111A Introduction to Computer and Computer Science

Final Project

Due: 2023/1/7 12:00:00

According to the tenet of **Pastafarianism**, the central creation myth is that an invisible and undetectable **Flying Spaghetti Monster** created the universe after drinking heavily. According to these beliefs, the Monster's intoxication was the cause for a flawed Earth. Fortunately, you are sober now (maybe not?). In this final project, we are going to create a simple world that only contains land and water. Your task is to count how many islands do we have in this simple world. Enjoy it!

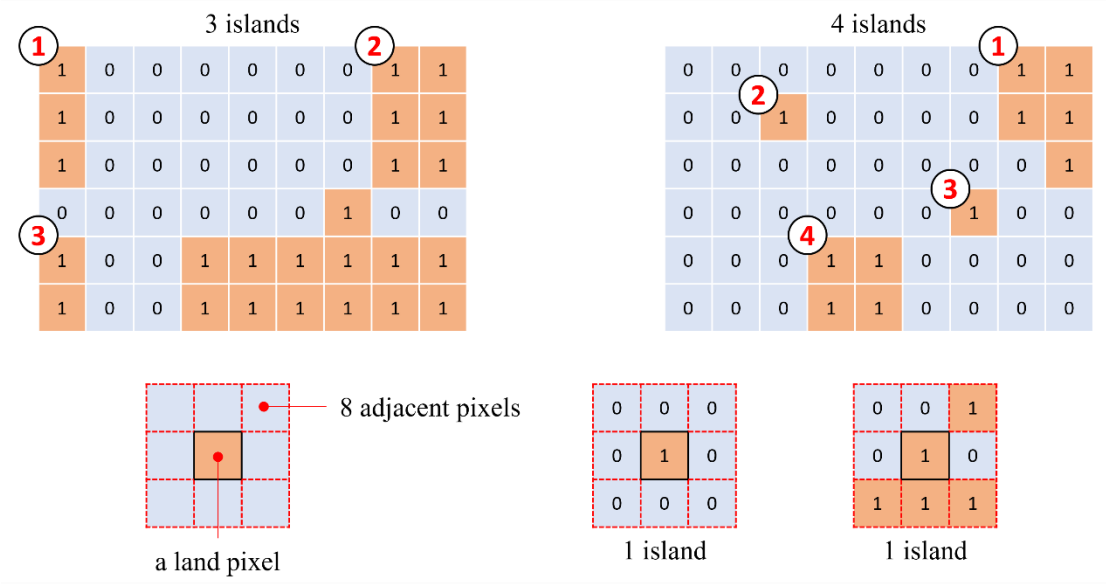
Problem #1: Create a 2D array

Please write a function to create a 2D array with random elements 0 or 1. Here is the sample code:

```
def create2Dmap(size=(50,50)):
    # 歡樂大放送
    return np.random.randint(0, 2, size)
```

Problem #2: Number of islands

Assuming 0 is water and 1 is land in this simple world. Any adjacent lands form an island. Please write a program to count how many islands do we have in this world. Here is the rule:



Here is the sample code:

```
class final:
    def __init__(self, img):
        self.original_img = img
        self.img_copy = np.copy(img)

    def numIslands(self):
        """Method for counting"""
        ???
        return count

    def search(self, input, i, j):
        """Method for searching"""
        ???
```

Please accomplish this homework with an organized code (e.g., with main script and function script). Here is a template for your code structure:

```
111A_final_0123456789
    ├─ func.py          # Solution of final project
    ├─ utils.py         # Utility functions for final project
    └─ main_final.py    # Main scripts of final project
```

You don't need to follow this structure, just keep your main script clean.

If everything goes well, your code might get this result:

```
(nycudopcs)                                  \Homeworks\Final>python main_final.py --dir ".//data//test_data.npy"
# of Islands in Data 0: 13
# of Islands in Data 1: 9
# of Islands in Data 2: 8
# of Islands in Data 3: 7
# of Islands in Data 4: 13
# of Islands in Data 5: 11
# of Islands in Data 6: 18
# of Islands in Data 7: 13
# of Islands in Data 8: 15
# of Islands in Data 9: 7
```

