GISC 3200K Final Project

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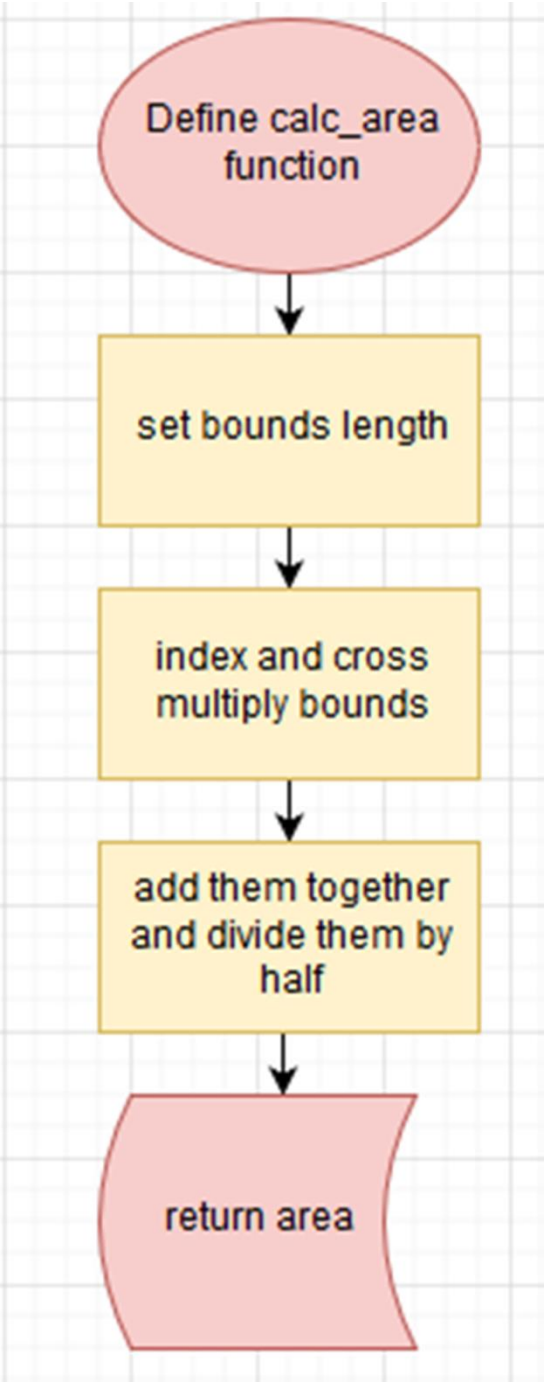
Objectives

- explore methods of plotting area of geographic polygons using programming in Python 3.7.
- The polygons used in this project are the county boundaries in the State of Georgia

Methods

- Define calc_area function
- In the function, set bounds length, index and cross multiply the bounds, and add and divide the sums by half
- Return the area



Results

- I tested the function using the Georgia county boundaries and the boundary coordinates of the Survey I boundary polygon (courtesy of Survey I class)
- The code gave the correct area output for each

```
tuples = ((10000,10000),
          (10094.80,9739.54),
          (10424.05,9719.34),
          (10282.33,10235.36))
```

```
co_names = co_bounds.keys()

for co_name in co_names:
    co_poly = co_bounds[co_name]
    r_area = calc_area(co_poly)
    print(co_name,abs(r_area *3.86102e-7),"square miles")
```

```
Montgomery 244.692860263618 square miles
Ben Hill 253.9070876785415 square miles
Banks 233.8865763869765 square miles
Paulding 314.341717224739 square miles
```

```
# define the calc_area function
def calc_area(bounds):

    # set the variable to the length of the tuples
    n = len(bounds)

    # z and d are equal to zero for the for loop
    z = 0
    d = 0


    #start of for loop
    for i in range(0, n):

        # x1 and y1 are the index of the bounds
        x1 = (bounds[i][0])
        y1 = (bounds[i][1])

        # the multiplication logic to calculate the polygon area
        #cross multiplication of tuples
        if i<n-1:
            x2 = (bounds[i + 1][0])
            y2 = (bounds[i + 1][1])


        # appends the last in the series
        if i==n-1:
            x2 = (bounds[0][0])
            y2 = (bounds[0][1])

        # the two sums
        z = z + (x1 * y2)
        d = d + (y1 * x2)

    # sum1 minus sum2
    a = z - d

    # area is half of sum1 minus sum2
    area = (a/2)

    # returns area
    return area
```

Conclusions

- The function achieved the project objectives by accurately calculating the area of a tuple of tuples
- Additionally, the function achieved objectives where it is able to utilize a polygon in tuple of tuples form, without the polygon being a part of the function.

References

- https://www.wikihow.com/Calculate-the-Area-of-a-Polygon
- Survey data: Professor Doug Sherill, Survey I Class
- County Bounds: Dr. Huidae Cho
- hcho.isnew.info