Gebze Technical University
Computer Engineering

CSE 222 - 2019 Spring

HOMEWORK 6 REPORT

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1 INTRODUCTION

1.1 Problem Definition

Data is the fundamental of computers.Without data,there would be nothing much that computers could do.Nowadays,due to evolution of computers,datum that is kept by hardwares are extremely larger than before and so that keeping the datum has became demanding task. In time many data structures have been created to be used in different ways.In this project,we are asked to implementthe proper data structures to keep every single word and their position in files that is inside a directory that is given.There will be 2 type of request;

1)To find all bi-grams that contains given word

2)To calculate the TFIDF value which is stand for the importance of a word in a file

Terms are explained below with details.

1.2 System Requirements

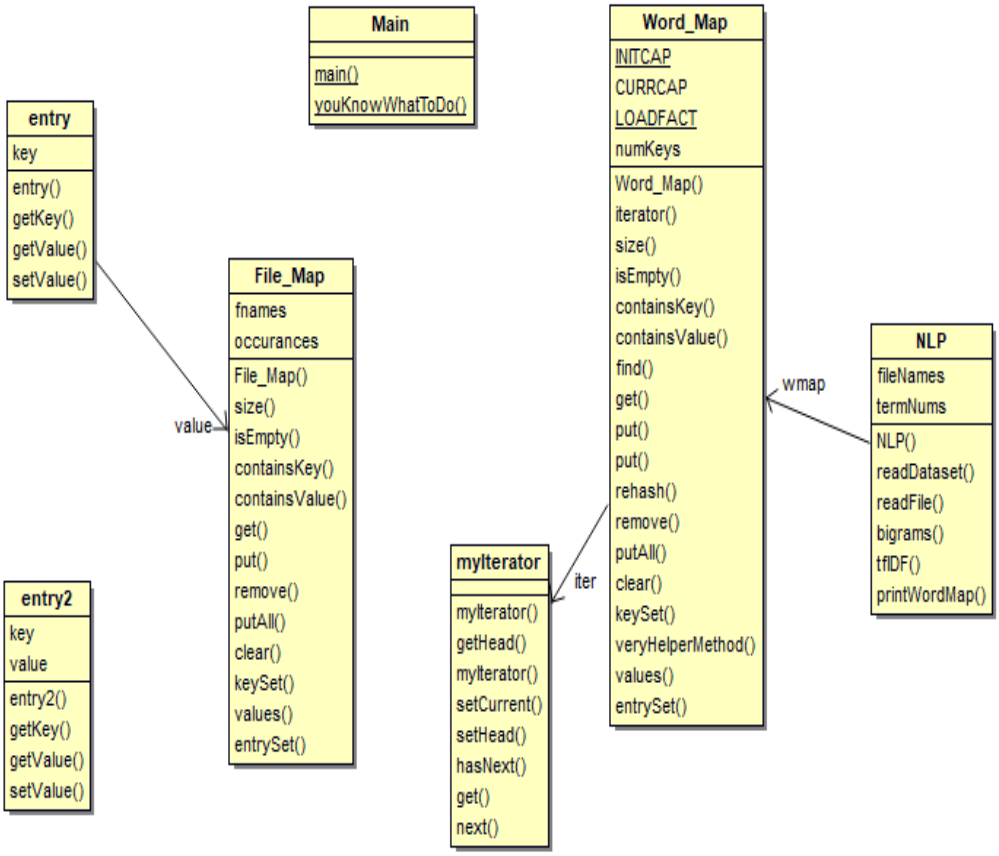
This program requires a hardware that can run an operating system which supports IntelliJ Idea Community Edition 2018 3.5 , JVM and libraries that are below:

```
import java.io.File;
import java.io.FileNotFoundException;
import java.util.HashSet;
import java.util.Scanner;
import java.util.Iterator;
import java.io.IOException;
import java.nio.file.Files;
import java.util.ArrayList;
import java.util.List;
```

