

ΗΥ416 ΓΡΑΦΙΚΑ ΥΠΟΛΟΓΙΣΤΩΝ

Πολύγωνα Περιοχές Γεμίσματος Πολυγώνων

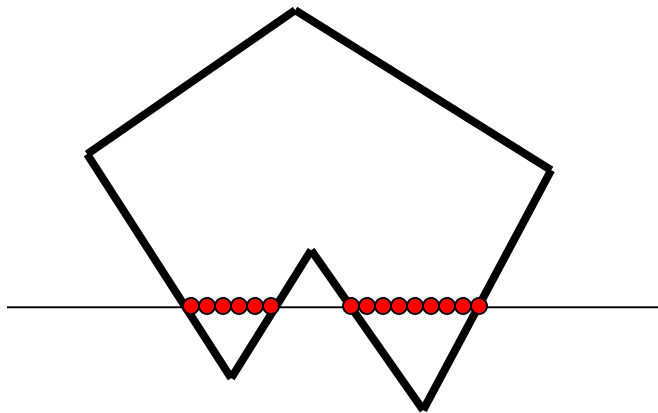
Π. ΤΣΟΜΠΑΝΟΠΟΥΛΟΥ

ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΙΑΣ

ΤΜΗΜΑ ΗΛΕΚΤΡΟΛΟΓΩΝ ΜΗΧΑΝΙΚΩΝ & ΜΗΧΑΝΙΚΩΝ ΥΠΟΛΟΓΙΣΤΩΝ

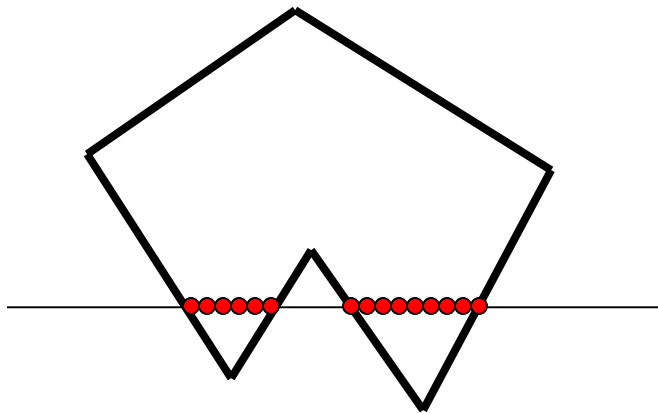
Pixel Fill-in

- ▶ Which intervals should we draw?



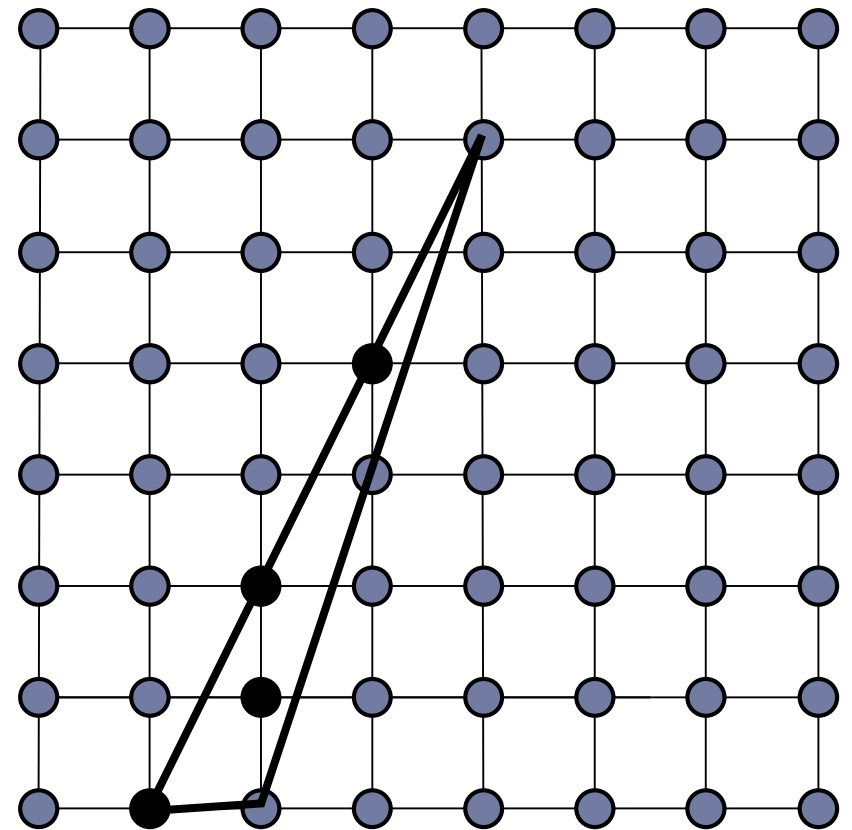
Pixel Fill-in

- ▶ Which intervals should we draw?
 - Odd intervals. But need to pay attention to scan lines passing through vertices.



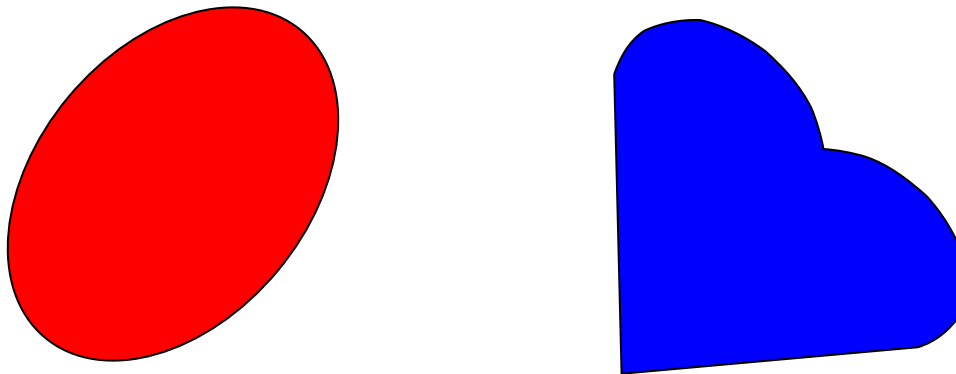
General Polygons - Problems

- ▶ Sliver polygons may not be drawn correctly
- ▶ No simple solution
- ▶ Long, thin triangles cause problems
- ▶ Want triangles with good aspect ratio (close to equilateral)



Curved Boundaries

- ▶ How to deal with curved boundaries?



Boundary Fill

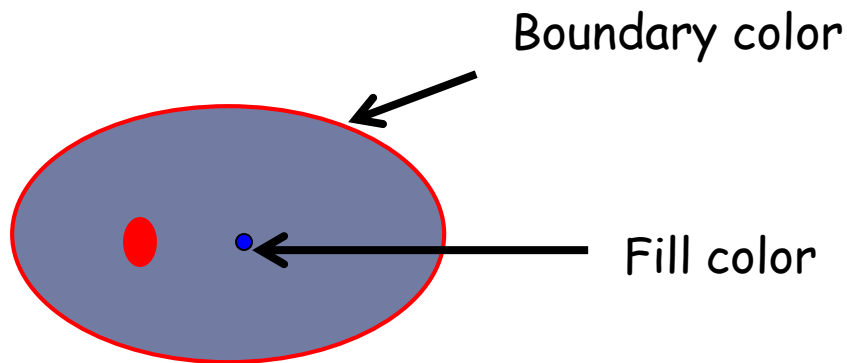
- ▶ Start with drawn boundaries and an interior point
- ▶ Recursively recolor outward from that point
 - ▶ If neighbor different, then recolor and recur
- ▶ Everything within the boundary is changed to that color

Boundary Fill

- ▶ Start with drawn boundaries and an interior point
- ▶ Recursively recolor outward from that point
 - ▶ If neighbor different, then recolor and recur
- ▶ Everything within the boundary is changed to that color

Boundary Fill

- ▶ Work for inner and outer boundaries

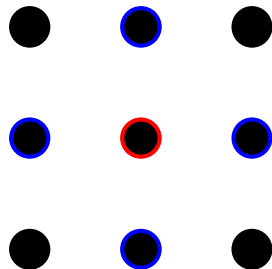


Boundary Fill

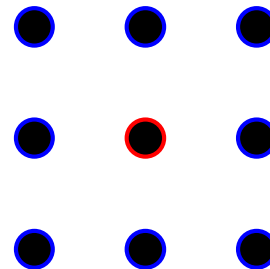
- ▶ Start with drawn outline of a polygon and an interior point
- ▶ Recursively recolor outward from that point
 - ▶ If neighbor different, then recolor and recur
- ▶ Everything within the boundary is changed to that color

Boundary Fill

- ▶ How to define a neighbor?

