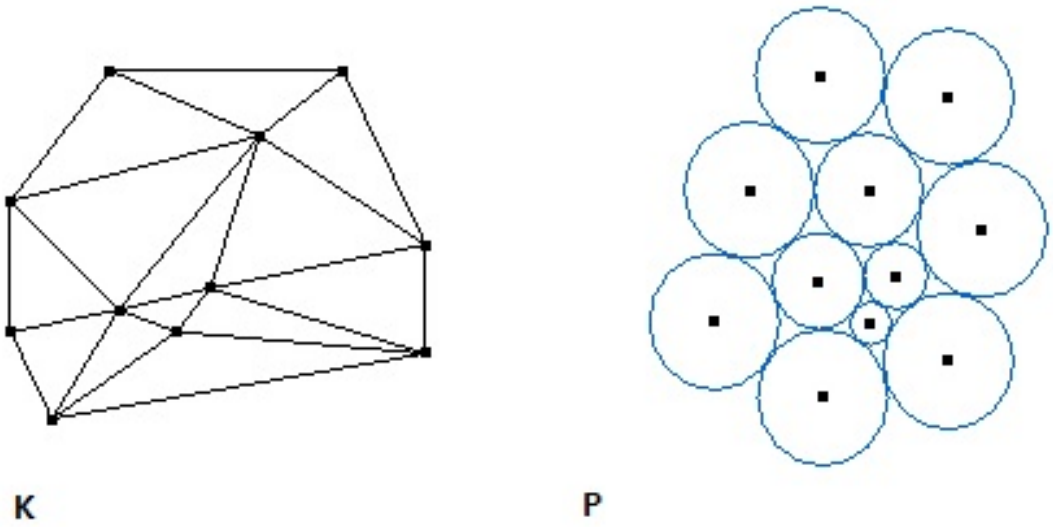
We restrict to the case in which K is a finite triangulation of a closed topological disc, so we have a finite number of vertices, edges and faces.



A simplicial 3-complex.

