Lab 8 Report

Problem:

In this final lab we had to use a randomized algorithm to compare trigonometric identities. We have to input random numbers to solve it. Then we also need to solve the partition problem in order to check if two sets belong to a bigger set.

Proposed solution:

For the randomized algorithm. I hardcoded the list of trigonometric functions in order to traverse make comparisons simpler. Then I created a variable that saves a random number Then I evaluated each of the functions with that number to compare. The algorithm runs in O(n^2). The partition problem is a backtracking algorithm in which you check if both sets are part of the large set. This should take O(n)

Conclusion:

In this lab I learned to use random and also the evaluate function and how it worked with the randomized algorithm. Also how the partition problem works if you take the set and if it is not even then there is no answer

Appendix:

import math

import mpmath

import random

def DisjointSetForest(size):

return np.zeros(size,dtype=np.int)-1

def find(S,i):

if S[i]<0:

return i

return find(S,S[i])

def union(S,i,j):

ri = find(S,i)

rj = find(S,j)

if ri!=rj:

S[rj] = ri

def trig\_identities(trig):

for i in range(len(trig)):

for j in range(len(trig)):

f1 = eval(trig[i])

f2 = eval(trig[j])

if f1 == f2:

print("True")

else:

print ("False")

t = random.randint(-mpmath.pi,mpmath.pi)

trig = ['mpmath.sin(t)','math.cos(t)','mpmath.tan(t)','mpmath.sec(t)','−mpmath.sin(t)','−math.cos(t)','−mpmath.tan(t)','mpmath.sin(−t)','math.cos(−t)','mpmath.tan(−t)','mpmath.sin(t)/math.cos(t)', '2\*mpmath.sin(t/2)\*math.cos(t/2)','sin(t)\*\*2', '1 − math.cos(t)/2','1−math.cos(2t)/2','1/math.cos(t)']

trig\_identities(trig)

def partition(S):

if len(S)%2 == 1:

return False

else:

S1 = DisjointSetForest(len(S)//2)

S2 = DisjointSetForest(len(S)//2)

for i in range(len(S)):

if S[i]%2 ==1:

union(S1,S[i],i)

else:

union(S2,S[i],i)

return True

Academic Agreement:

I certify that this project is entirely my own work. I wrote, debugged, and tested the code being presented, performed the experiments, and wrote the report. I also certify that I did not share my code or report or provided inappropriate assistance to any student in the class.

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