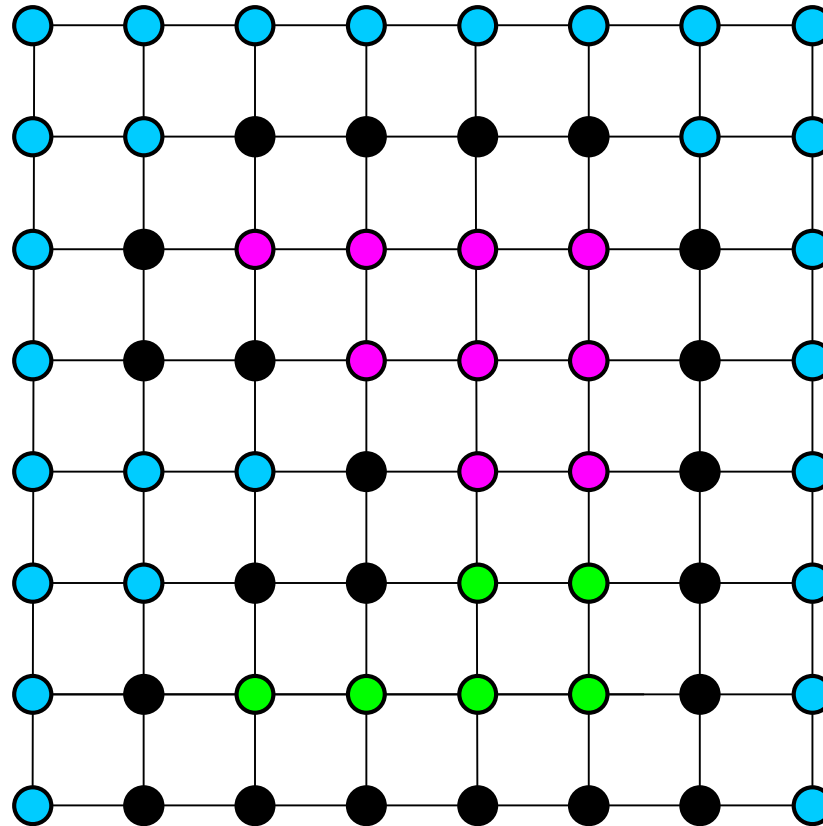


4-connected



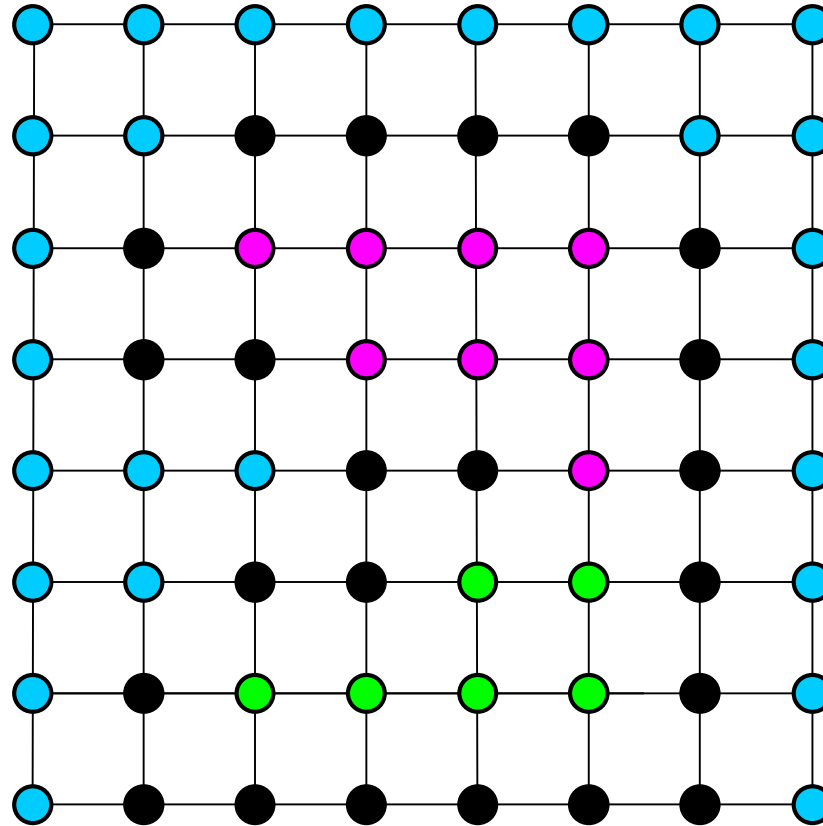
8-connected

Boundary Fill - Example

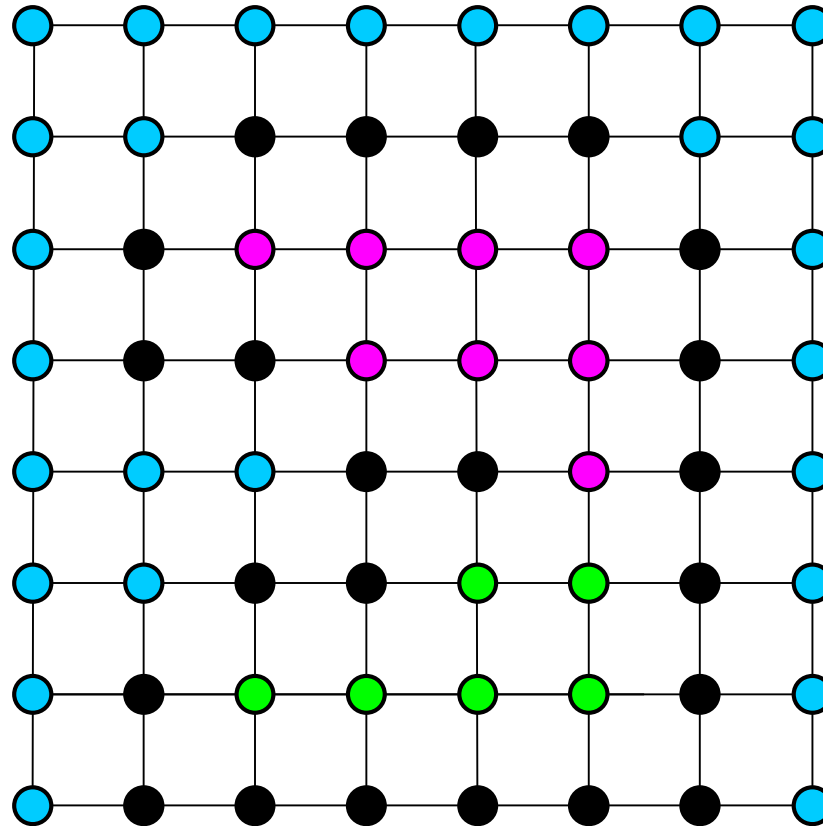


Black pixels indicate boundary pixels

Boundary Fill - Example

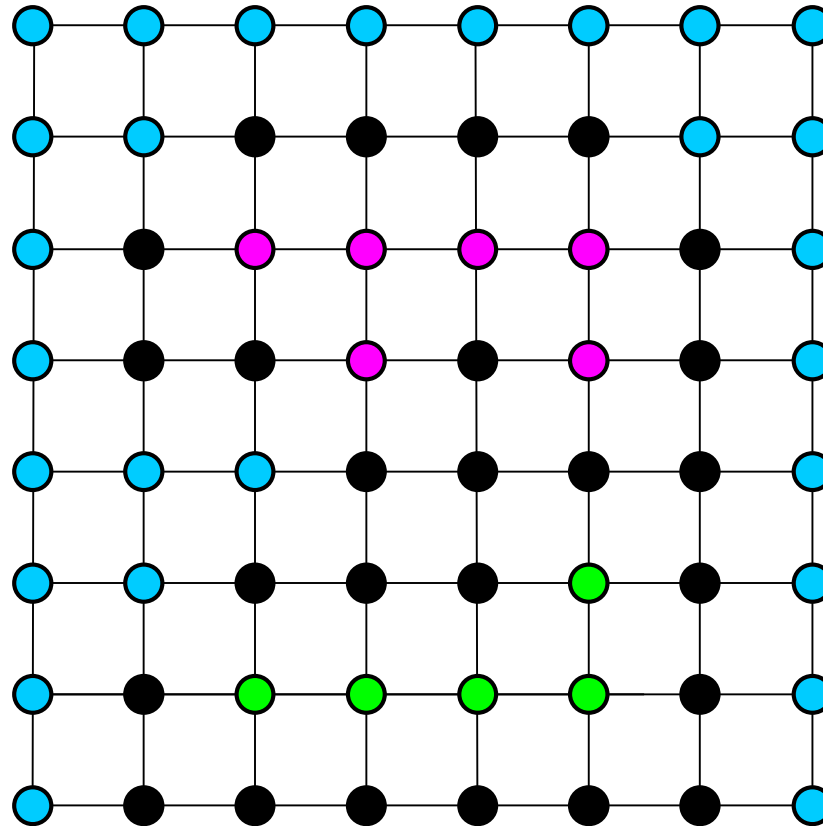


Boundary Fill - Example



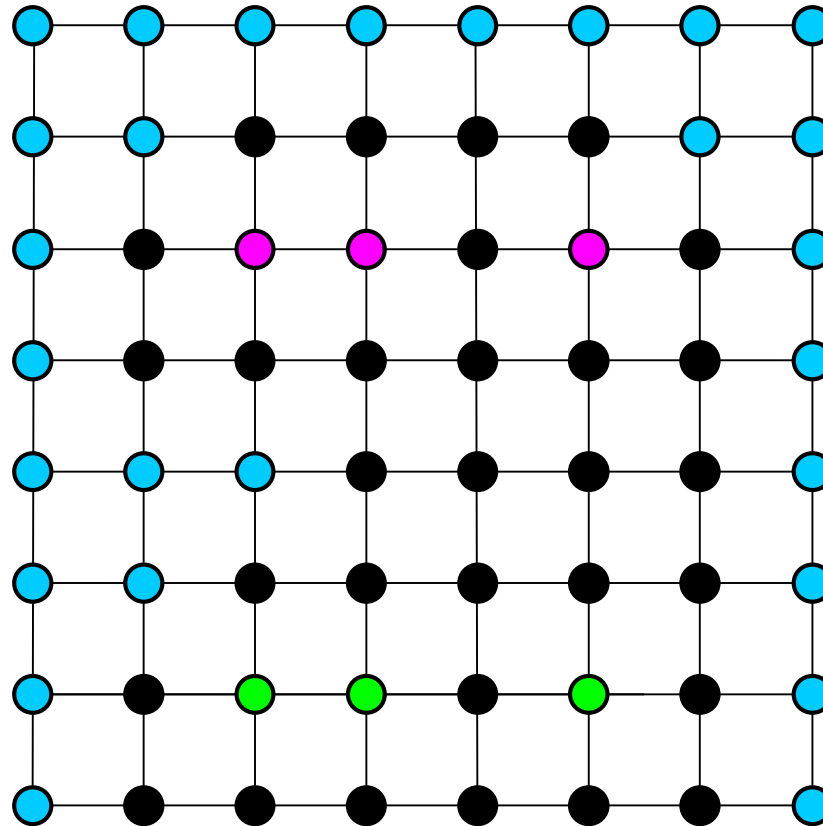
Continue checking neighboring pixels until reaching **boundary pixels**
or **previously visited pixels!**

Boundary Fill - Example



