

**Name: Angad Sandhu**  
**Registration Number: 190905494**  
**Section: CSE-A**  
**Roll Number: 60**  
**Subject: DS Lab 5**

**1) Try the given wordcount program for heart disease dataset, covid 19 dataset, example dataset and german credit dataset**

**# mapper.py**

```
import sys
```

```
for line in sys.stdin:
```

```
    words = line.strip().split(',')
```

```
    for word in words:
```

```
        print("%s\t%d"%(word, 1))
```

**#reduce.py**

```
from operator import itemgetter
```

```
import sys
```

```
current_word = None
```

```
current_count = 0
```

```
word = None
```

```
for line in sys.stdin:
```

```
    try:
```

```
        word, count = line.strip().split('\t', 1)
```

```
        count = int(count)
```

```
    except ValueError:
```

```
        continue
```

```
    if current_word == word:
```

```
        current_count += count
```

```
    else:
```

```
        if current_word:
```

```
            print("%s\t%d"%(current_word, current_count))
```

```
        current_count = count
```

```
        current_word = word
```

```
if current_word == word:
```

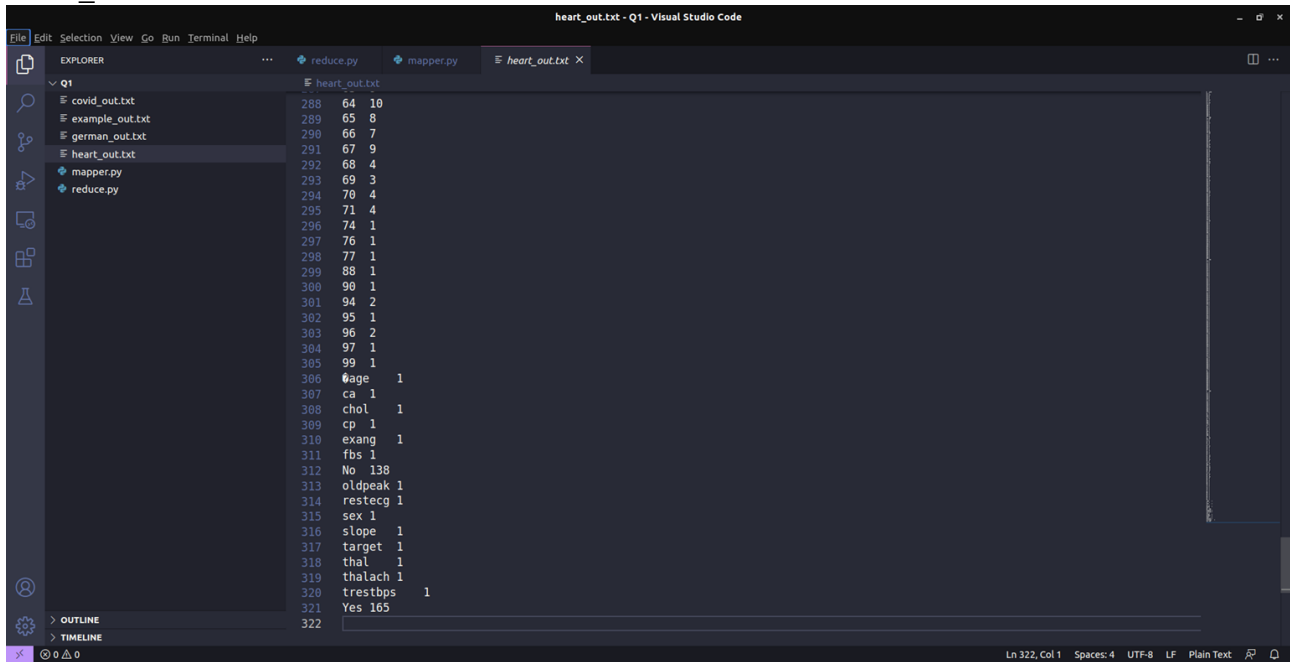
```
    print("%s\t%d"%(current_word, current_count))
```

**Output:**

```
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/heart_disease_data.csv | python Q1/mapper.py | sort | python Q1/reduce.py > Q1/heart_out.txt
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/covid_19_data.csv | python Q1/mapper.py | sort | python Q1/reduce.py > Q1/covid_out.txt
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/example.csv | python Q1/mapper.py | sort | python Q1/reduce.py > Q1/example_out.txt
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/german_credit.csv | python Q1/mapper.py | sort | python Q1/reduce.py > Q1/german_out.txt
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> █
```

