**SUMMARY**

**TASK 1:**

**O(Maximum(Number of lines in csv file1 , Number of lines in csv2))**

**TASK 2:**

**O( Maximum( Number of lines in csv file1 , Number of lines in csv file2))**

***Note: We are considering addition to the set in O(1) where due to Amortized time concept it can be O(N) but only very few times. So on average its O(1).***

**TASK 3:**

**O(Maximum ( Number of lines in csv file1, Number of lines in csv file2))**

**TASK 4:**

**O(Maximum ( Number of lines in csv fil2, (Number of lines in csv file1 \* Log(Number of lines in csv file1)))**

**TASK 1**

import csv

with open('texts.csv', 'r') as f: **-> O(1)**

reader = csv.reader(f) **-> O(Number of lines in csv file1)**

texts = list(reader)[0] **-> O(1)**

print("First record of texts, {} texts {} at time {}".format(texts[0], texts[1], texts[2])) **-> O(1)**

**Total = O(Number of lines in csv file1) + O(1) + O(1)**

**As O(1) and O(1) are considered as constants therefore**

**Total = O(Number of lines in csv file1)**

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with open('calls.csv', 'r') as f:  **-> O(1)**

reader = csv.reader(f)  **-> O(Number of lines in csv file2)**

calls = list(reader) **-> O(Number of lines in csv file2)**

calls=calls[len(calls)-1] **-> O(1)**

print("Last record of calls, {} calls {} at time {}, lasting {} seconds".format(calls[0], calls[1], calls[2], calls[3])) **-> O(1)**

**Total = O(Number of lines in csv file1) + O(Number of lines in csv file2) + O(1) + O(1) + O(1)**

**As all O(1) are considered as constants and as O(Number of lines in csv file2) + O(Number of lines in csv file2) = O(Number of lines in csv file2)**

**Therefore final TC :** **O(Number of lines in csv file1) + O(Number of lines in csv file2)**

**O(Maximum(Number of lines in csv file1 , Number of lines in csv2))**

**TASK 2**

import csv

# Using Sets for neglecting duplicates

final\_list=set([])

with open('texts.csv', 'r') as f: **-> O(1)**

reader = csv.reader(f) **-> O(Number of lines in csv file1)**

texts = list(reader) **-> O(Number of lines in csv file1)**

#Appending to set in not present

for i in texts: **-> O(Number of lines in csv file1)**

final\_list.add(i[0]) **-> O(1)**

final\_list.add(i[1]) **-> O(1)**

**Total = O(Number of lines in csv file) + O(Number of lines in csv file1) + O(Number of lines in csv file1) + O(1) + O(1) + O(1)**

**As all O(1) are considered as constants and as O(Number of lines in csv file1) + O(Number of lines in csv file1) = O(Number of lines in csv file1)**

**Total = O(Number of lines in csv file1)**

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with open('calls.csv', 'r') as f:  **-> O(1)**

reader = csv.reader(f)  **-> O(Number of lines in csv file2)**

calls = list(reader) **-> O(Number of lines in csv file2)**

#Adding to set in not present

for i in calls: **-> O(Number of lines in csv file2)**

final\_list.add(i[0]) **-> O(1)**

final\_list.add(i[1]) **-> O(1)**

print("There are {} different telephone numbers in the records.".format(len(final\_list))) **-> O(1)**

**Total = O(Number of lines in csv file2) + O(Number of lines in csv file2) + O(Number of lines in csv file2) + O(1) + O(1) + O(1)**

**As all O(1) are considered as constants and as O(Number of lines in csv file2) + O(Number of lines in csv file2) = O(Number of lines in csv file2)**

**Total = O(Number of lines in csv file2)**

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**Therefore final TC :**

**O( Maximum( Number of lines in csv file1 , Number of lines in csv file2))**

***Note: We are considering addition to the set in O(1) where due to Amortized time concept it can be O(N) but only very few times. So on average its O(1).***

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**TASK 3**

"""

Read file into texts and calls.

It's ok if you don't understand how to read files.