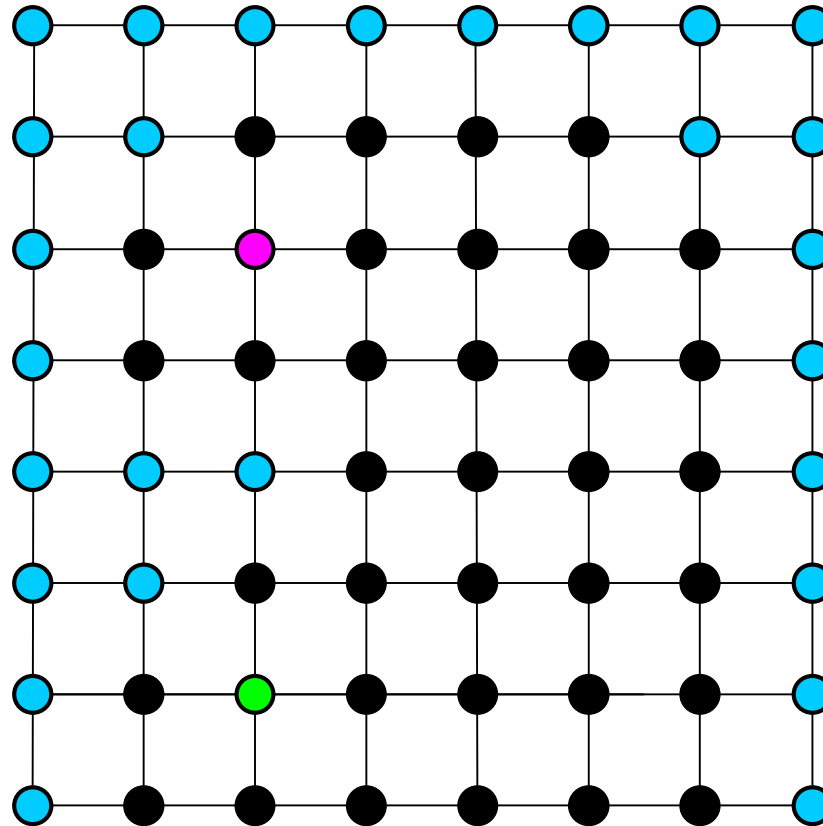
Continue checking neighboring pixels until reaching **boundary pixels**
or **previously visited pixels!**

Boundary Fill - Example



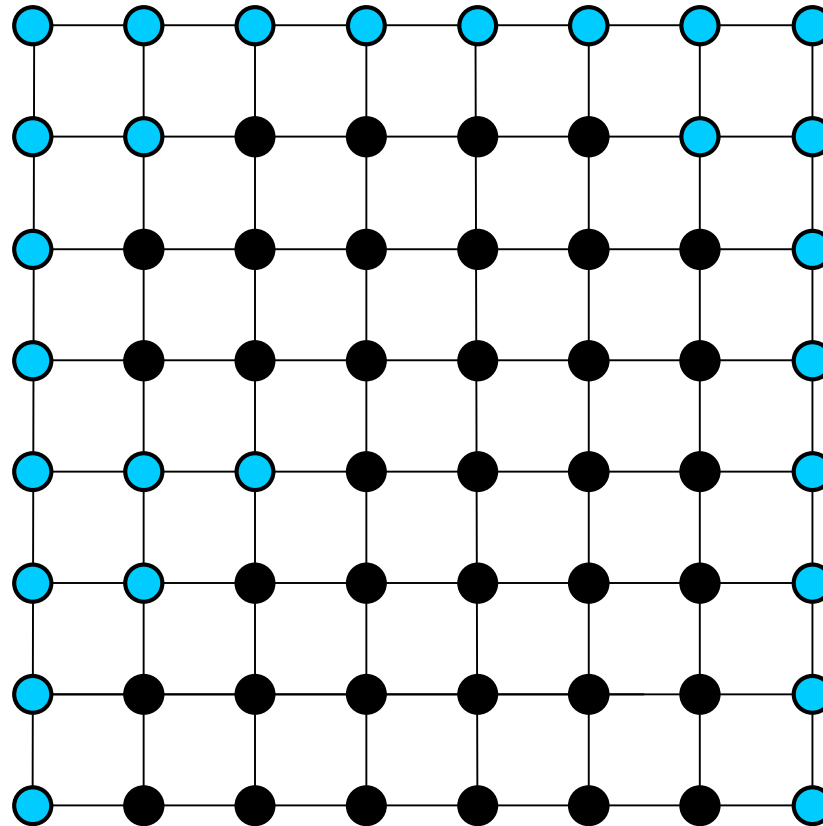
Continue checking neighboring pixels until reaching **boundary pixels**
or **previously visited pixels!**

Boundary Fill - Example



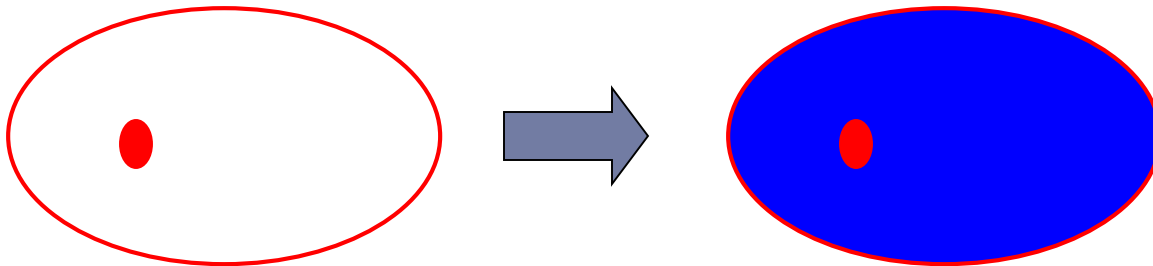
Continue checking neighboring pixels until reaching **boundary pixels**
or **previously visited pixels!**