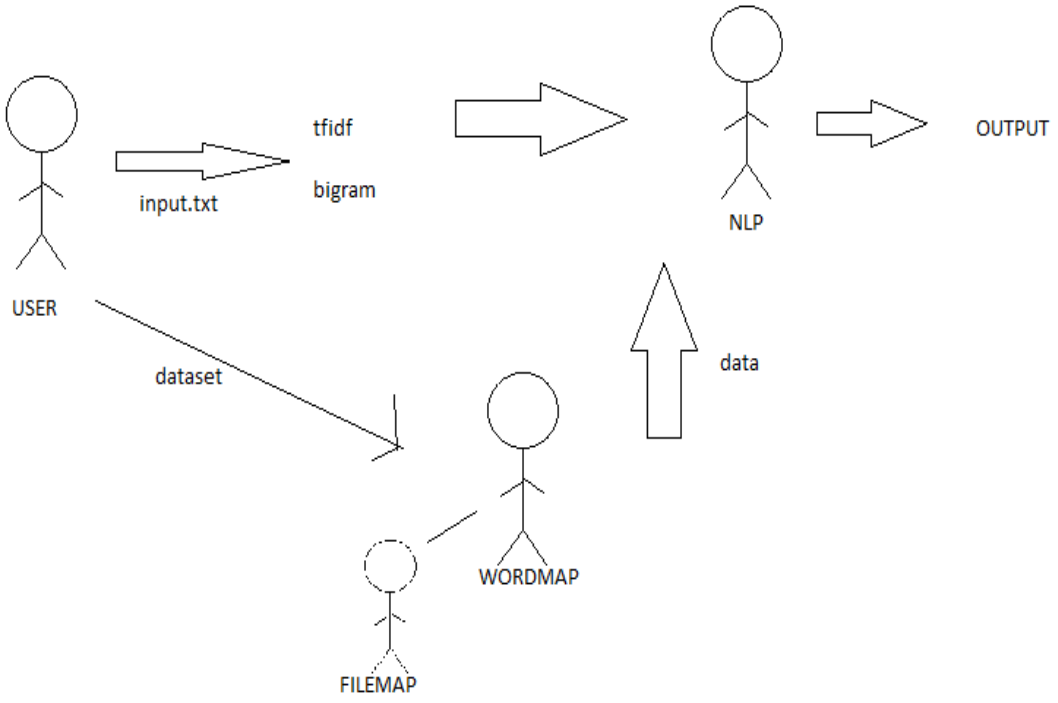
If the number of total words is considered N.Then the program uses 4N amount of memory.Because,for each word, indexes should be kept and also each node should have a next Node.

2 METHOD

2.1 Class Diagrams



2.2 Use Case Diagrams



User creates an input file to show what is requested,and also show the path of the directory which contains dataset.While nlp doing tasks,it uses dataset that is kept in wordmap.

```
Map<Integer,String> map = Map.of(1, "A", 2, "B", 3, "C");
```

key	value
1	A
2	B
3	C

2.3 Problem Solution Approach

In order to achieve this task,I implemented HashMap whose key type is word(String)and value type is FileMap which keeps the occurrances of the word in different files. First of all, the files that is given by user must be processed to keep dataset in the HashMap. While processing files,each word should have been added seperately.In order to achieve this task,Put method of HashMap is implemented specifically.The number of the total words and file numbers also counted to calculate tdidf value which is easier part.To achieve finding all bigrams,I implemented helper method which takes file name and index parameter and finds the word in that position.After taking word parameter in bigram method,, helper method finds all the words that is adjacent to parameter word and puts them to a list in a loop.

Here is the complexities of Methods:

WordMap:

Iterator -> O(1)
Size -> O(1)
IsEmpty -> O(1)
containsKey -> O(n) (in case of collision) O(1) best case
containsValue -> O(n) at the worst case but since the iterator used,it will be more efficient
get->O(n) (in case of collision) O(1) best case
put->O(n) (in case of collision and rehashing) O(1) best case
rehash->O(n) worst and best
putAll-> O(n)
keySet-> O(n)
values-> O(n) Since they copy the data its linear complexity
entrySet ->O(n)
veryHelperMethod -> O(n^2) (checks if it contains a key in a while loop)

FileMap:

Size -> O(1)
isEmpty->O(1)
containsKey -> O(n) (searching in underlying array of arraylist)
containsValue -> O(n) (searching in underlying array of arraylist)
get -> O(n) (finding index)
put-> O(n) (controls if it contains the key)
putAll-> O(n)
keySet-> O(n)
values-> O(n) Since they copy the data its linear complexity
entrySet ->O(n)