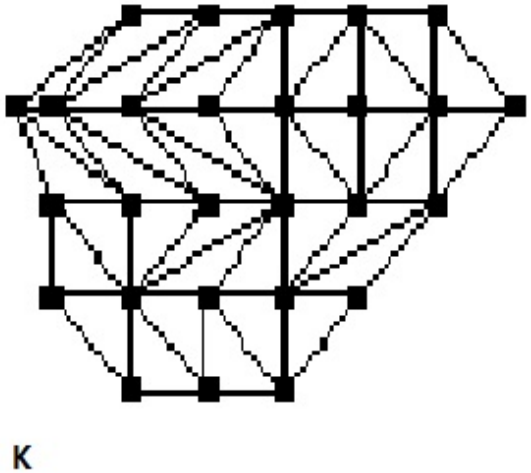
Test results of some complexes

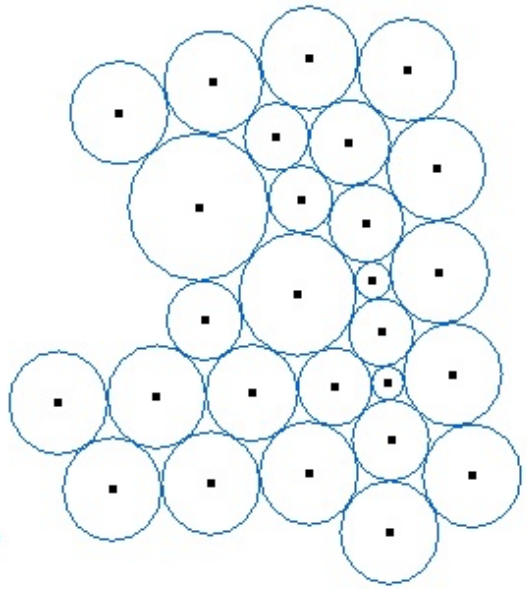
Test results



With boundary radii, $r_{boundary}$=16

Test results

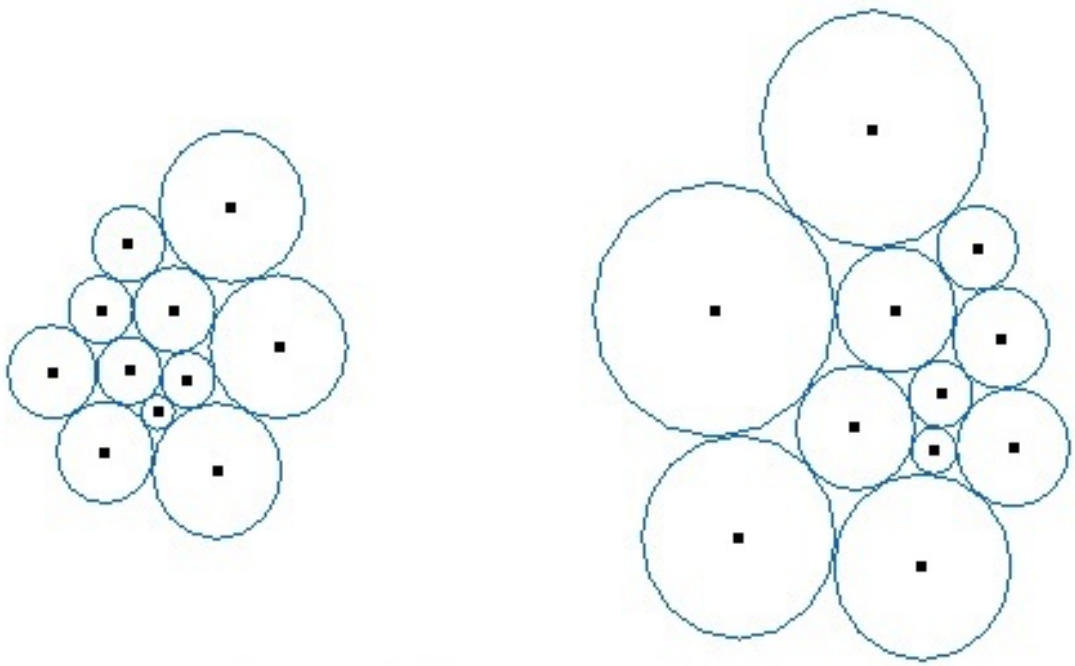

K


P

With boundary radii, $r_{boundary}$=16

Test results

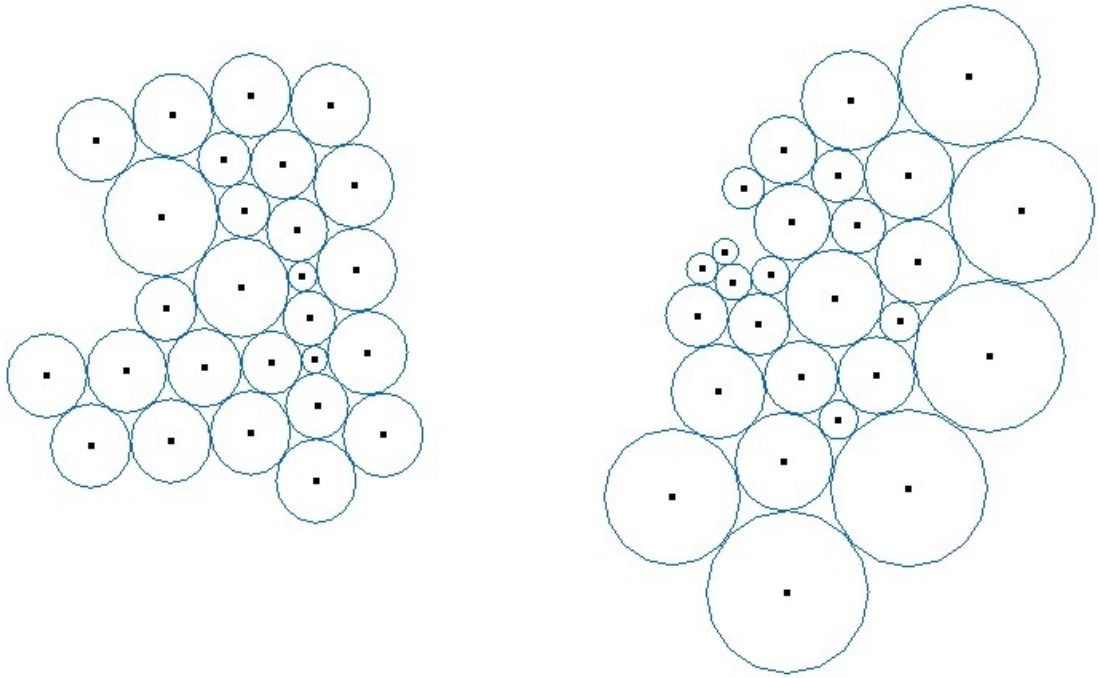
The boundary conditions are needed to give a unique circle packing.



