



CS360 Artificial Intelligence Final Project Report

Pentagons Formation using Tangram Pieces

Readme File

Students:

Man-Seui Chan

Lecture in Charge:

Tsang, Cheung-choy Eric

Macau University of Science and Technology

Faculty of Innovation Engineering

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1 A guideline to the software

1.1 Install Anaconda

- a. Go to [Anaconda](https://www.anaconda.com) [https://www.anaconda.com], click "Download".

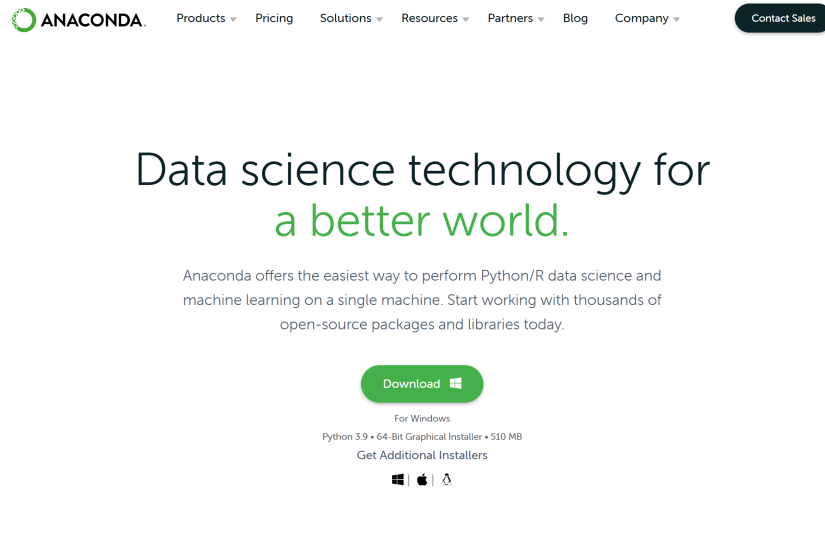


Figure 1: Anaconda

- b. After that, open the downloaded installer and keep clicking the "Next" button to complete the installation.



Figure 2: Installer

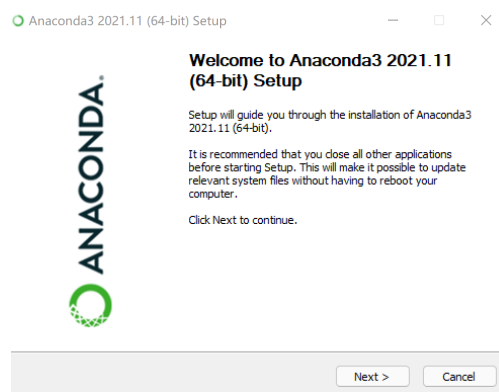


Figure 3: Clicking the "Next" button



1.2 Configuring the Python environment

- a. Go to Anaconda Prompt



Figure 4: Anaconda Prompt

- b. Enter the following commands

```
1 conda create -n pygui python=3.7.9
2 pip install PyQt5
3 pip install PyQt5-tools
4 pip install numpy==1.22.3
5 pip install opencv-python==4.5.5.64
6 pip install Pillow==9.1.0
```

1.3 Running software

- a. Enter the "activate pygui" in Anaconda Prompt to go into the pygui environment.



```
Anaconda Prompt (Anaconda3)

(base) C:\Users\HUAWEI>activate pygui

(pygui) C:\Users\HUAWEI>
```

Figure 5: Go into the pygui environment

- b. Then go to the folder where the program is located

```
Anaconda Prompt (Anaconda3)

(base) C:\Users\HUAWEI>activate pygui
(pygui) C:\Users\HUAWEI>cd C:\Users\HUAWEI\OneDrive - Macau University of Science and Technology\Desktop\tangram\tangram
(pygui) C:\Users\HUAWEI\OneDrive - Macau University of Science and Technology\Desktop\tangram\tangram>
```

Figure 6: Go to the folder where the program is located

- c. Go to the `search_algorithm.py` and `config.py` in the tangram folder and change the path to the current directory.



```
search_algorithm.py
C: > Users > HUAWEI > OneDrive - Macau University of Science and Technology > Desktop > tangram > tangram > search_algorithm.py >
2 import multiprocessing
3 import os
4 from multiprocessing import Queue, Process
5 import time
6
7 import cv2
8 from PIL import Image
9
10 import config
11 import utils
12 from config import TangramElementEnum, ANGLE_NUM, TRIANGLE_ELEMENT_STATE_DIC, PI, ConcaveConvexEnum
13 from tangram_element import Point, Triangle, Square, Parallelogram
14 from utils import get_final_result
15
16 target_path = r"C:\Users\HUAWEI\Desktop\tangram" #Change the target path
17
18
19 class Solve:
20
21     def __init__(self):
22         self.corners = []
23         self.error_threshold = 0.01
24         self.unit_length = 620 / 8
25         self.concave_convex_enum = ConcaveConvexEnum.convex
26         # mark some elements of Tangram
```