NLP:

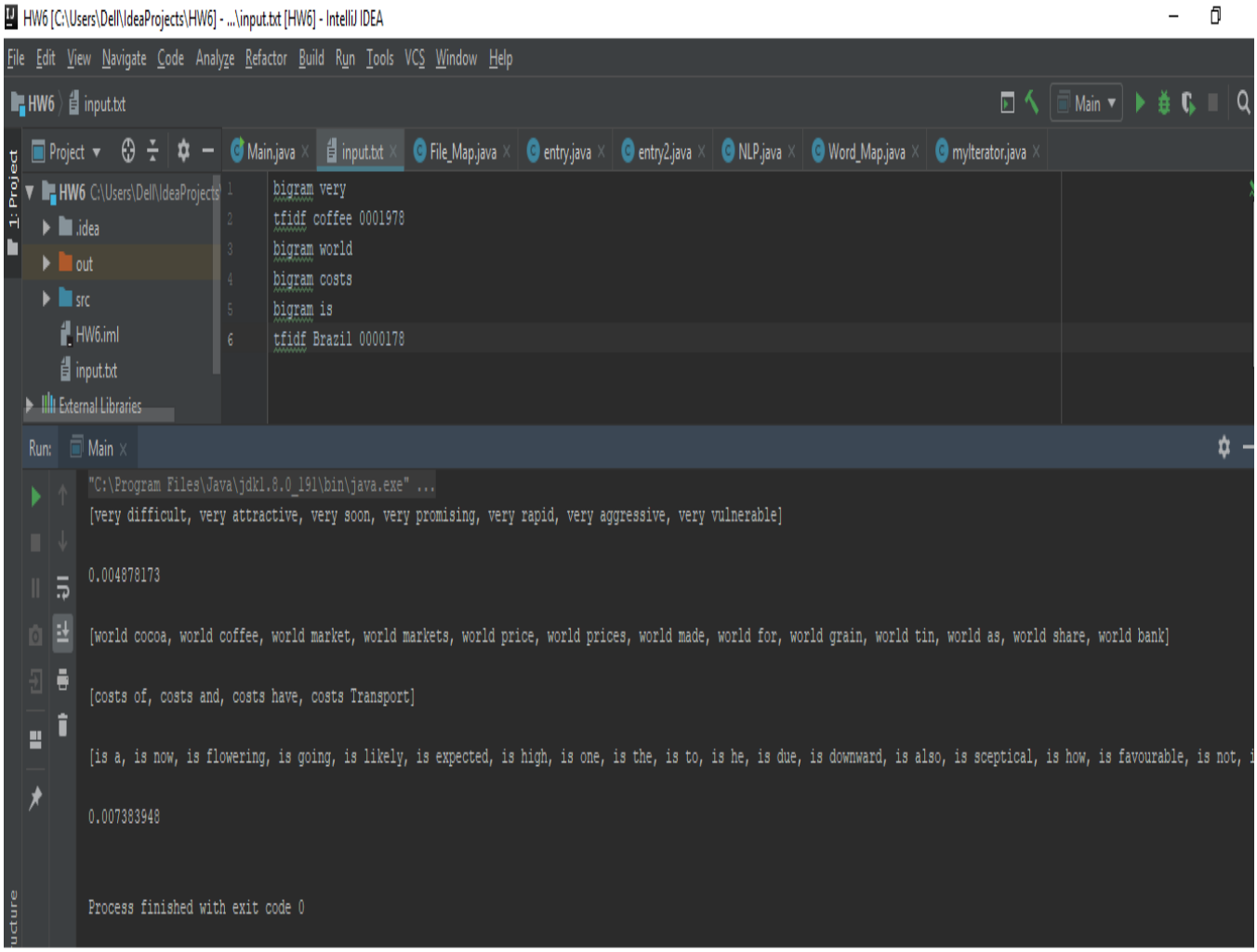
Bigrams-> O(n^4) -> (In 2 nested loop helper method is called)
TFIDF-> O(n) -> get method is called for wordmap
PrintWordMap -> O(n^2) -> 2 nested loops for printing
ReadDataSet -> O(n^2) -> calls contains method inside 2 nested loops

