CSCE629: Rpoject #1

Due on Thursday, April 25, 2019

Prof.Chen 12:00am

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Question 1

Generate graphs with specific nodes density

(a) Suppose "chuck" implies throwing.

Listing 1: Generate graph class

```
import networkx as nx
import matplotlib.pyplot as plt
import random
import collections
import pickle
import heap
# __counter__ = 1
# __pair__ = 1
class Solution(object):
    def __init__(self,x):
        self.counter = collections.defaultdict(int)
        self.g = set()
        self.weight = collections.defaultdict(int)
        self.graph = collections.defaultdict(set)
        self.size = x
        for i in range(x-1):
            self.g.add(tuple([i,i+1]))
            self.graph[i].add(i+1)
            self.graph[i+1].add(i)
            self.weight[tuple([i,i+1])] = random.uniform(1,10)
            self.counter[i] += 1
            self.counter[i+1] += 1
    def gene_graph_sparse(self):
        while len(self.g)<3*self.size:
            a = int(self.size*random.random())
            b = int(self.size*random.random())
            c = random.uniform(1,10)
            if a!=b and (a,b) not in self.g and (b,a) not in self.g:
                self.graph[a].add(b)
                self.graph[b].add(a)
                self.g.add(tuple([a,b]))
```

Question 1 continued on next page...

```
                self.counter[a] += 1
                self.counter[b] += 1
                self.weight[tuple([a,b])] = c
        return self.g
    def gene_graph_dense(self):
        for a in range(self.size-1):
            wait = list(range(a)) + list(range(a+1,self.size))
            picked = random.sample(wait, int(0.2*self.size))
            for b in picked:
                self.graph[a].add(b)
                self.graph[b].add(a)
                self.g.add(tuple([a,b]))
                self.counter[a] += 1
                self.counter[b] += 1
                self.weight[tuple([a,b])] = random.uniform(1,10)
        return self.g
    def save(self):
        with open('graph_15000.pickle', 'wb') as f:  # Python 3: open(..., 'wb')
            pickle.dump([self.graph, self.weight, self.g,self.size], f)
        f.close()
```

Question 2

How much wood would a woodchuck chuck if a woodchuck could chuck wood?

(a) Suppose "chuck" implies throwing.

> According to the Associated Press (1988), a New York Fish and Wildlife technician named Richard Thomas calculated the volume of dirt in a typical 25–30 foot (7.6–9.1 m) long woodchuck burrow and had determined that if the woodchuck had moved an equivalent volume of wood, it could move "about **700 pounds (320 kg)** on a good day, with the wind at his back".

Question 2 continued on next page...

(b) Suppose "chuck" implies vomiting.

A woodchuck can ingest 361.92 cm^3 (22.09 cu in) of wood per day. Assuming immediate expulsion on ingestion with a 5% retainment rate, a woodchuck could chuck **343.82 cm^3** of wood per day.

Question 3

Identify the author of Equation 1 below and briefly describe it in English.

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)} \tag{1}$$

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BONUS QUESTIONS

Question 4

The table below shows the nutritional consistencies of two sausage types. Explain their relative differences given what you know about daily adult nutritional recommendations.

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Question 4 continued on next page...

Per 50g	Pork	Soy
Energy	760kJ	538kJ
Protein	7.0g	9.3g
Carbohydrate	0.0g	4.9g
Fat	16.8g	9.1g
Sodium	0.4g	0.4g
Fibre	0.0g	1.4g

malesuada suscipit.

Question 5

Listing 2: Luftballons Perl Script

```
#!/usr/bin/perl

use strict;
use warnings;

for (1..99) { print $_." Luftballons\n"; }

# This is a commented line

my $string = "Hello World!";

print $string."\n\n";

$string =~ s/Hello/Goodbye Cruel/;

print $string."\n\n";

finale();

exit;

sub finale { print "Fin.\n"; }
```

Question 5 continued on next page...

(a) How many luftballons will be output by the Listing 2 above?

99 luftballons.

(b) Identify the regular expression in Listing 2 and explain how it relates to the anti-war sentiments found in the rest of the script.

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