Game of life

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The Game of Life, also known simply as Life, is a cellular automaton devised by the British mathematician John Horton Conway in 1970. The "game" is a zero-player game, meaning that its evolution is determined by its initial state, requiring no further input. One interacts with the Game of Life by creating an initial configuration and observing how it evolves or, for advanced players, by creating patterns with particular properties.

HERE IS THE PYTHON CODE OF GAME OF LIFE.

```
import random
from graphics import *

#this function creates an NxN array filled with zeros
def empty(N):
    a=[]
    for i in range(N):
        b=[]
        for j in range(N):
            b=b+[0]
        a=a+[b]
    return a
#this function fills the array a with a portion p of
live cells
def fill(a,p):
    N=len(a)
    for i in range(N):
        for j in range(N):
            if random.uniform(0,1)<p:
                a[i][j]=1
```

First function creates an NxN array filled with zeros.

this function fills the array a with a portion p of live cells

```
def update(A,B):
    N=len(A)
    for i in range(N):
        for j in range(N):
            neigh=A[(i-1)%N][(j-1)%N]+A[(i-1)%N][j]+
            A[(i-1)%N][(j+1)%N]+A[i][(j-1)%N]+A[i]
            [(j+1)%N]+A[(i+1)%N][(j-1)%N]+A[(i+1)%N]
            [j]+A[(i+1)%N][(j+1)%N]
            if A[i][j]==0:
                if neigh==3:
                    B[i][j]=1
                else:
                    B[i][j]=0
            else:
                if neigh==2 or neigh==3:
                    B[i][j]=1
                else:
                    B[i][j]=0


def gen2Dgraphic(N):
    a=[]
    for i in range(N):
        b=[]
        for j in range(N):
            b=b+[Circle(Point(i,j),.49)]
        a=a+[b]
    return a

def push(B,A):
    N=len(A)
    for i in range(N):
        for j in range(N):
            A[i][j]=B[i][j]
def slider(a,x,y):
    a[0+x][0+y]=1
    a[0+x][1+y]=1
    a[2+x][1+y]=1
    a[0+x][2+y]=1
    a[1+x][2+y]=1
def slider2(a,x,y):
```

this function update A and B.

this function is to know where is the circle.Such as the coordinate

```
    a[0+x][0+y]=1
    a[1+x][0+y]=1
    a[2+x][0+y]=1
    a[0+x][1+y]=1
    a[1+x][2+y]=1


def drawArray(A,a,window):
A is the array of 0,1 values representing the state
of the game
a is an array of Circle objects
window is the GraphWin in which we will draw the
circles
```