## Output files (truncated)

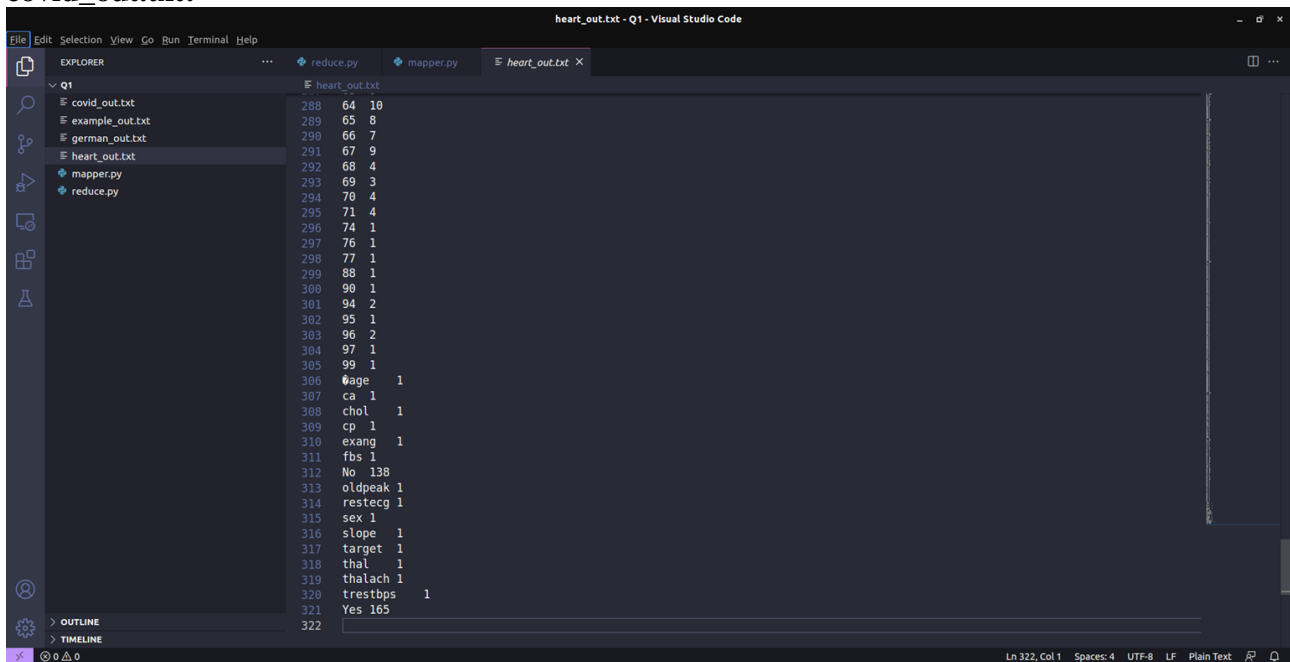
### heart\_out.txt:



The screenshot shows the Visual Studio Code editor with the file 'heart\_out.txt' open. The Explorer sidebar on the left shows a project structure with files like 'covid\_out.txt', 'example\_out.txt', 'german\_out.txt', 'heart\_out.txt', 'mapper.py', and 'reduce.py'. The main editor area displays the content of 'heart\_out.txt', which is a truncated output of a program. The text is as follows:

```
Q1
288 64 10
289 65 8
290 66 7
291 67 9
292 68 4
293 69 3
294 70 4
295 71 4
296 74 1
297 76 1
298 77 1
299 88 1
300 90 1
301 94 2
302 95 1
303 96 2
304 97 1
305 99 1
306 Wage 1
307 ca 1
308 chol 1
309 cp 1
310 exang 1
311 fbs 1
312 No 138
313 oldpeak 1
314 restecg 1
315 sex 1
316 slope 1
317 target 1
318 thal 1
319 thalach 1
320 trestbps 1
321 Yes 165
322
```

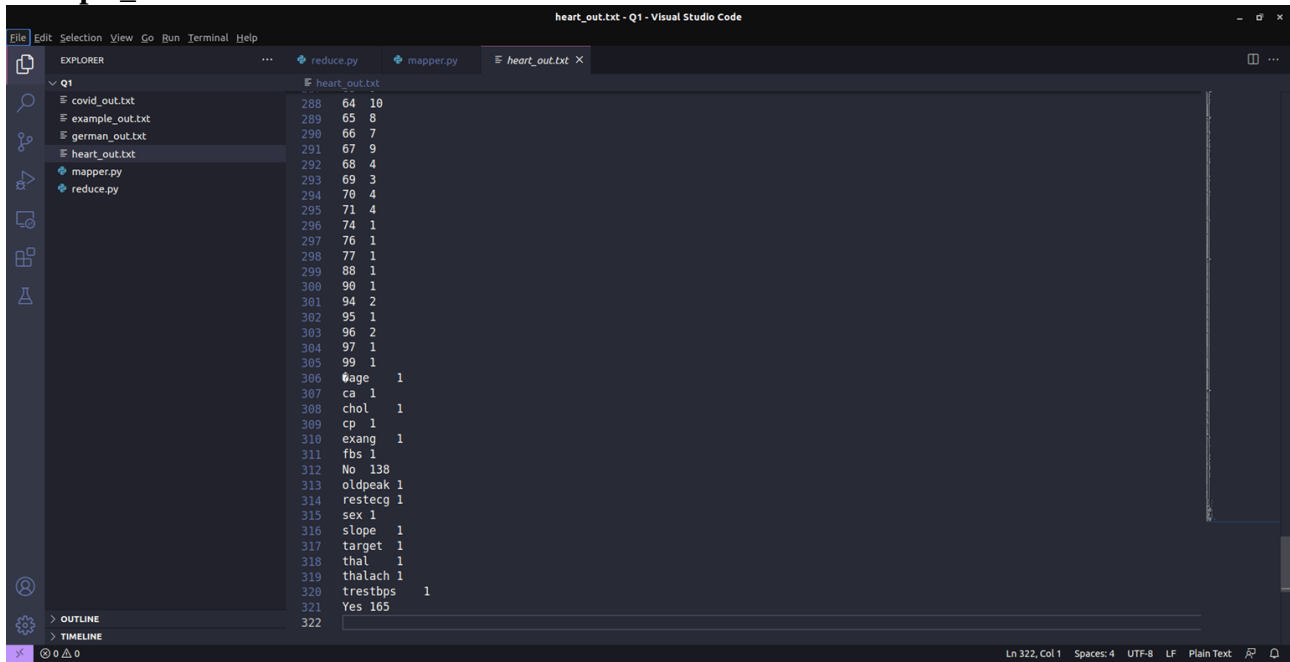
### covid\_out.txt:



The screenshot shows the Visual Studio Code editor with the file 'covid\_out.txt' open. The Explorer sidebar on the left shows a project structure with files like 'covid\_out.txt', 'example\_out.txt', 'german\_out.txt', 'heart\_out.txt', 'mapper.py', and 'reduce.py'. The main editor area displays the content of 'covid\_out.txt', which is a truncated output of a program. The text is as follows:

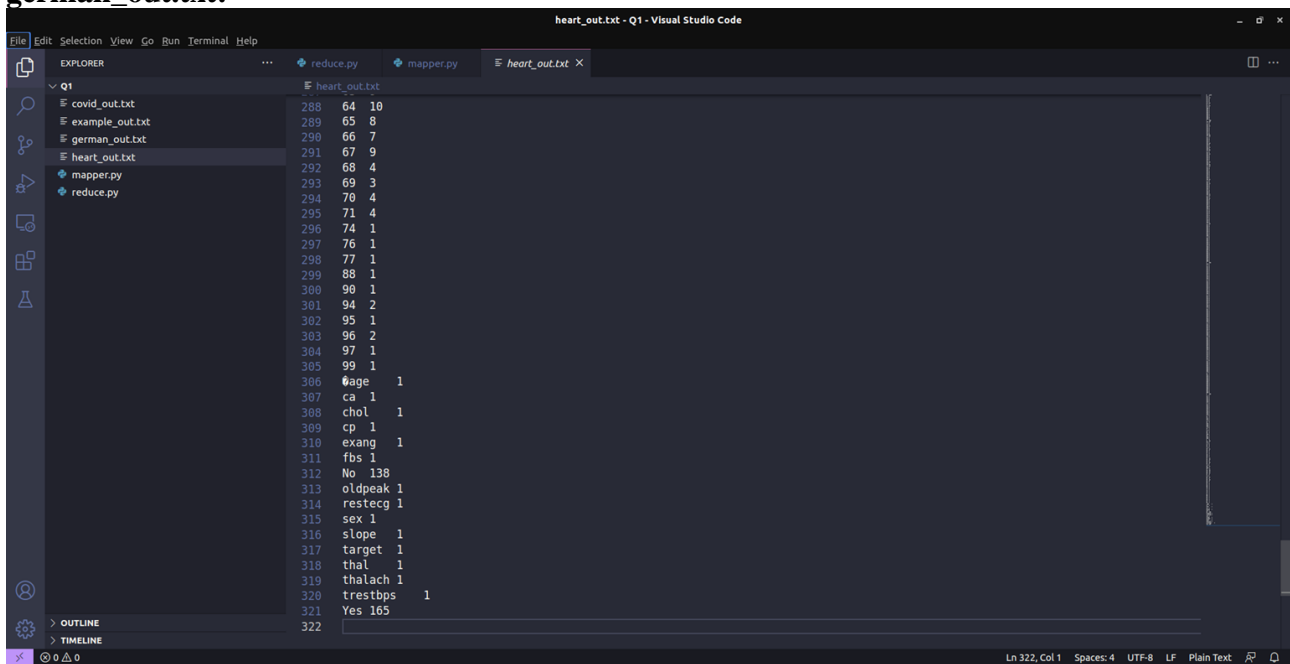
```
Q1
288 64 10
289 65 8
290 66 7
291 67 9
292 68 4
293 69 3
294 70 4
295 71 4
296 74 1
297 76 1
298 77 1
299 88 1
300 90 1
301 94 2
302 95 1
303 96 2
304 97 1
305 99 1
306 Wage 1
307 ca 1
308 chol 1
309 cp 1
310 exang 1
311 fbs 1
312 No 138
313 oldpeak 1
314 restecg 1
315 sex 1
316 slope 1
317 target 1
318 thal 1
319 thalach 1
320 trestbps 1
321 Yes 165
322
```

## example\_out.txt:



```
Q1
288 64 10
289 65 8
290 66 7
291 67 9
292 68 4
293 69 3
294 70 4
295 71 4
296 74 1
297 76 1
298 77 1
299 88 1
300 90 1
301 94 2
302 95 1
303 96 2
304 97 1
305 99 1
306 age 1
307 ca 1
308 chol 1
309 cp 1
310 exang 1
311 fbs 1
312 No 138
313 oldpeak 1
314 restecg 1
315 sex 1
316 slope 1
317 target 1
318 thal 1
319 thalach 1
320 trestbps 1
321 Yes 165
322
```

## german\_out.txt:



```
Q1
288 64 10
289 65 8
290 66 7
291 67 9
292 68 4
293 69 3
294 70 4
295 71 4
296 74 1
297 76 1
298 77 1
299 88 1
300 90 1
301 94 2
302 95 1
303 96 2
304 97 1
305 99 1
306 age 1
307 ca 1
308 chol 1
309 cp 1
310 exang 1
311 fbs 1
312 No 138
313 oldpeak 1
314 restecg 1
315 sex 1
316 slope 1
317 target 1
318 thal 1
319 thalach 1
320 trestbps 1
321 Yes 165
322
```

