

# Assignment 0

CS-541: Artificial Intelligence

Spring 2022

In this assignment you will go over some simple coding problems to brush up on your python programming skills. For those of you who want to recap python programming, some useful sources are:

- <https://docs.python.org/3/tutorial/>
- <https://www.w3schools.com/python/>
- <https://www.oreilly.com/library/view/learning-python-5th/9781449355722/>

You might be required to install some python packages to complete these assignments. If anything is ambiguous or unclear.

1. Discuss possible interpretations with other students, your TA, and instructor
2. Make use of web sources.
3. Send e-mail to your TA first, and to your instructor if an issue is not resolved to your satisfaction.

## 1 Twin Primes

Twin prime numbers are a pair of prime number which differ by two, e.g. 3 and 5, 5 and 7, 11 and 13, and so on.

Write a program *twin\_prime.py* which takes a number  $x$  as input and computes the maximum twin prime between 1 and  $x$ . A faster method to check if a number is prime is that it should not be divisible by any number between 2 to  $\sqrt{n}$ .

**Note:** Your program should consider the case where  $x$  is a very large number.

## 2 Matrix Manipulation

Write a program *grayscale.py* that converts a colored image into grayscale.

A color image is a  $width \times height \times 3$  matrix. Use any python package to read the image as a matrix. Convert each pixel (with R,G,B values) to a single grayscale value using the equation below.

$$value = 0.2989R + 0.5870G + 0.1140B$$

An example code to read the image is:

```
from matplotlib.image import imread
image_rgb = imread(infile)
```

An example code to write the image is:

```
from matplotlib import pyplot as plt
#pyplot requires pixel values to be between 0 and 1
image_gray = plt.imsave('outfile.jpeg',outfile/255)
```

### 3 Data Summary

Write a program *summary.py* that computes the minimum, maximum, mean and standard deviation of the number of COVID cases over time for a state (input by the user).

The *csv* file for the COVID data can be found [here](#).

### Submission

This is an individual assignment. Each person should submit as a single zip file containing the required code files and a readme file. The readme should include the following:

- names and one line descriptions of each of the code files
- input and/or a path to the input file
- output and/or a path to the output file

**Remember that after general discussions with others, you are required to work out the problems by yourself. All submitted work must be your own, though you can get help with others, so long as you cite the help. Please refer to the Stevens Honor System for clarifications.**