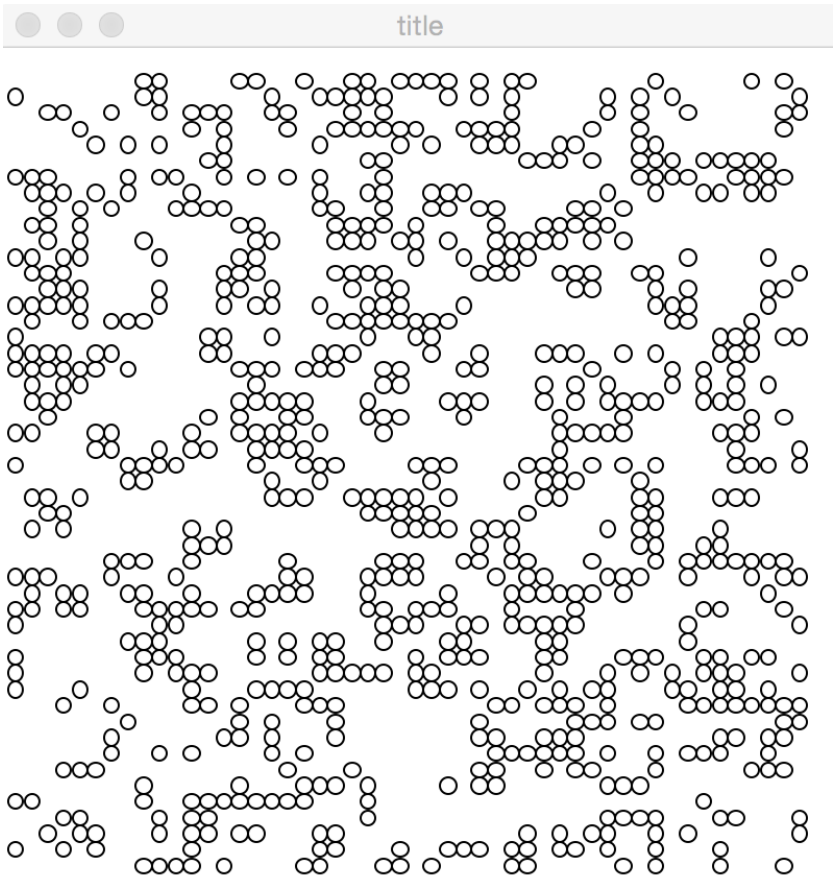
```
    N=len(A)
    for i in range(N):
        for j in range(N):
            if A[i][j]==1:
                a[i][j].undraw()
                a[i][j].draw(window)
            if A[i][j]==0:
                a[i][j].undraw()

N=50
win = GraphWin("title",400,400)
win.setCoords(-1,-1,N+1,N+1)
grid=empty(N)
grid2=empty(N)
circles=gen2Dgraphic(N)
fill(grid,0.3)

while True:
    drawArray(grid,circles,win)
    update(grid,grid2)
    push(grid2,grid)
```

N is the number of live cells we start with.

There are the outputs of my program on next page.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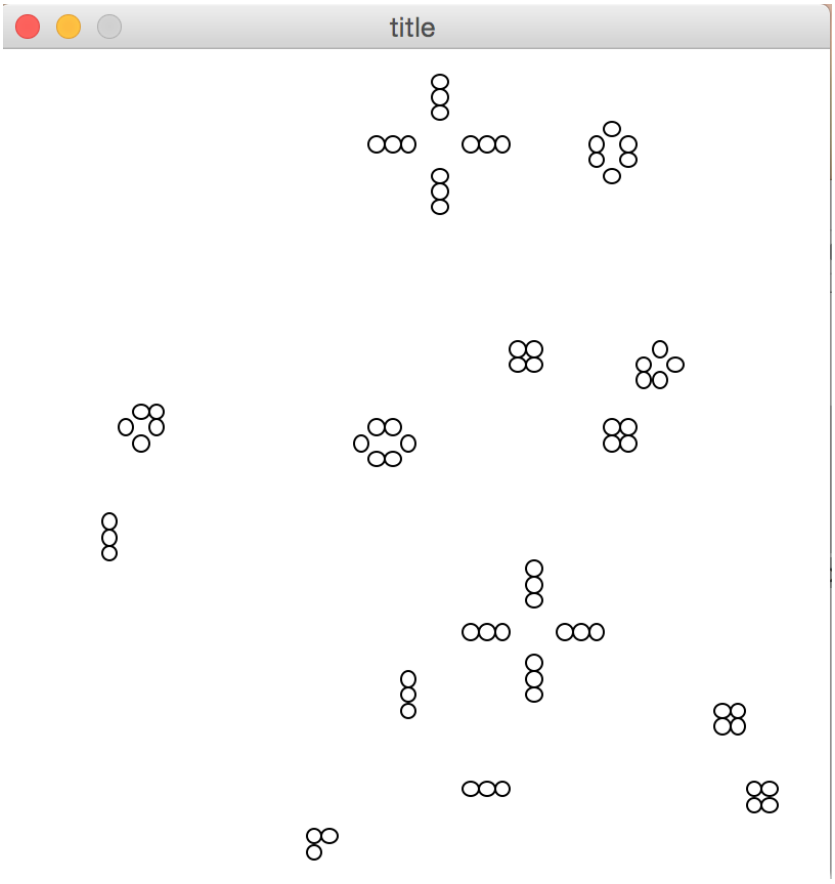
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