## 2) Map Reduce Program to find frequent words

Try the given frequent word count program for heart disease dataset, covid 19 dataset, example dataset, and german credit dataset

### #freqmap1.py:

```
import sys

for line in sys.stdin:
    L = [ (word.strip().lower(), 1) for word in line.strip().split(',') ]

    for word, n in L:
        print("{}\t{}".format(word, n))
```

### #freqred1.py

```
import sys

lastWord = None
sum = 0

for line in sys.stdin:
    try:
        word, count = line.strip().split('\t', 1)
        count = int(count)
    except ValueError:
        continue

    if lastWord == None:
        lastWord = word
        sum = count
        continue

    if word == lastWord:
        sum += count

    else:
        print("{}\t{}".format(lastWord, sum))
        sum = count
        lastWord = word

# output last word
if lastWord == word:
    print("{}\t{}".format(lastWord, sum))
```

### #freqmap2.py:

```
import sys

for line in sys.stdin:
    word, count = line.strip().split('\t', 1)
    count = int(count)
    print("{}\t{}".format(word, count))
```

```

#freqred2.py:
import sys

mostFreq = []
currentMax = -1

for line in sys.stdin:
    word, count = line.strip().split('\t', 1)
    count = int(count)

    if count > currentMax:
        currentMax = count
        mostFreq = [ word ]

    elif count == currentMax:
        mostFreq.append(word)

for word in mostFreq:
    print("{}\t{}".format(word, currentMax))

```

## Output:

```

PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/heart_disease_data.csv | python Q2/freqmap1.py | sort | python Q2/freqred1.py | python Q2/freqmap2.py | sort | python Q2/freqred2.py > Q2/heart_
out.txt
>> cat data/covid_19_data.csv | python Q2/freqmap1.py | sort | python Q2/freqred1.py | python Q2/freqmap2.py | sort | python Q2/freqred2.py > Q2/covid_out.t
xt
>> cat data/example.csv | python Q2/freqmap1.py | sort | python Q2/freqred1.py | python Q2/freqmap2.py | sort | python Q2/freqred2.py > Q2/example_out.txt
>> cat data/german_credit.csv | python Q2/freqmap1.py | sort | python Q2/freqred1.py | python Q2/freqmap2.py | sort | python Q2/freqred2.py > Q2/german_out.
txt
>> █

```

**heart\_out.txt:**

**0      1145**

**covid\_out.txt:**

**0      45012**

**example\_out.txt:**

**amex 13**

**german\_out.txt:**

**1      700**

**3) MapReduce Program to explore the dataset and perform filtering (typically creating key value pairs) by mapper and perform count and summary operations on instances.**

**#itemmap.py (for heart disease dataset)**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 14:
        age, sex, cp, trestbps, chol, fbs, restecg, thalach, exang, oldpeak, slope, ca, thal, target = data
        print("{}\t{}".format(age, trestbps))
```

**#itemmap.py (for covid 19 dataset)**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 8:
        sno, observationdate, province, country, lastupdate, confirmed, deaths, recovered = data
        print("{}\t{}".format(country, confirmed))
```

**#itemmap.py (for example dataset)**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 6:
        date, time, location, itemtype, amount, cardtype = data
        print("{}\t{}".format(itemtype, amount))
```

**#itemmap.py (for german credit dataset)**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 3:
        credibility, creditamount, durationofcredit = data
        print("{}\t{}".format(credibility, creditamount))
```

**#itemred.py:**

```
import fileinput

transaction_count = 0
sales_total = 0

for line in fileinput.input():

    try:
```

```
data = line.strip().split("\t")
if len(data) != 2:
    continue
except ValueError:
    continue

current_key, current_value = data
try:
    sales_total += float(current_value)
    transaction_count += 1
except ValueError:
    continue
```

```
print("{}\t{}".format(transaction_count, sales_total))
```

### Output:

```
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/heart_disease_data.csv | python Q3/itemmap.py | sort | python Q3/itemred.py > Q3/heart_out.txt
>> cat data/covid_19_data.csv | python Q3/itemmap.py | sort | python Q3/itemred.py > Q3/covid_out.txt
>> cat data/example.csv | python Q3/itemmap.py | sort | python Q3/itemred.py > Q3/example_out.txt
>> cat data/german_credit.csv | python Q3/itemmap.py | sort | python Q3/itemred.py > Q3/german_out.txt
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> █
```

**4) Write a mapper and reducer program for word count by defining a separator instead of using “\t”**

**#sepmap.py**

```
import sys
```

```
def read_input(file):
    for line in file:
        yield line.strip().split(',')
```

```
def main(separator="\t"):
    data = read_input(sys.stdin)
    for words in data:
        for word in words:
            print("%s%s%d"%(word, separator, 1))
```

```
if __name__ == '__main__':
    sep = sys.argv[1]
    main(separator=sep)
```

**#sepred.py:**

```
import sys
```

```
from itertools import groupby
```

```
from operator import itemgetter
```

```
def read_mapper_output(file, separator='\t'):
    for line in file:
        yield line.rstrip().split(separator, 1)
```

```
def main(separator="\t"):
    data = read_mapper_output(sys.stdin, separator=separator)
    for current_word, group in groupby(data, itemgetter(0)):
        try:
            total_count = sum(int(count) for current_word, count in group)
            print("%s%s%d"%(current_word, separator, total_count))
        except ValueError:
            pass
```

```
if __name__ == '__main__':
    sep = sys.argv[1]
    main(separator=sep)
```