"""

import csv

with open('texts.csv', 'r') as f: **-> O(Number of lines in csv file1)**

reader = csv.reader(f) **-> O(Number of lines in csv file1)**

texts = list(reader) **-> O(Number of lines in csv file1)**

def checkCaller(phone\_no): **-> O(1)**

if(len(phone\_no.split("("))>0):

return True

def checkCaller(phone\_no): **-> O(1)**

if(phone\_no[0]=="("):

return True if phone\_no.split("(")[1].split(")")[0]=="080" else False

return False

def getReceiver(phone\_no): **-> O(1)**

# if telephone no

if(phone\_no[0]=="("):

return phone\_no.split("(")[1].split(")")[0]

# if mobile no

elif(len(phone\_no.split(" "))>0):

return phone\_no.split(" ")[0]

# if telemarketers no

else:

return phone\_no.split("140")[1]

list\_of\_codes=set([])

calls\_total=0

call\_and\_receive\_total=0

with open('calls.csv', 'r') as f: **-> O(Number of lines in csv file2)**

reader = csv.reader(f) **-> O(Number of lines in csv file2)**

calls = list(reader) **-> O(Number of lines in csv file2)**

for call in calls: **-> O(Number of lines in csv file2)**

# check if caller from banglore

isCallerFromBanglore=checkCaller(call[0]) **-> O(1)**

getReceiverNo=getReceiver(call[1]) **-> O(1)**

# if caller from banglore

if(isCallerFromBanglore): **-> O(1)**

list\_of\_codes.add(getReceiverNo) **-> O(1)**

# check if receiver from banglore

isReceiverFromBanglore=checkCaller(call[1]) **-> O(1)**

if(isReceiverFromBanglore): **-> O(1)**

# inc banglore -> banglore calls count

call\_and\_receive\_total+=1 **-> O(1)**

# inc total banglore calls count

calls\_total+=1 **-> O(1)**

print("The numbers called by people in Bangalore have codes:") **-> O(1)**

list\_of\_codes=sorted(list\_of\_codes)

for list\_code in list\_of\_codes:

print(list\_code)

percent=round((float)((call\_and\_receive\_total/calls\_total))\*100,2) **-> O(1)**

print("{} percent of calls from fixed lines in Bangalore are calls to other fixed lines in Bangalore.".format(percent)) **-> O(1)**

**Total = O(Number of lines in csv file1) \*3 + O(Number of lines in csv file2)\*5 + O(1)\* 14**

**As all O(1) are considered as constants and as O(Number of lines in csv file) + O(Number of lines in csv file) = O(Number of lines in csv file)**

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**Therefore final TC :**

**O(Maximum ( Number of lines in csv file1, Number of lines in csv file2))**

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**TASK 4**

"""

Read file into texts and calls.

It's ok if you don't understand how to read files.

"""

import csv

telemarketers={}

receivers=set([])

with open('calls.csv', 'r') as f: **-> O(Number of lines in csv file1)**

reader = csv.reader(f) **-> O(Number of lines in csv file1)**

calls = list(reader) **-> O(Number of lines in csv file1)**

for call in calls:  **-> O(Number of lines in csv file1)**

telemarketers[call[0]]=1

# if already present in telemarketers dict then remove caller

if(call[1] in telemarketers):

del telemarketers[call[1]]

else:

receivers.add(call[1]) # add to receivers list

with open('texts.csv', 'r') as f: **-> O(Number of lines in csv file2)**

reader = csv.reader(f) **-> O(Number of lines in csv file2)**

texts = list(reader) **-> O(Number of lines in csv file2)**

# remove text senders and receivers from telemarketers list

for text in texts: **-> O(Number of lines in csv file2)**

if(text[0] in telemarketers):

del telemarketers[text[0]]

if(text[1] in telemarketers):

del telemarketers[text[1]]

# remove receivers from telemarketers list

for i in receivers: **-> O(Number of lines in csv file1)**

if(i in telemarketers):

del telemarketers[i]

telemarketers=sorted(telemarketers.keys()) **-> O(Number of lines in csv file1 \* Log(Number of lines in csv file1))**

print("These numbers could be telemarketers: ")

for caller in telemarketers: **-> O(Number of lines in csv file1)**

print(caller)

**Therefore final TC :**

**O(Maximum ( Number of lines in csv fil2, (Number of lines in csv file1 \* Log(Number of lines in csv file1)))**