Without the boundary conditions, there can be many possible circle packings

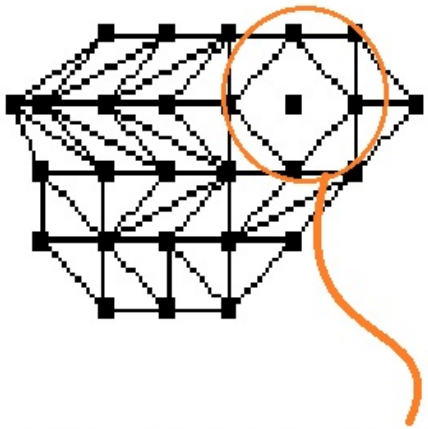
Test results

The boundary conditions are needed to give a unique circle packing.

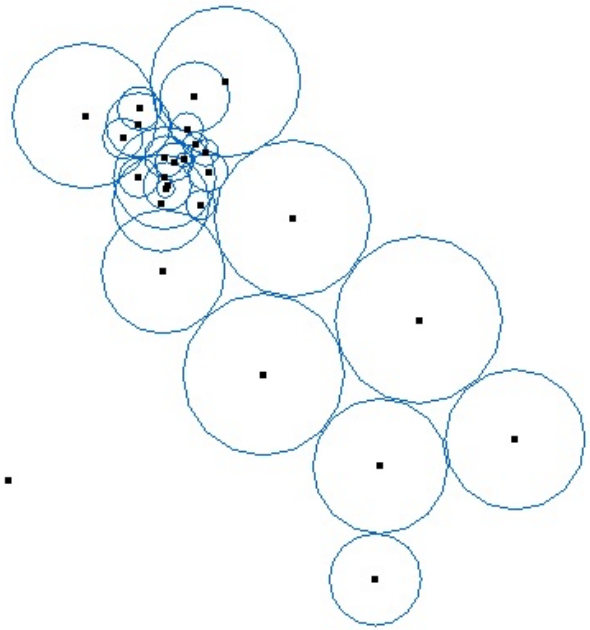


Without the boundary conditions, there can be many possible circle packings

We restrict to the case in which K is a finite triangulation of a closed topological disc, so we have a finite number of vertices, edges and faces.