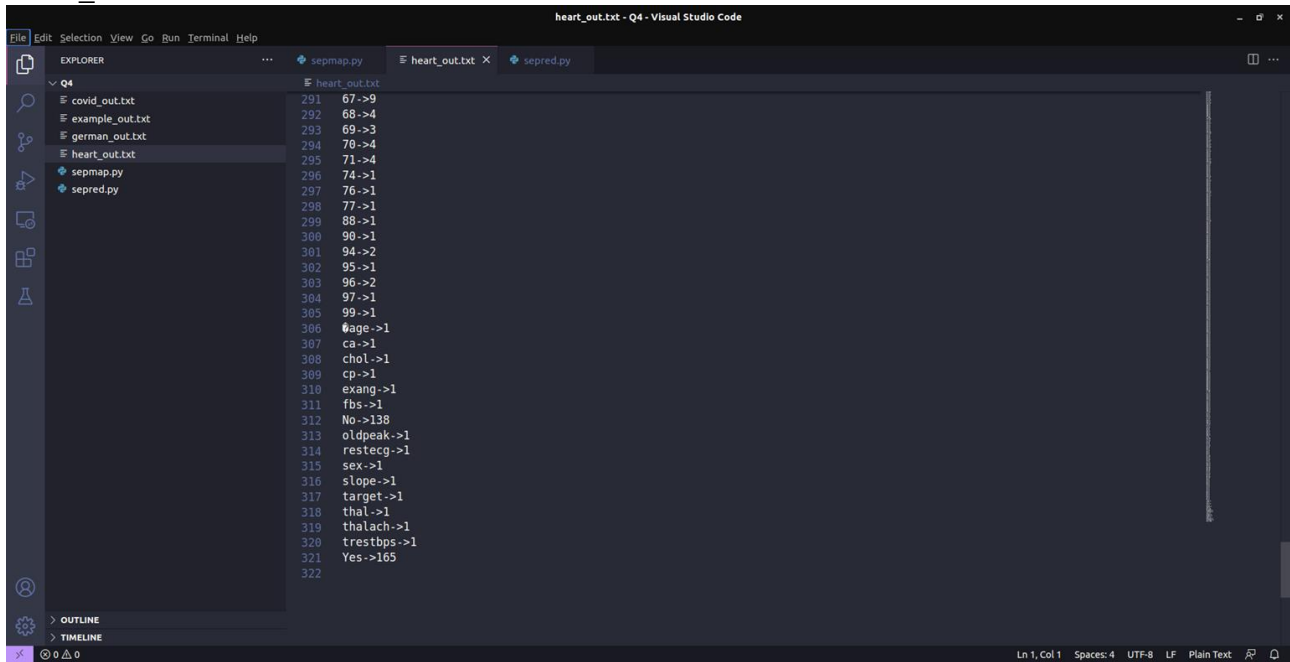
**Output:**

```
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/heart_disease_data.csv | python Q4/sepmap.py "->" | sort | python Q4/sepred.py "->" > Q4/heart_out.txt
>> cat data/covid_19_data.csv | python Q4/sepmap.py "->" | sort | python Q4/sepred.py "->" > Q4/covid_out.txt
>> cat data/example.csv | python Q4/sepmap.py "->" | sort | python Q4/sepred.py "->" > Q4/example_out.txt
>> cat data/german_credit.csv | python Q4/sepmap.py "->" | sort | python Q4/sepred.py "->" > Q4/german_out.txt
```



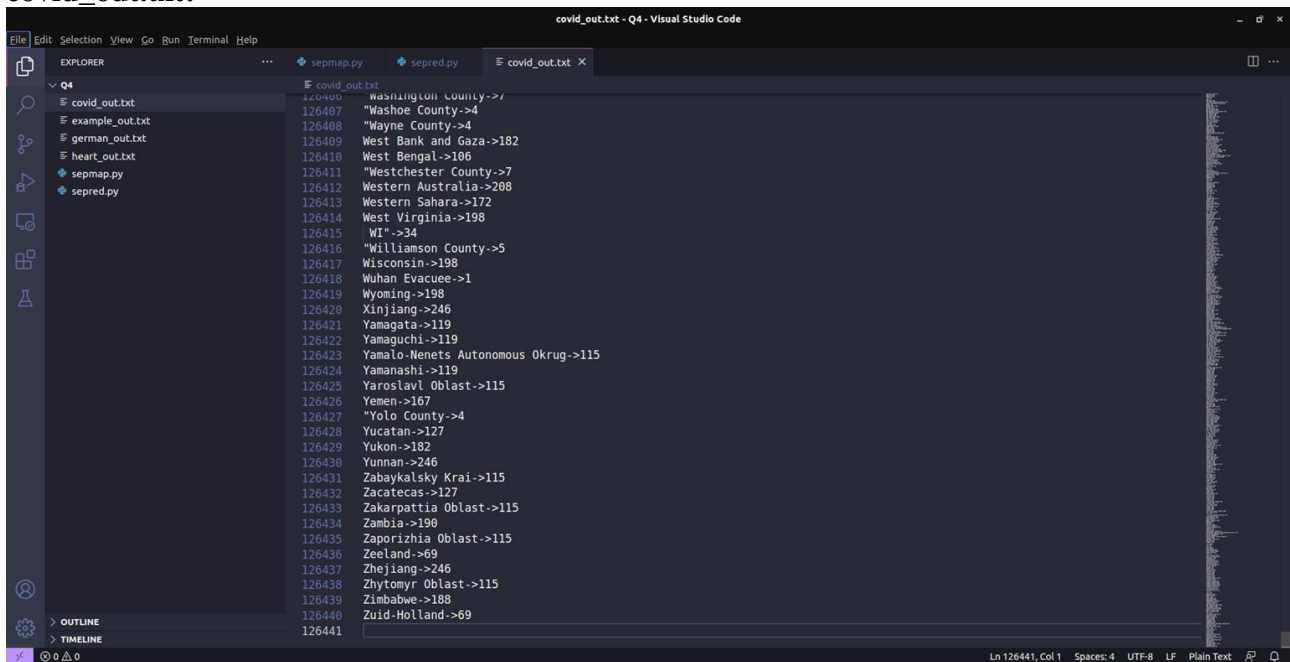
## Output files (truncated):