Boundary Fill - Example

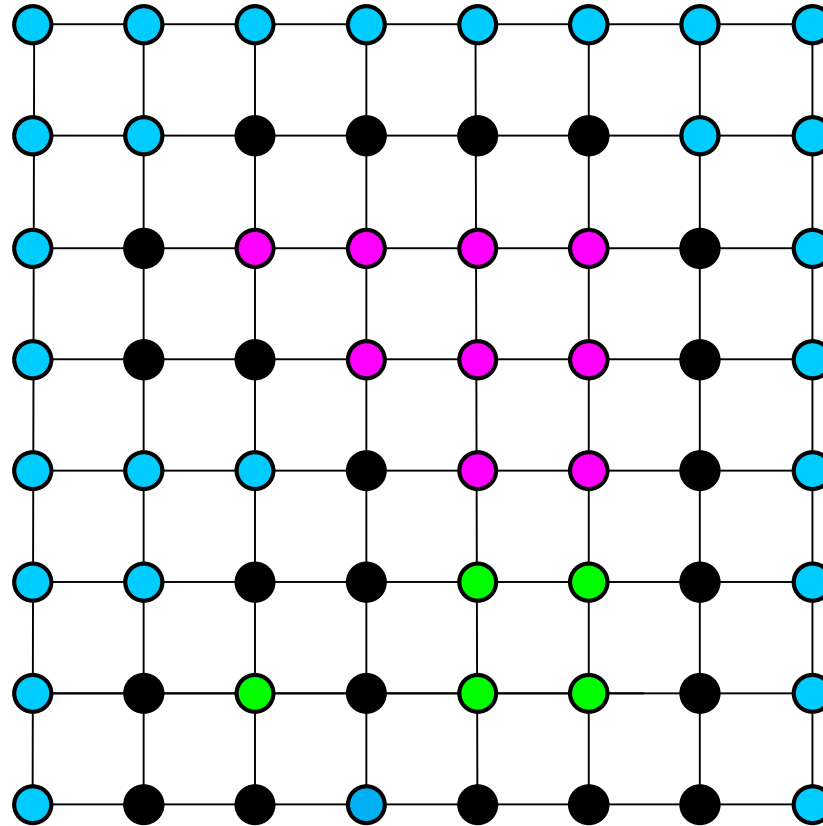


Continue checking neighboring pixels until reaching **boundary pixels**
or **previously visited pixels!**