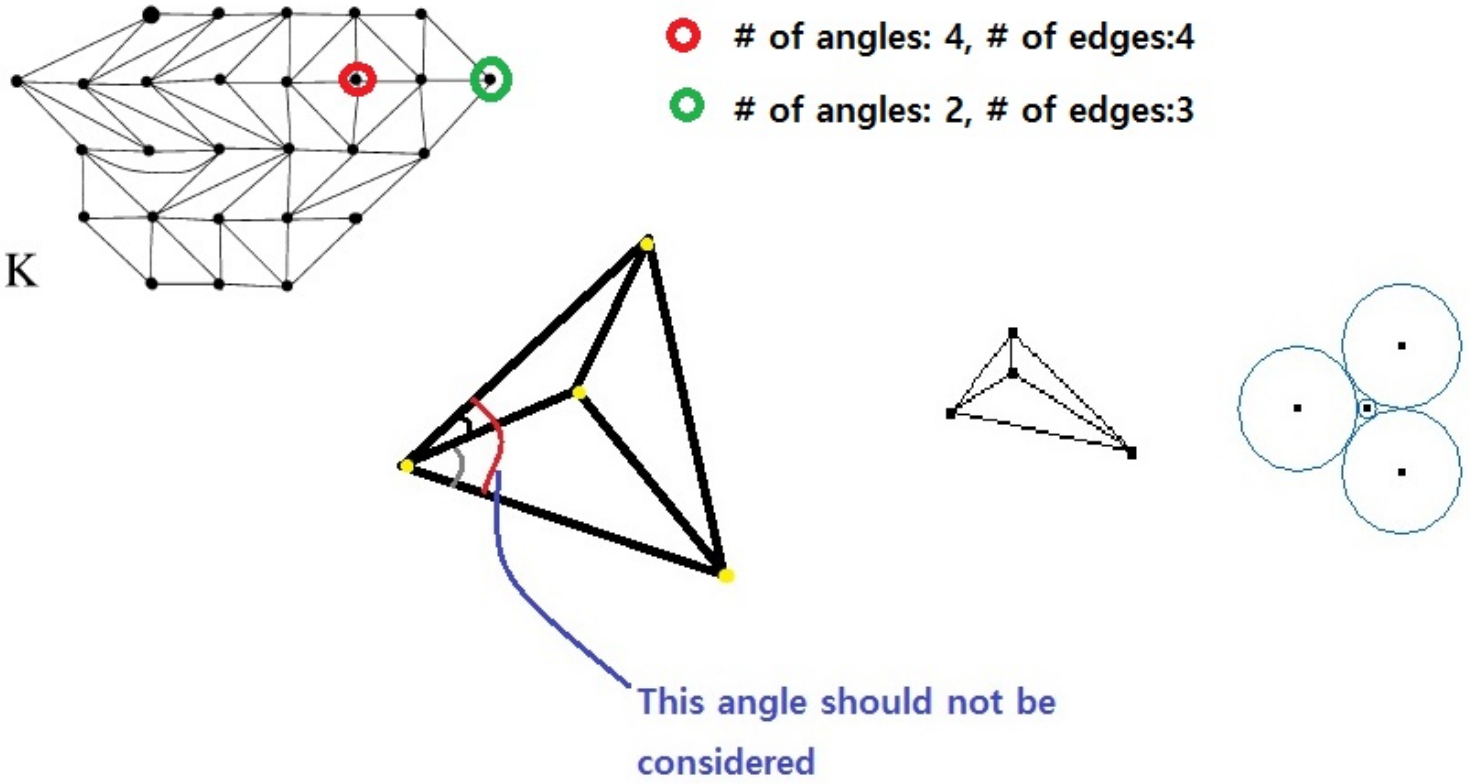


Because of this, it is not a closed topological disc



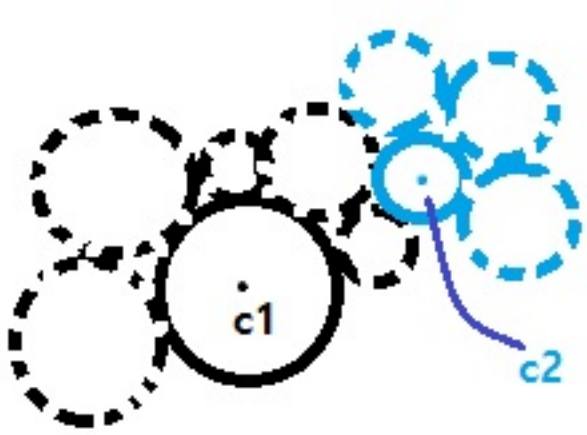
Things to consider

To discern whether the vertex is interior or boundary, I used the information of the sign of the normal vector.



Things to consider

To locate circles in certain order, in this implementation I used the angle information with vectors between x-axis. and I also used two directions to located circles.



Locating Circles in certain order should be considered with angle

Thank you

 C.Collins, K. Stephenson A circle packing algorithm, J. Comp. Geom. **25** (2003), 233-256.