### heart\_out.txt:



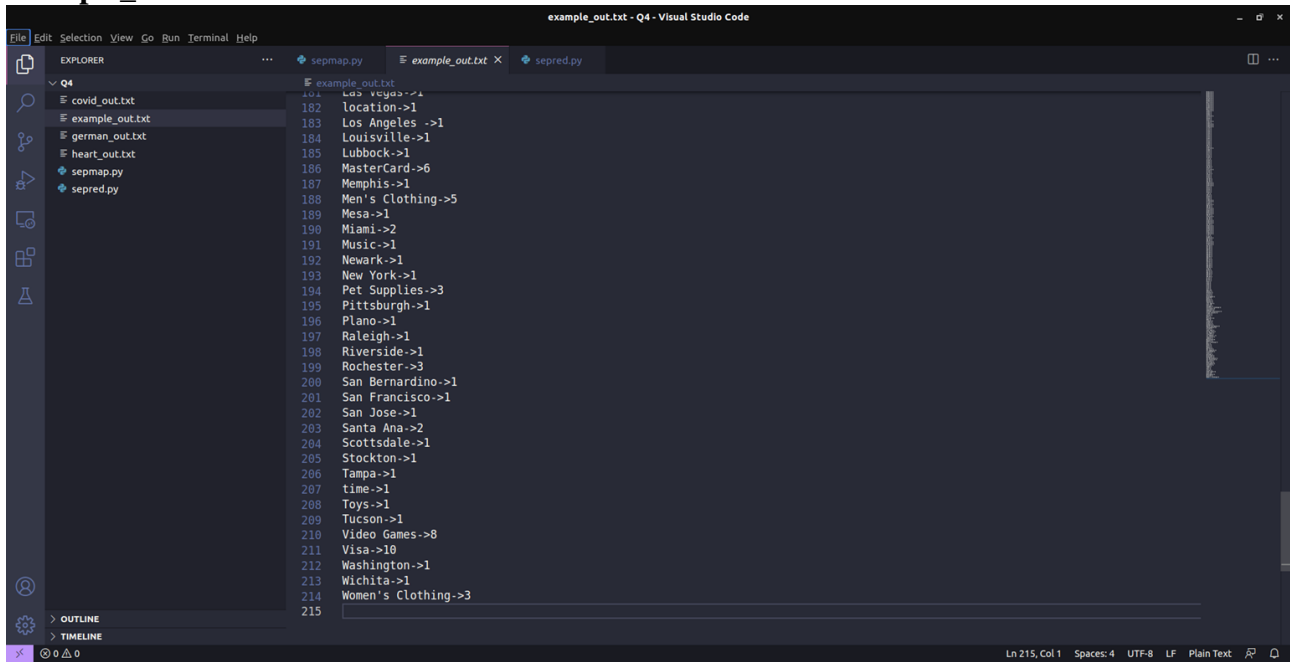
```
291 67->9
292 68->4
293 69->3
294 70->4
295 71->4
296 74->1
297 76->1
298 77->1
299 88->1
300 90->1
301 94->2
302 95->1
303 96->2
304 97->1
305 99->1
306 0age->1
307 ca->1
308 chol->1
309 cp->1
310 exang->1
311 fbs->1
312 No->138
313 oldpeak->1
314 restecg->1
315 sex->1
316 slope->1
317 target->1
318 thal->1
319 thalach->1
320 trestbps->1
321 Yes->165
322
```

### covid\_out.txt:



```
126400 Washington County->1
126407 "Washoe County->4
126408 "Wayne County->4
126409 West Bank and Gaza->182
126410 West Bengal->106
126411 "Westchester County->7
126412 Western Australia->208
126413 Western Sahara->172
126414 West Virginia->198
126415 WI"->34
126416 "Williamson County->5
126417 Wisconsin->198
126418 Wuhan Evacuee->1
126419 Wyoming->198
126420 Xinjiang->246
126421 Yamagata->119
126422 Yamaguchi->119
126423 Yamalo-Nenets Autonomous Okrug->115
126424 Yamanashi->119
126425 Yaroslavl Oblast->115
126426 Yemen->167
126427 "Yolo County->4
126428 Yucatan->127
126429 Yukon->182
126430 Yunnan->246
126431 Zabaykalsky Krai->115
126432 Zacatecas->127
126433 Zakarpattia Oblast->115
126434 Zambia->190
126435 Zaporizhia Oblast->115
126436 Zealand->69
126437 Zhejiang->246
126438 Zhytomyr Oblast->115
126439 Zimbabwe->188
126440 Zuid-Holland->69
126441
```