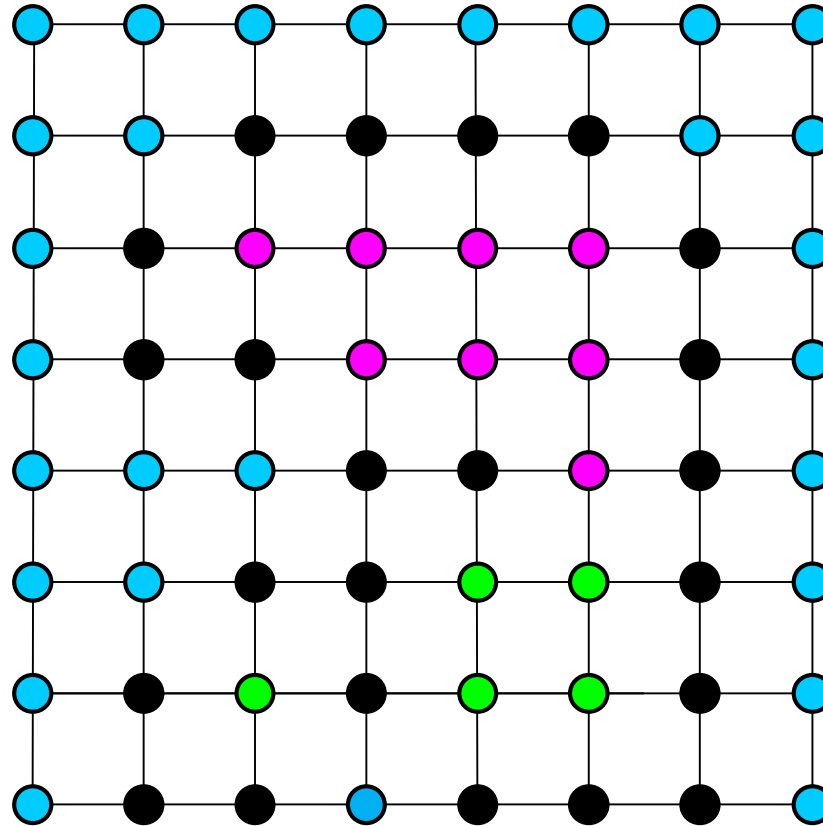
Boundary Fill



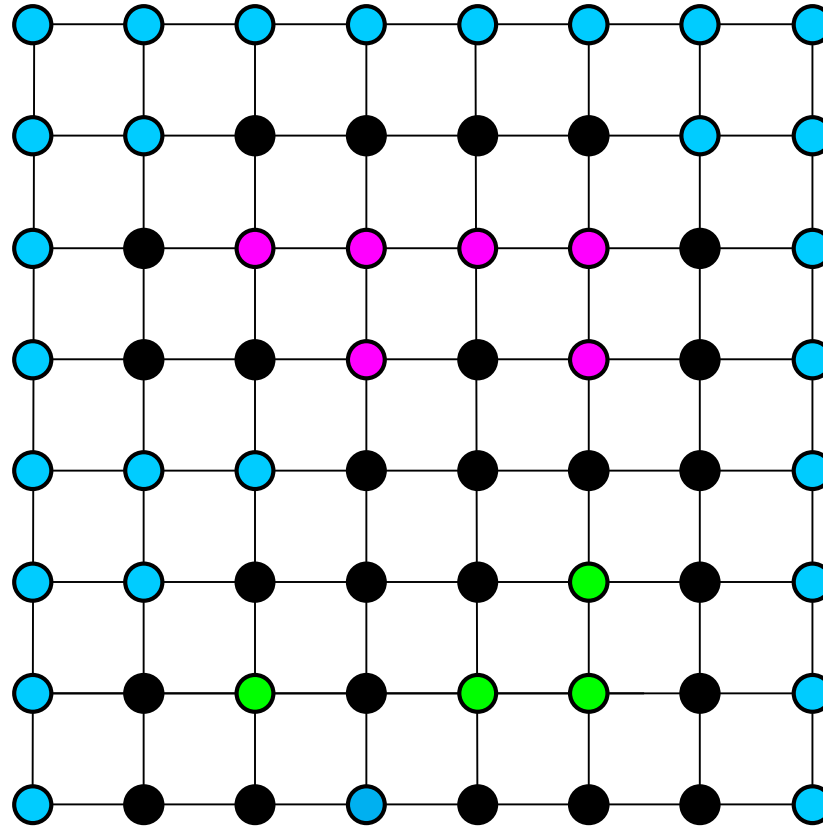
Boundary Fill - Counter Example



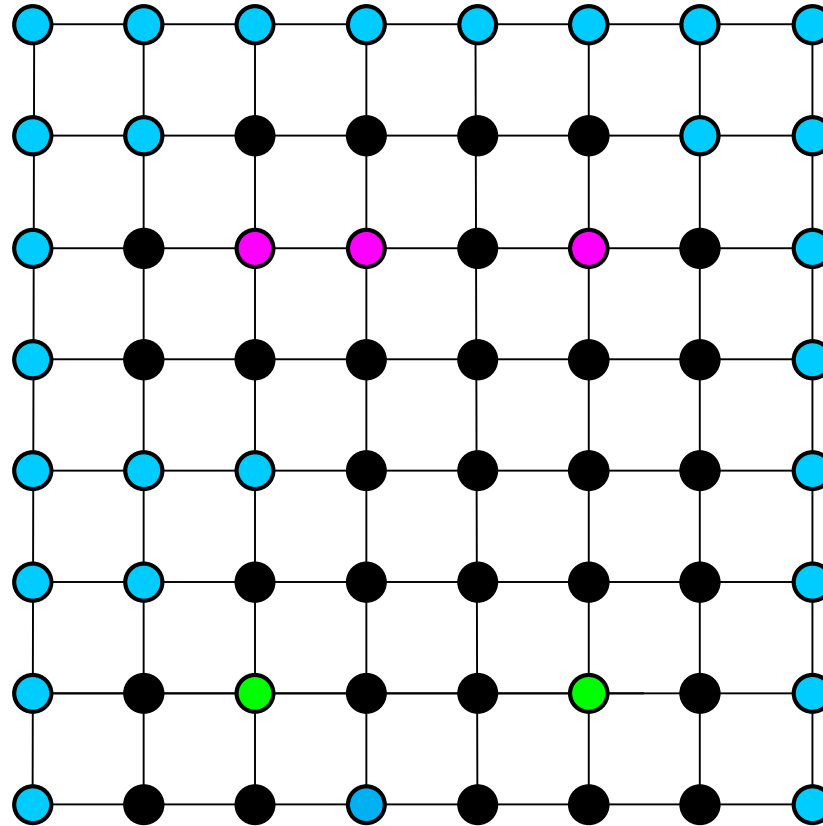
Boundary Fill - Counter Example



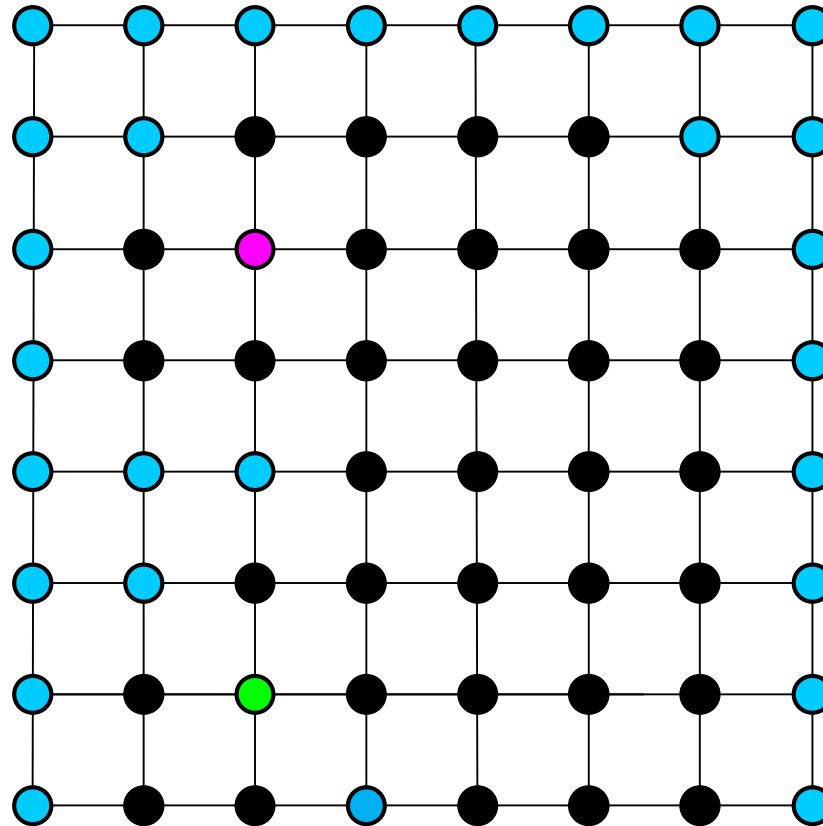
Boundary Fill - Counter Example



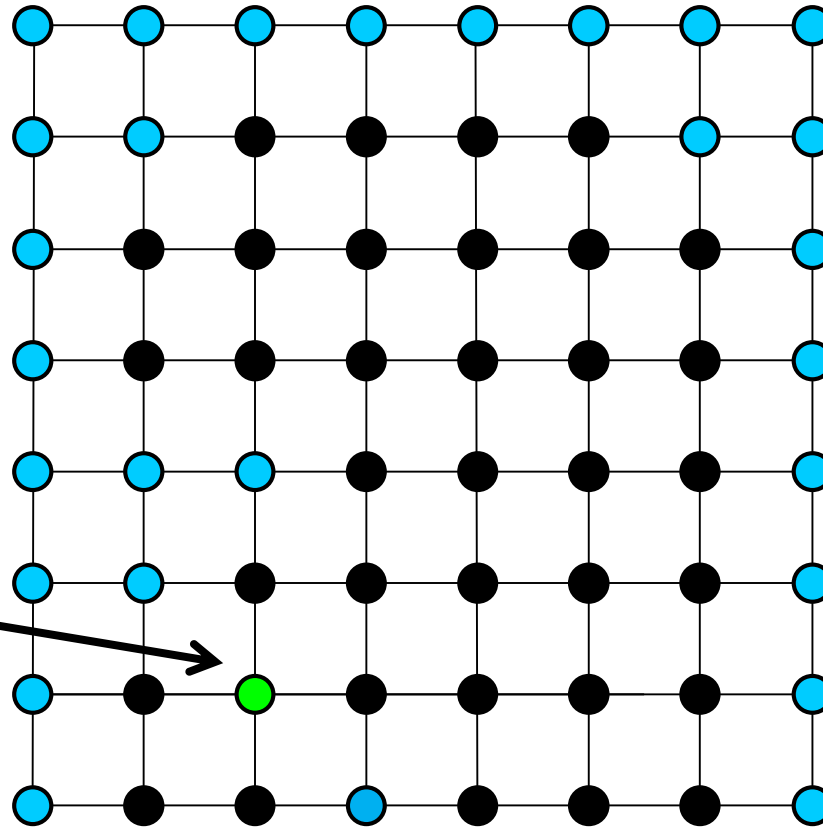
Boundary Fill - Counter Example



Boundary Fill - Counter Example



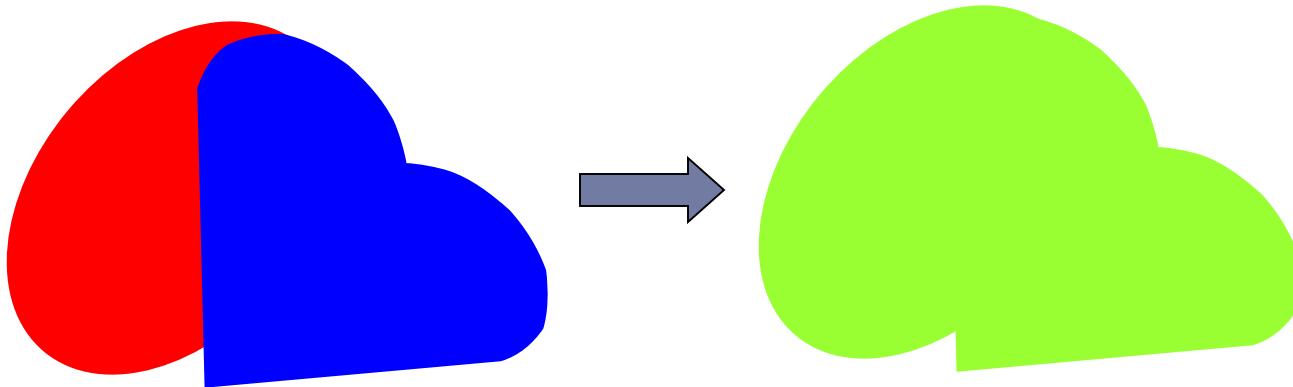
Boundary Fill - Counter Example



Area that is
not drawn
with
Boundary Fill
Algorithm

How to deal with this?

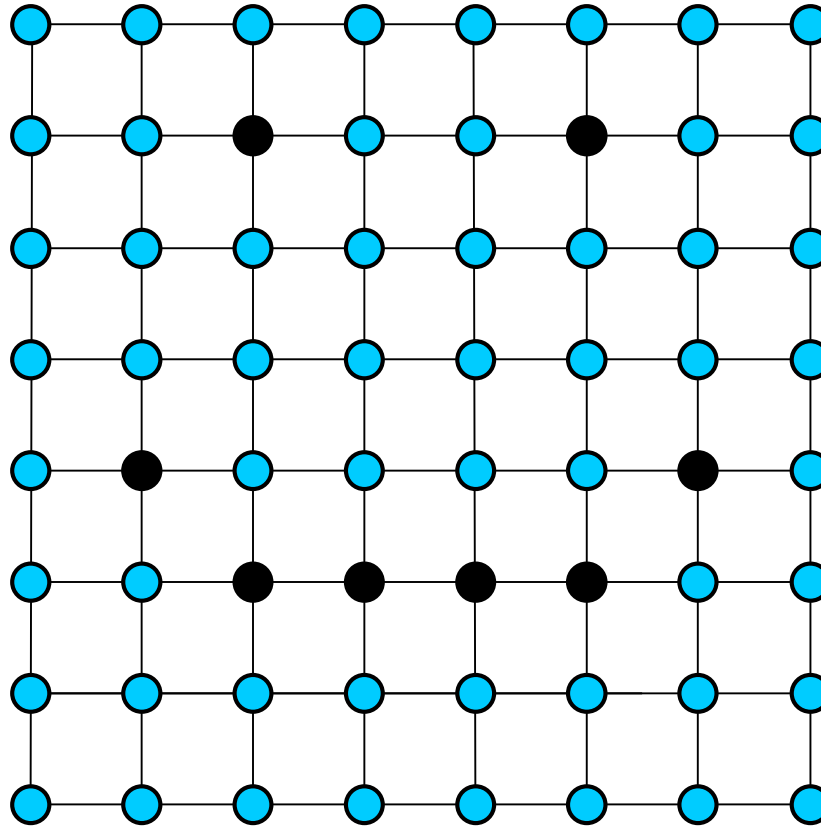
- ▶ Multiple color boundaries?