Figure 7: Edit the TARGET path

```
config.py
C: > Users > HUAWEI > OneDrive - Macau University of Science and Technology > Desktop > tangram > tangram > config.py > ...
1 """Config file for 7 elements Tangram puzzle."""
2
3 import math
4
5 # in 7 Tangram we always use all the elements
6 from enum import Enum, IntEnum
7
8 ELEMENT_NUM = 7
9 TANGRAM_S = 8.
10 PI = math.pi
11 SQRT_2 = 2 ** 0.5
12
13 # number of angles tried to place elements
14 # for example, 8 means every rotation is 2 * pi / 8 = pi / 4
15 ANGLE_NUM = 8
16
17 # total state number for each element
18 TRIANGLE_STATE = 3 # p0, p1, p2
19 SQUARE_STATE = 1 # p0
20 PARALLELOGRAM_STATE = 4 # p0, p1, inverse_p0, inverse_p1
21
22 #Change the path
23 RESULT_PATH = "C:\Users\HUAWEI\OneDrive - Macau University of Science and Technology\Desktop\tangram\tangram\result"
24
```

Figure 8: Edit the RESULT path

- d. Enter the "python tangram_solver.py" in Anaconda Prompt to execute our program.



```
Anaconda Prompt (Anaconda3) - python_tangram_solver.py

(base) C:\Users\HUAWEI>activate pygui
(pygui) C:\Users\HUAWEI>cd C:\Users\HUAWEI\OneDrive - Macau University of Science and Technology\Desktop\tangram\tangram
(pygui) C:\Users\HUAWEI\OneDrive - Macau University of Science and Technology\Desktop\tangram\tangram>python tangram_solver.py
python: can't open file 'tangram_solver.py': [Errno 2] No such file or directory
(pygui) C:\Users\HUAWEI\OneDrive - Macau University of Science and Technology\Desktop\tangram\tangram>python tangram_solver.py
Warning: QT_DEVICE_PIXEL_RATIO is deprecated. Instead use:
  QT_AUTO_SCREEN_SCALE_FACTOR to enable platform plugin controlled per-screen factors.
  QT_SCREEN_SCALE_FACTORS to set per-screen DPI.
  QT_SCALE_FACTOR to set the application global scale factor.
```

Figure 9: Execute our program

f. After that you can choose the method on the UI interface for the formation of the pentagon.

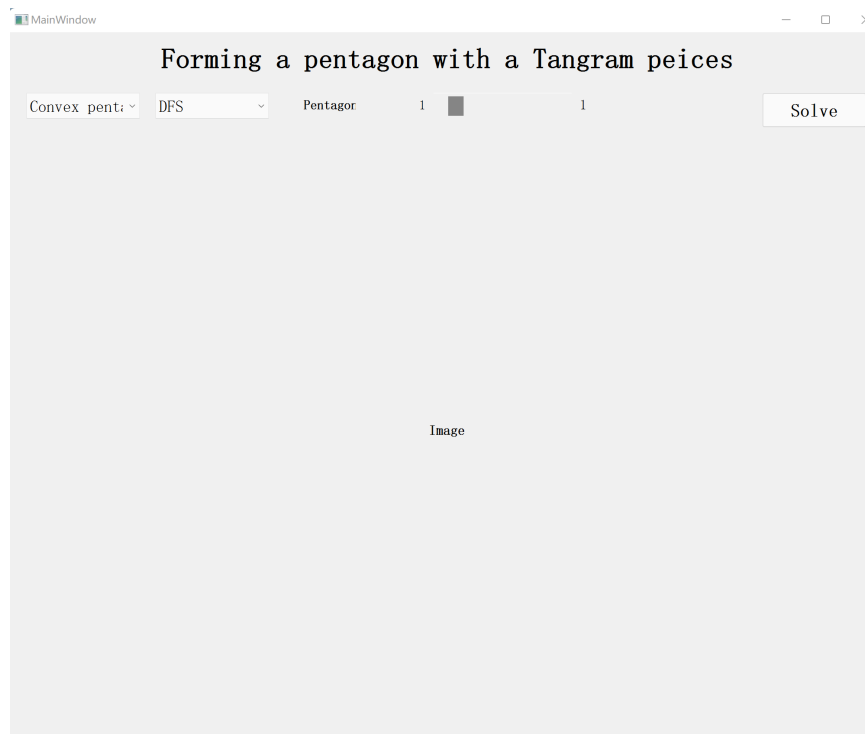


Figure 10: UI interface



g. Clicking the "Solve" button to start searching.

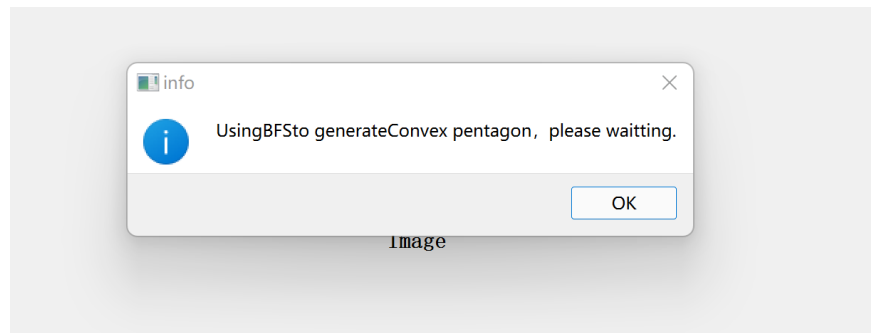


Figure 11: Start searching