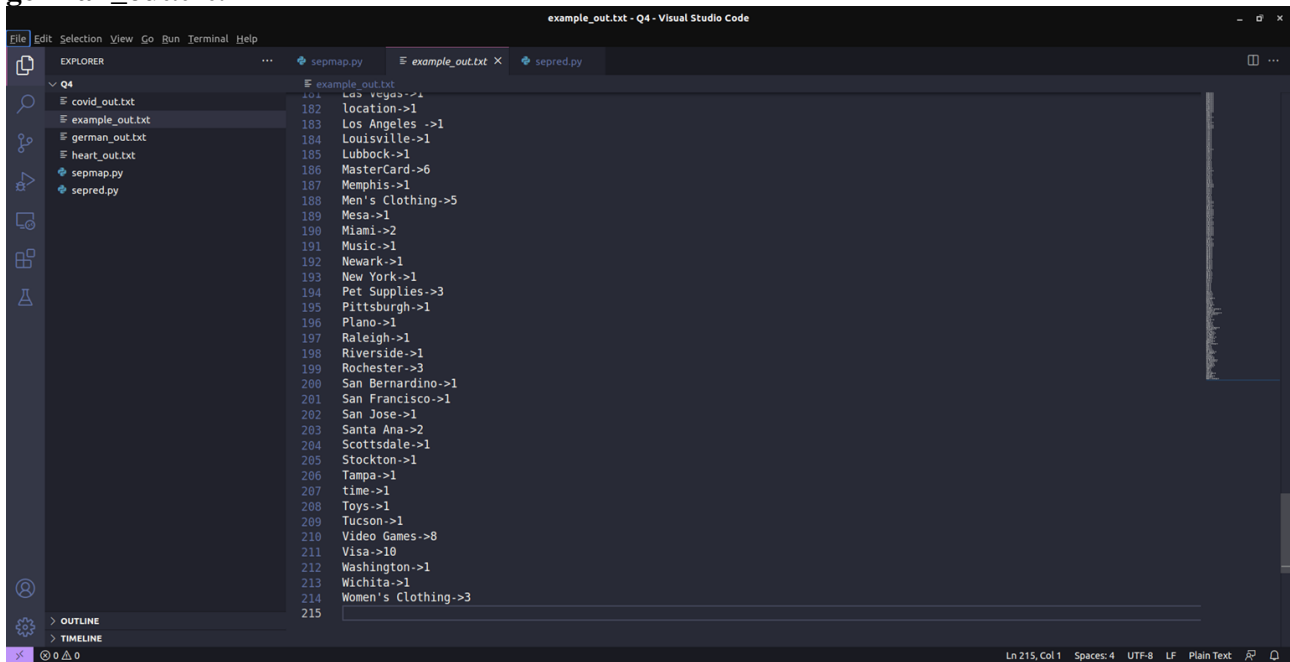
## example\_out.txt:



The screenshot shows the Visual Studio Code interface with the file 'example\_out.txt' open. The Explorer sidebar on the left shows a project structure with files like 'covid\_out.txt', 'example\_out.txt', 'german\_out.txt', 'heart\_out.txt', 'sepmay.py', and 'sepred.py'. The main editor area displays the content of 'example\_out.txt', which is a list of items and their counts, starting with 'Las Vegas->1' and ending with 'Women's Clothing->3'. The status bar at the bottom indicates 'Ln 215, Col 1', 'Spaces: 4', 'UTF-8', 'LF', 'Plain Text', and '0 0 0'.

```
181 Las Vegas->1
182 Location->1
183 Los Angeles ->1
184 Louisville->1
185 Lubbock->1
186 MasterCard->6
187 Memphis->1
188 Men's Clothing->5
189 Mesa->1
190 Miami->2
191 Music->1
192 Newark->1
193 New York->1
194 Pet Supplies->3
195 Pittsburgh->1
196 Plano->1
197 Raleigh->1
198 Riverside->1
199 Rochester->3
200 San Bernardino->1
201 San Francisco->1
202 San Jose->1
203 Santa Ana->2
204 Scottsdale->1
205 Stockton->1
206 Tampa->1
207 time->1
208 Toys->1
209 Tucson->1
210 Video Games->8
211 Visa->10
212 Washington->1
213 Wichita->1
214 Women's Clothing->3
215
```