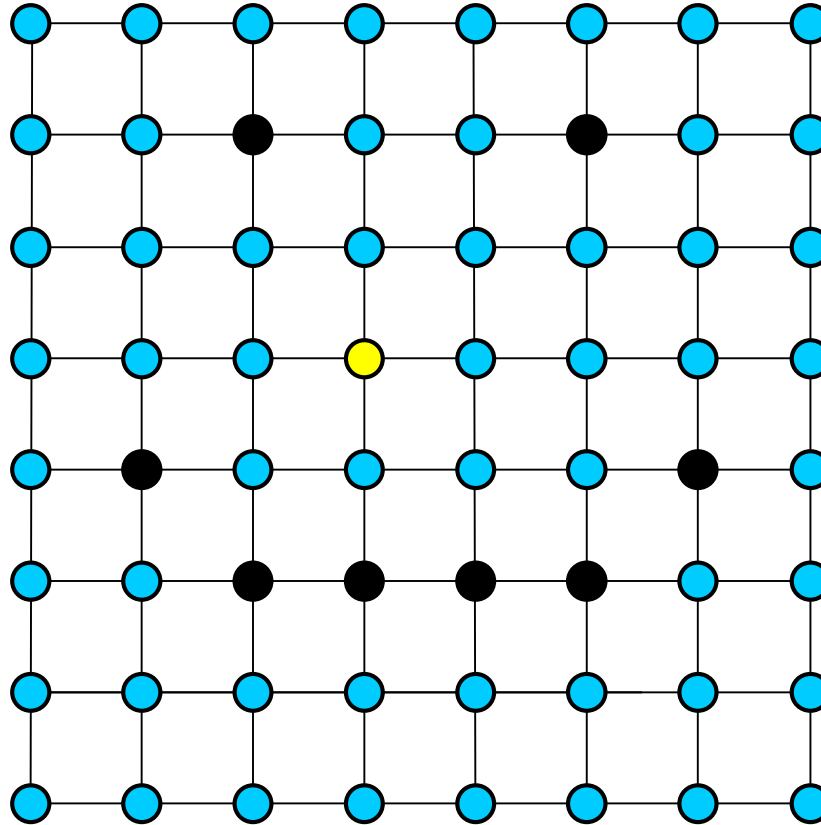
Flood Fill

- ▶ Start with a point
- ▶ Define color under that point as the interior color
- ▶ Recursively recolor outward from that point
 - ▶ If neighbor is interior color, then recolor and recur
- ▶ Contiguous regions are recolored

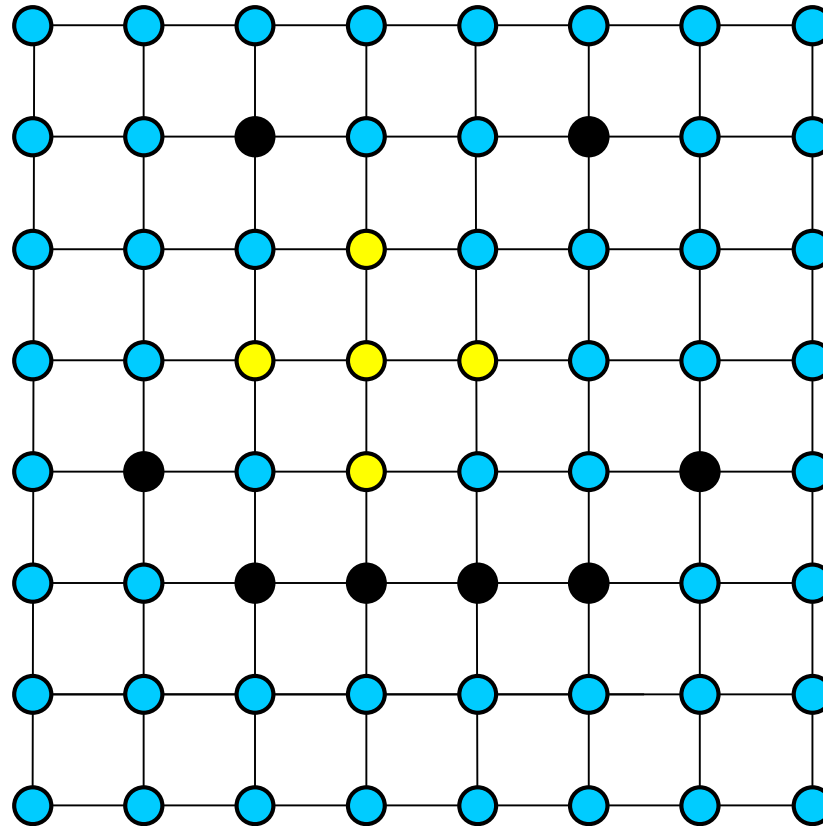
Flood Fill - Example



Flood Fill - Example

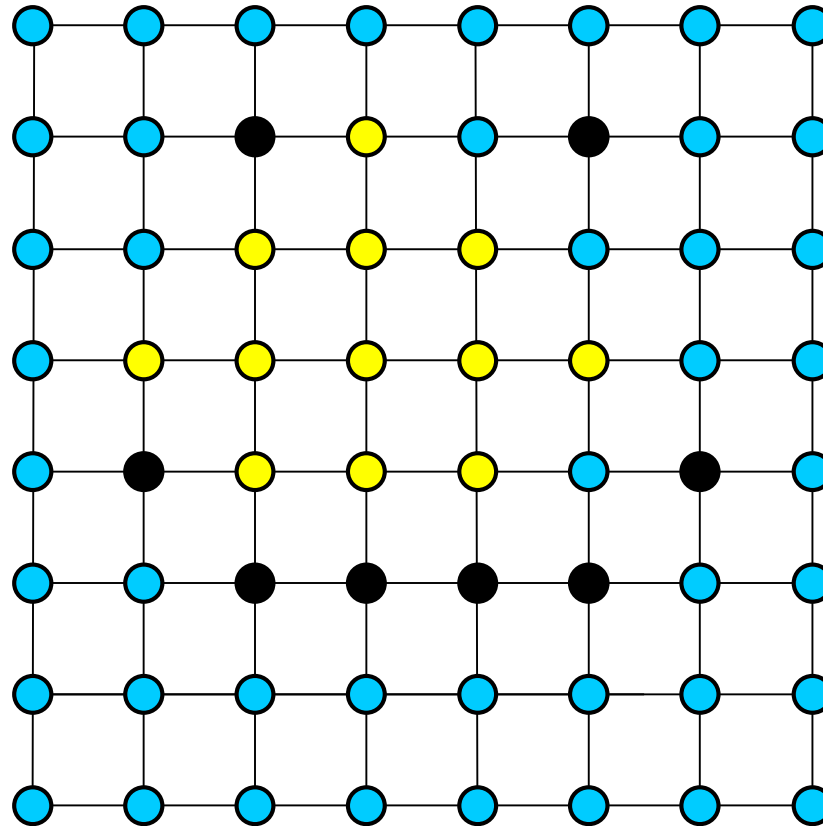


Flood Fill - Example



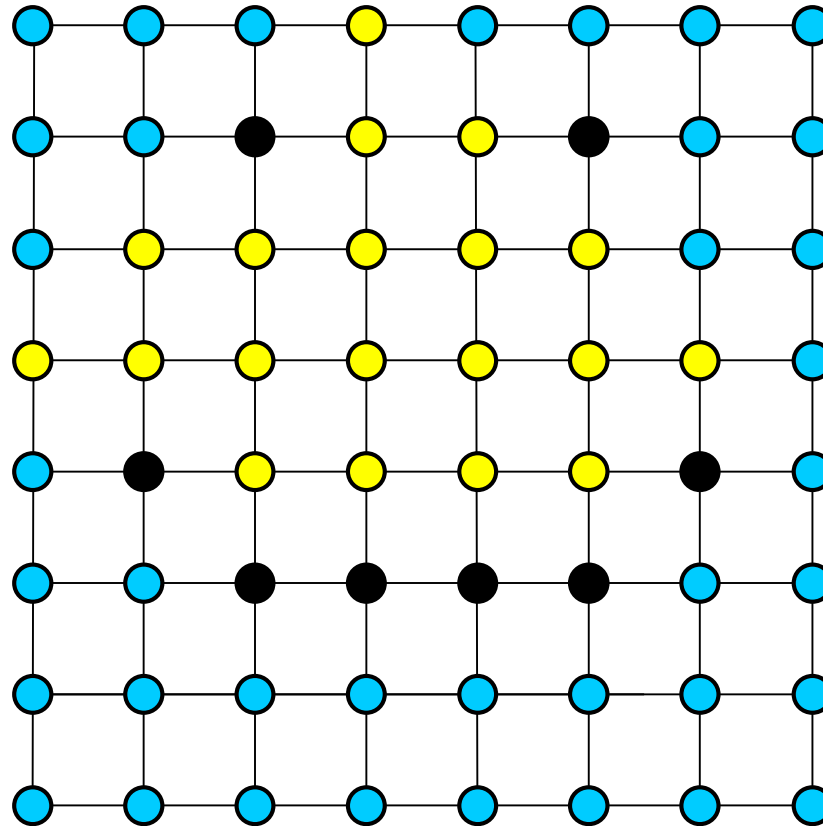
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



