Conway's Game of Life

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This document is about how to create a Conway's Game of Life with codes. "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."[1]

Figure 1: This figure shows the old computer.

[1]

GAME OF LIFE

[2]

[2] This code is pretty precise.The rules are these. "Any live cell with fewer than two live neighbours dies, as if caused by under-population. "Any live cell with two or three live neighbours lives on to the next generation. Any live cell with more than three live neighbours dies, as if by over-population. Any dead cell with exactly three live neighbours becomes a live cell, as if by reproduction."

```
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
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#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

def update(A,B):
N=len(A)
for i in range(N):
```
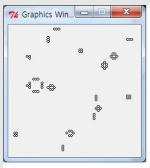

```
for j in range(N):
neigh=A[(i-1)%N][(j-1)%N]+A[(i-1)%N][j]+A[(i-1)%N][(j+1)%N]+A[i][(j-1)%N]+A[i][(j+1)%N]+A[(i+1)%N][(j-1)
if A[i][j]==0:
if neigh==3:
B[i][j]=1
else:
B[i][j]=0
else:
if neigh==2 or neigh==3:
B[i][j]=1
else:
B[i][j]=0


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 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=60
win = GraphWin()
win.setCoords(-1,-1,N+1,N+1)
grid=empty(N)
grid2=empty(N)
circles=gen2Dgraphic(N)
fill(grid,0.3)

#for i in range(100):
while True:
drawArray(grid,circles,win)
update(grid,grid2)
push(grid2,grid)




#def 2Dgraphic(A):
#    N=len(A)
#    a=[]
#    for i in range(N):
#        b=[]
#        for j in range(N):
#            b=b+[Circle(Point(i,j),.49)]
#        a=a+[b]

#def graph2Darray(A,window):
#    N=len(A)
#    for i in range(N):
#        for j in range(N):
#            A[i][j].draw(window)
```

This indicates the output(result) of my program.



REFERENCES

wikipedia. Conway's game of life. Website, October 2015. URL https://en.wikipedia.org/wiki/Conway%27s_Game_of_Life.