## german\_out.txt:



This screenshot is identical to the one above, showing the Visual Studio Code interface with the file 'example\_out.txt' open. The Explorer sidebar on the left shows a project structure with files like 'covid\_out.txt', 'example\_out.txt', 'german\_out.txt', 'heart\_out.txt', 'sepmay.py', and 'sepred.py'. The main editor area displays the content of 'example\_out.txt', which is a list of items and their counts, starting with 'Las Vegas->1' and ending with 'Women's Clothing->3'. The status bar at the bottom indicates 'Ln 215, Col 1', 'Spaces: 4', 'UTF-8', 'LF', 'Plain Text', and '0 0 0'.

```
181 Las Vegas->1
182 Location->1
183 Los Angeles ->1
184 Louisville->1
185 Lubbock->1
186 MasterCard->6
187 Memphis->1
188 Men's Clothing->5
189 Mesa->1
190 Miami->2
191 Music->1
192 Newark->1
193 New York->1
194 Pet Supplies->3
195 Pittsburgh->1
196 Plano->1
197 Raleigh->1
198 Riverside->1
199 Rochester->3
200 San Bernardino->1
201 San Francisco->1
202 San Jose->1
203 Santa Ana->2
204 Scottsdale->1
205 Stockton->1
206 Tampa->1
207 time->1
208 Toys->1
209 Tucson->1
210 Video Games->8
211 Visa->10
212 Washington->1
213 Wichita->1
214 Women's Clothing->3
215
```

**5) Try to apply finding max value using map reduce concept for the output of heart disease dataset, covid 19 dataset, example dataset, german credit dataset**

**#costmap.py (for heart disease dataset):**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 14:
        age, sex, cp, trestbps, chol, fbs, restecg, thalach, exang, oldpeak, slope, ca, thal, target = data
        print("{}\t{}".format(sex, chol))
```

**#costmap.py (for covid 19 dataset):**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 8:
        sno, observationdate, province, country, lastupdate, confirmed, deaths, recovered = data
        print("{}\t{}".format(observationdate, confirmed))
```

**#costmap.py (for example dataset)**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 6:
        date, time, location, itemtype, amount, cardtype = data
        print("{}\t{}".format(itemtype, amount))
```

**#costmap.py (for german credit dataset)**

```
import fileinput

for line in fileinput.input():
    data = line.strip().split(",")

    if len(data) == 3:
        credibility, creditamount, durationofcredit = data
        print("{}\t{}".format(credibility, creditamount))
```

**#costred.py:**

```
import fileinput

max_val = 0
old_key = None

for line in fileinput.input():

    data = line.strip().split("\t")
```

```

if len(data) != 2:
    continue

current_key, current_value = data
try:
    v = float(current_value)
except ValueError:
    continue

if old_key and (old_key != current_key):
    print("{}\t{}".format(old_key, max_val))
    old_key = current_key

max_val = 0

old_key = current_key
if float(current_value) > float(max_val):
    max_val = float(current_value)

if old_key != None:
    print("{}\t{}".format(old_key, max_val))

```

### Output:

```

PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> `
>> cat data/heart_disease_data.csv | python Q5/costmap.py | sort | python Q5/costred.py > Q5/heart_out.txt
>> cat data/covid_19_data.csv | python Q5/costmap.py | sort | python Q5/costred.py > Q5/covid_out.txt
>> cat data/example.csv | python Q5/costmap.py | sort | python Q5/costred.py > Q5/example_out.txt
>> cat data/german_credit.csv | python Q5/costmap.py | sort | python Q5/costred.py > Q5/german_out.txt
PS D:\Code\CSE\Year 3\Sem 6\DSL\Week 5> █

```

#### Heart\_out.txt

```

0      564.0
1      353.0

```

#### covid\_out.txt

```

1/22/2020      444.0
1/23/2020      444.0
1/24/2020      549.0
1/25/2020      761.0
1/26/2020     1058.0

```

#### German\_out.txt

```

0      18424.0
1      15857.0

```

#### example\_out.txt

```

Books      498.29
Cameras    485.71
Children's Clothing      364.53
Computers      288.32
Consumer Electronics      410.37
Crafts      489.93
DVDs      492.8
Garden      386.56
Health and Beauty      464.36
Men's Clothing      443.78
Music      213.64
Pet Supplies      431.73
Toys      13.79
Video Games      460.39
Women's Clothing      481.31

```

6) (Instructed to not do)

7) Write a map reduce program to count even or odd numbers in randomly generated natural numbers

**#mapper.py:**

```
import sys

for line in sys.stdin:
    words = line.strip().split()

    for word in words:
        num = int(word)
        if num % 2 == 0:
            print("%s\t%d"%( "even", 1))
        else:
            print("%s\t%d"%( "odd", 1))
```

**#reduce.py**

```
from operator import itemgetter
import sys

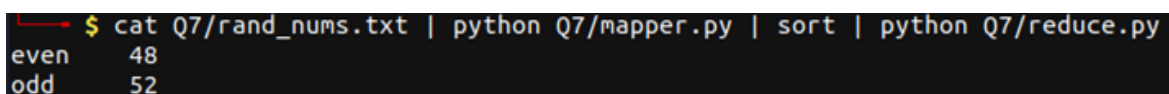
current_word = None
current_count = 0
word = None

for line in sys.stdin:
    try:
        word, count = line.strip().split('\t', 1)
        count = int(count)
    except ValueError:
        continue

    if current_word == word:
        current_count += count
    else:
        if current_word:
            print("%s\t%d"%(current_word, current_count))

        current_count = count
        current_word = word

if current_word == word:
    print("%s\t%d"%(current_word, current_count))
```

**Output:**A terminal window with a dark background. The command line shows a pipeline: 'cat Q7/rand\_nums.txt | python Q7/mapper.py | sort | python Q7/reduce.py'. Below the command, the output is displayed in two lines: 'even 48' and 'odd 52'.

```
$ cat Q7/rand_nums.txt | python Q7/mapper.py | sort | python Q7/reduce.py
even 48
odd 52
```