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Section: 05

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#Task 01

import numpy as np

def count(x, y, matrix, visit):

if (not ((len(matrix)) > x >= 0)) or not (((len(matrix[0])) > y >= 0)) or (matrix[x][y] == "N") or (visit[x][y] != 0):

return 0

if visit[x][y] != 1:

matrix[x][y] = "N"

visit[x][y]=1

c = 1

for x1 in range(x-1, x+2):

for y1 in range(y-1, y+2):

if not x == x1 or not y == y1:

c += count(x1, y1, matrix, visit)

return c

def infected\_person(filename):

f = open(filename, "r")

matrix = []

infected = 0

for i in f.readlines():

temp=[]

for j in i:

if j == "Y" or j == "N":

temp.append(j)

matrix.append(temp)

matrix = np.array(matrix)

row = matrix.shape[0]

column = matrix.shape[1]

visit = np.zeros((row,column))

# a = x, b = y

for a in range(row):

for b in range(column):

infected = max(infected, count(a, b, matrix, visit))

print(infected)

print("Sample input 1:")

infected\_person("input.txt")

print("Sample input 2:")

infected\_person("input 2.txt")

#Task 02

import numpy as np, collections as coll

def human(x, y, matrix):

c = 0

for i in range(x):

for j in range(y):

if matrix[i][j] == "H":

c += 1

return c

def time(row, column, matrix, visit, attack, human, alien):

direction = [(-1, 0), (0, 1), (1, 0), (0, -1)]

while alien:

x1, y1, attack = alien.popleft()

visit[x1][y1] = 1

for x, y in direction:

if (0 <= x1+x < row) and (0 <= y1+y < column) and (matrix[x1+x][y1+y] == "H") and (visit[x1][y1] == 1):

visit[x1+x][y1+y] = 1

matrix[x1+x][y1+y] = "A"

human.remove((x1+x, y1+y))

alien.append([x1+x, y1+y, attack+1])

return attack

def position(x, y, matrix, visit):

human = []

alien = coll.deque()

attack = 0

for x1 in range(x):

for y1 in range(y):

if matrix[x1][y1] == "A":

alien.append([x1, y1, attack])

if matrix[x1][y1] == "H":

human.append((x1, y1))

return time(x, y, matrix, visit, attack, human, alien)

def apocalypse(filename):

f = open(filename, "r")

r = f.read(4)

row = int(r[0])

column = int(r[2])

matrix = []

for i in f.readlines():

temp = []

if not i == row and not i == column:

for j in i:

if j == "A" or j == "H" or j == "T":

temp.append(j)

matrix.append(temp)

matrix = np.array(matrix)

visit = np.zeros((row, column))

print("Time:", position(row, column, matrix, visit), "minutes")

if human(row, column, matrix) == 0:

print("No one survived")

else:

print(human(row, column, matrix), "survived")

print("Sample input 1")

apocalypse("Question2 input1.txt")

print("Sample input 2")

apocalypse("Question2 input2.txt")