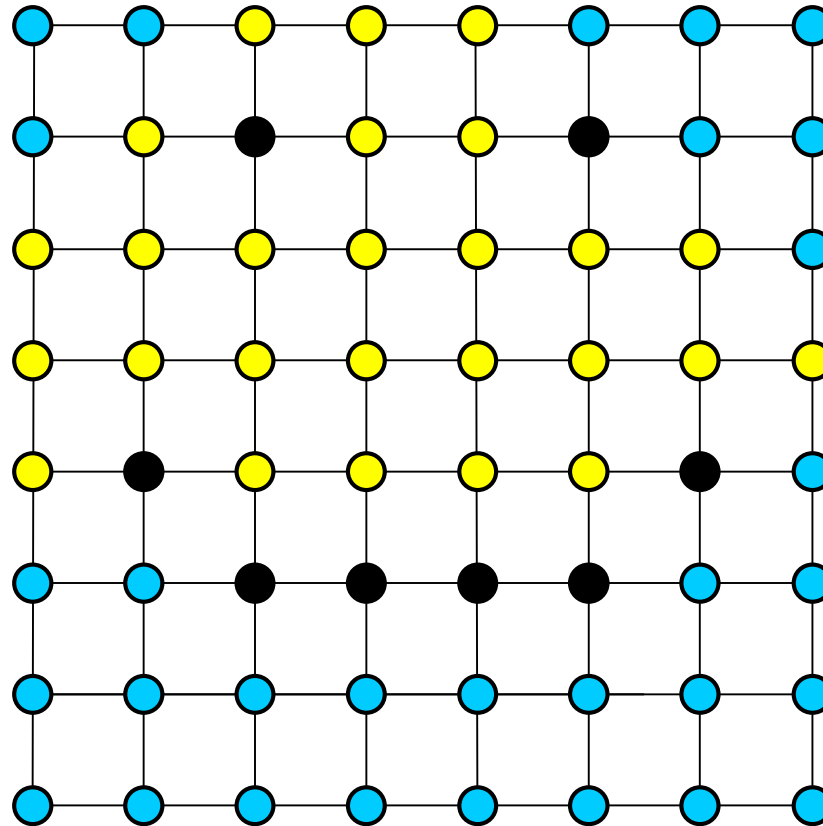
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



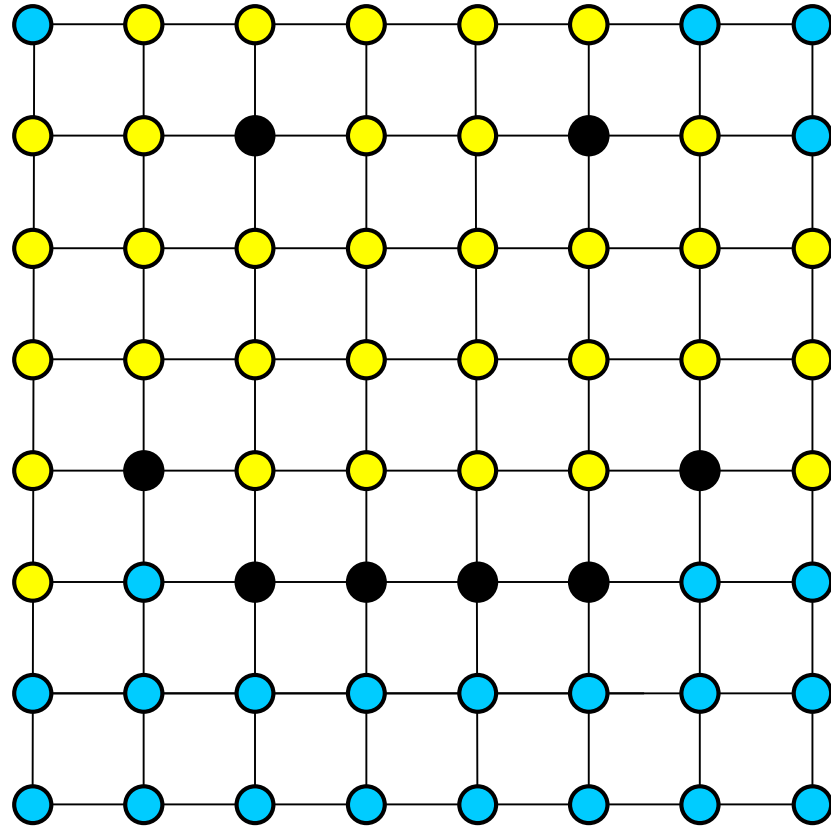
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



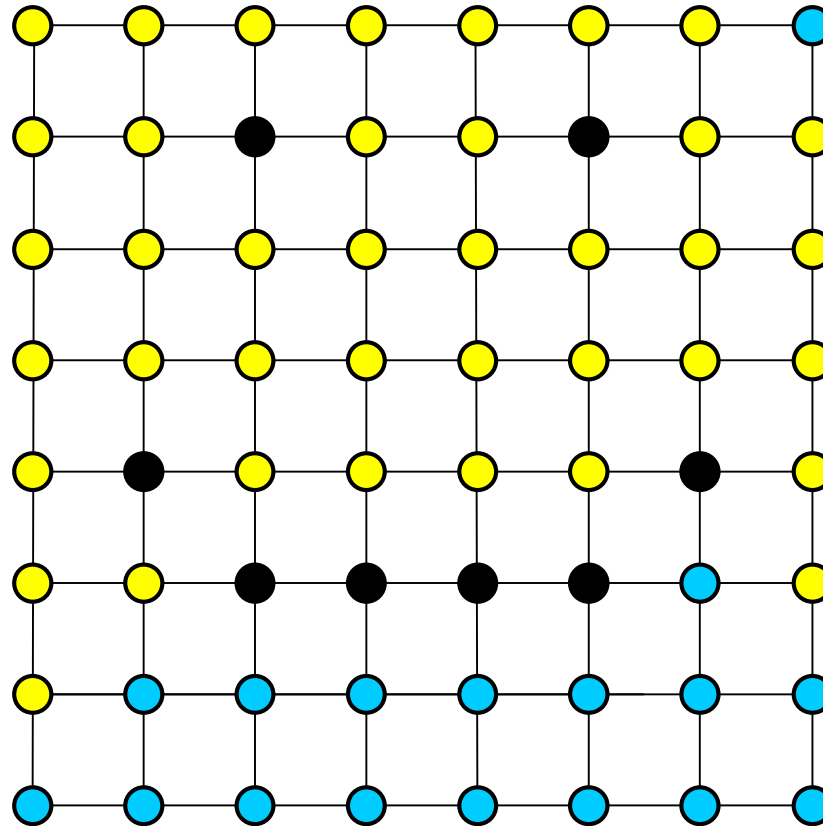
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



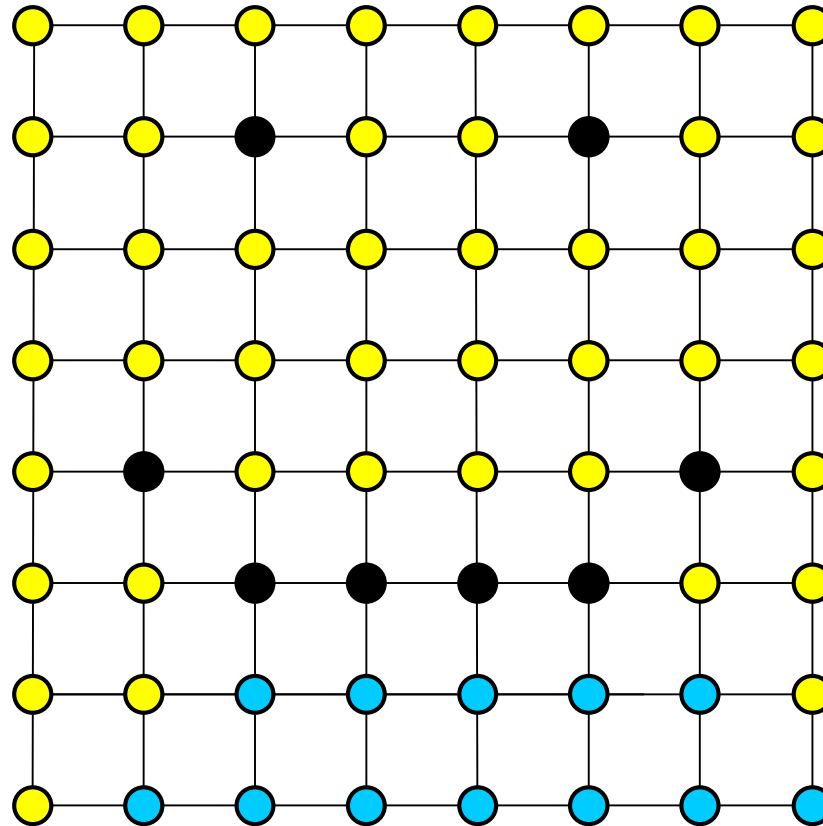
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