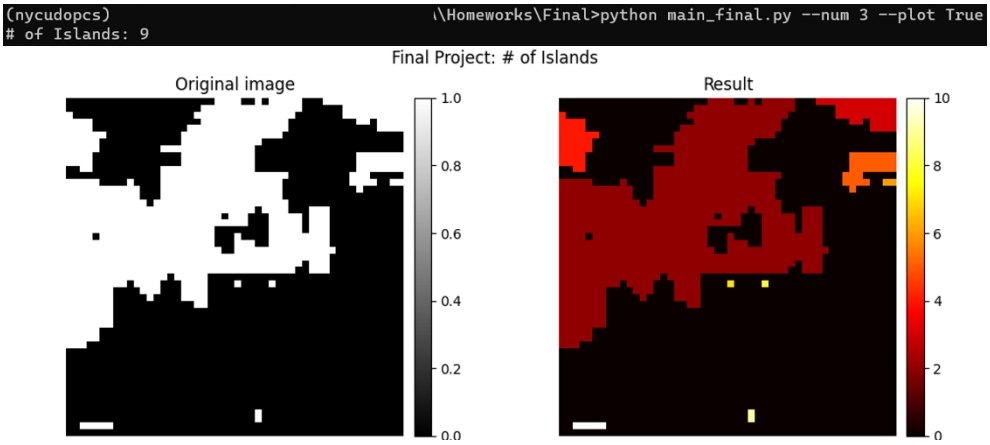
FRIENDLY REMINDER

Be careful with the directory of "test_data.npy"

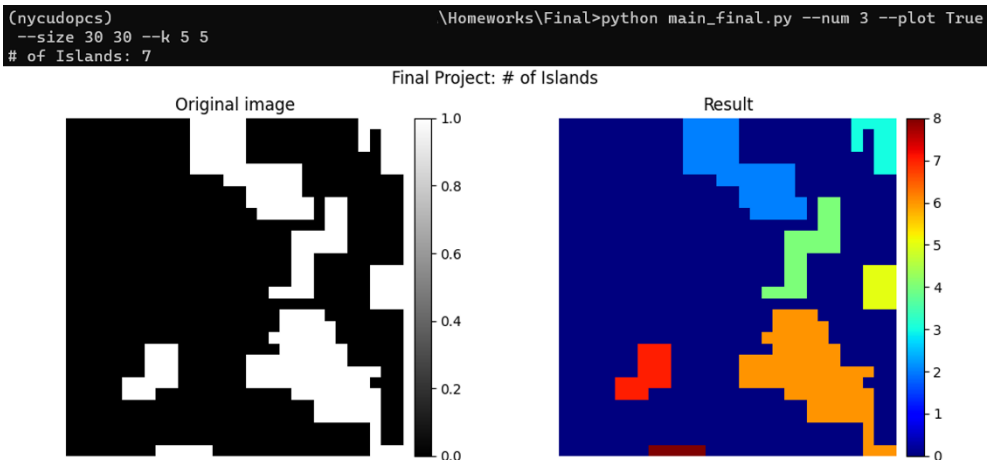
Problem #3: Plot the result

Please create a 2D array with arbitrary size, then plot your result. If everything goes well, your code might get these results:

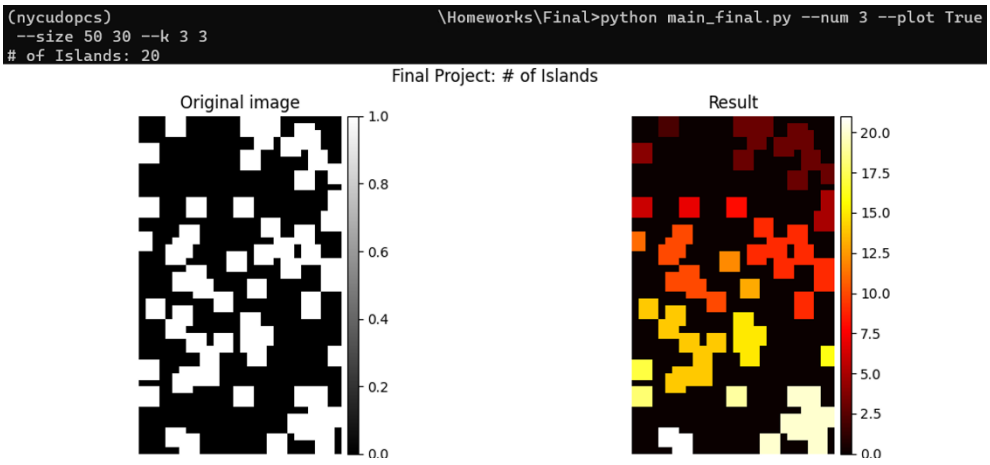
1. Image size = (50,50), kernel size = (15,15)



2. Image size = (30,30), kernel size = (5,5)



3. Image size = (50,30), kernel size = (3,3)



FRIENDLY REMINDER

You don't need to plot a figure that is exactly same as mine.

Hand in procedure:

As we had mentioned in the lecture, you should list all your collaborators in your programs. Here is the template:

```
"""
Created on Sun Aug 7 01:23:45 2022

@author: Xi Winnie, student ID

@collaborators: Jane Doe, her student ID
                John Doe, his student ID
"""
```

Please save your code as a "**.zip**", "**.7z**", or "**.rar**" file, where the file name should follow this format:

111A_final_ID.zip

For example,

111A_final_0123456789.zip

Please be aware. **We are not going to accept any homework file with wrong file name or without signature**. Please double check the content of your file.

Once you have accomplished your works, you can upload your homework to the "E3@NYCU" system. There will be a section for uploading your homework.