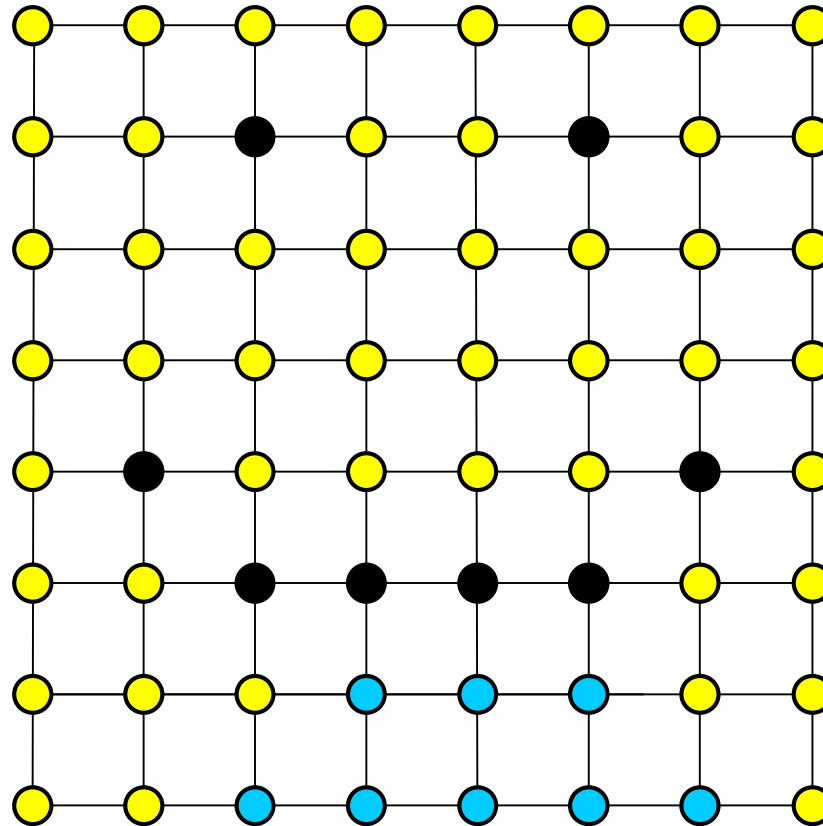
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



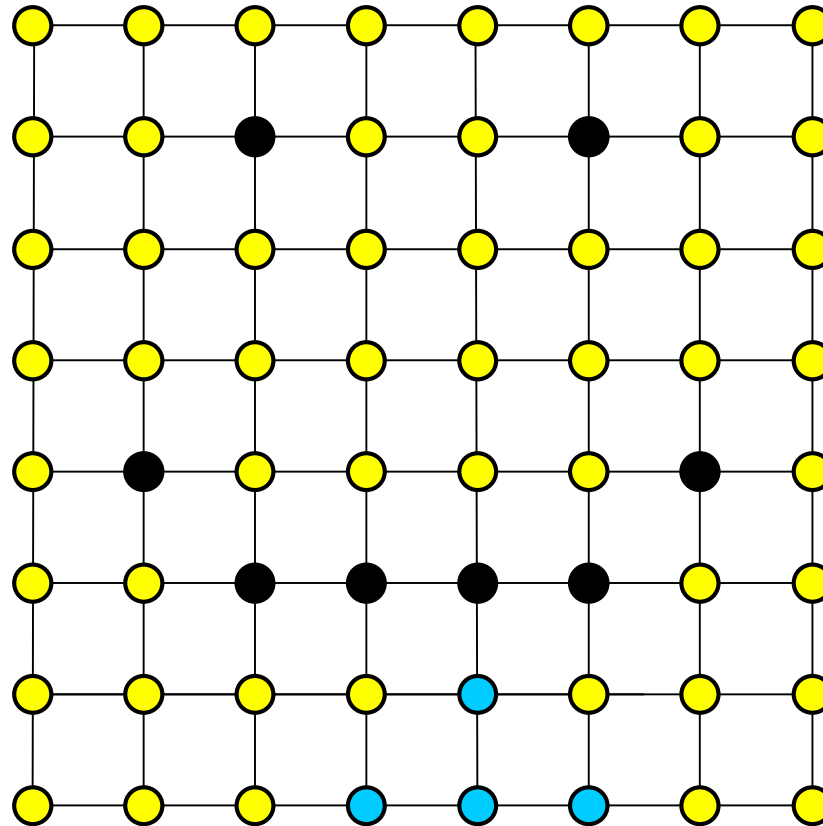
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



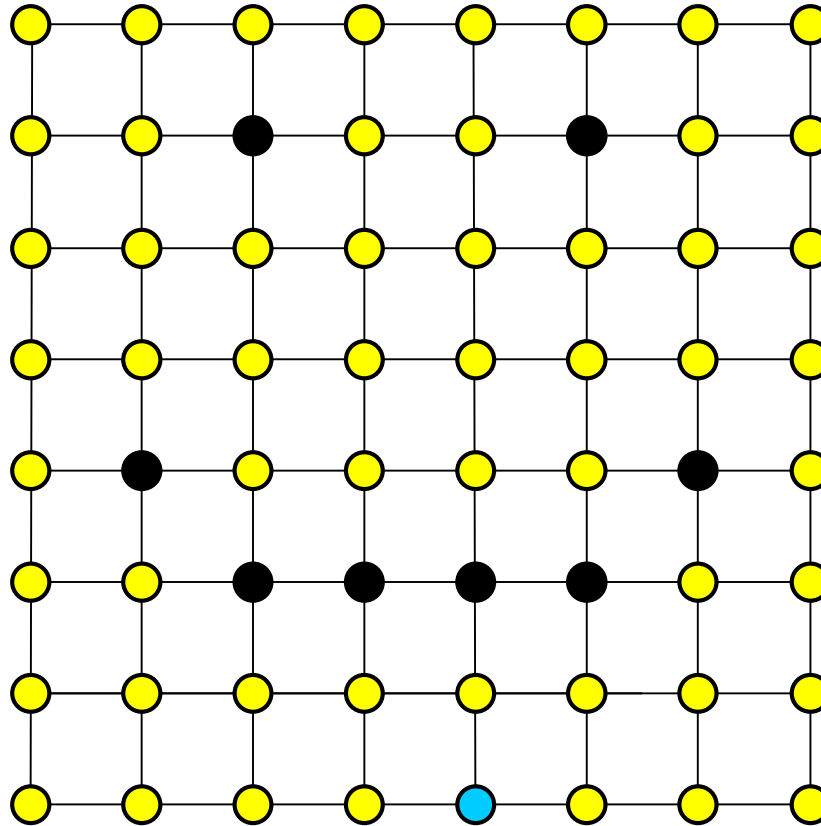
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



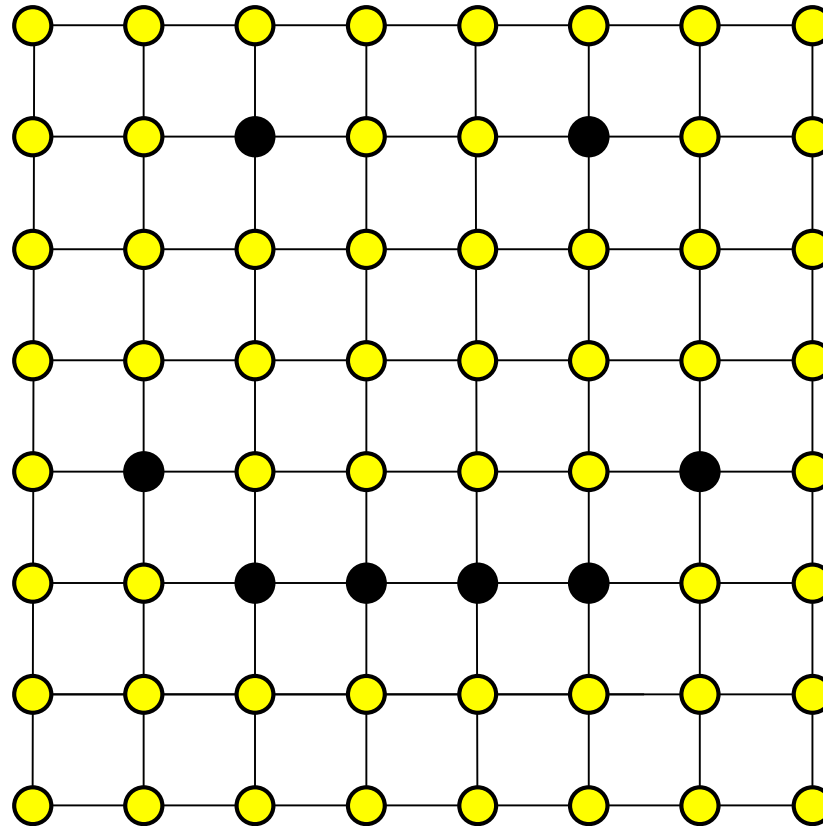
Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



Continue setting the colors for neighboring pixels if it is **interior pixels!**

Flood Fill - Example



Continue setting the colors for neighboring pixels if it is **interior pixels!**

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