3 RESULT

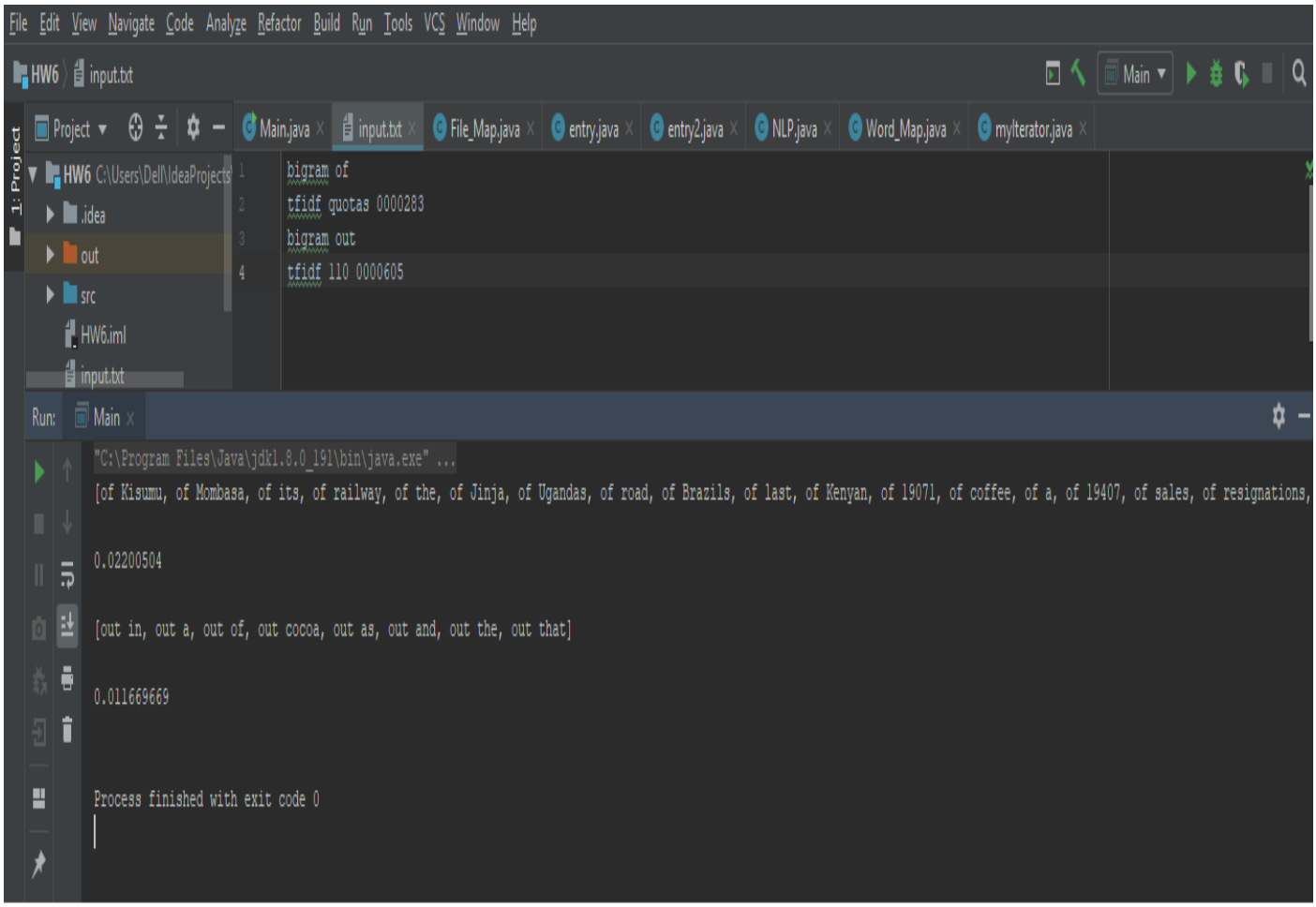
3.1 Test Cases

The program is checked for several inputs,which contains different input files,different directories and also different datasets.

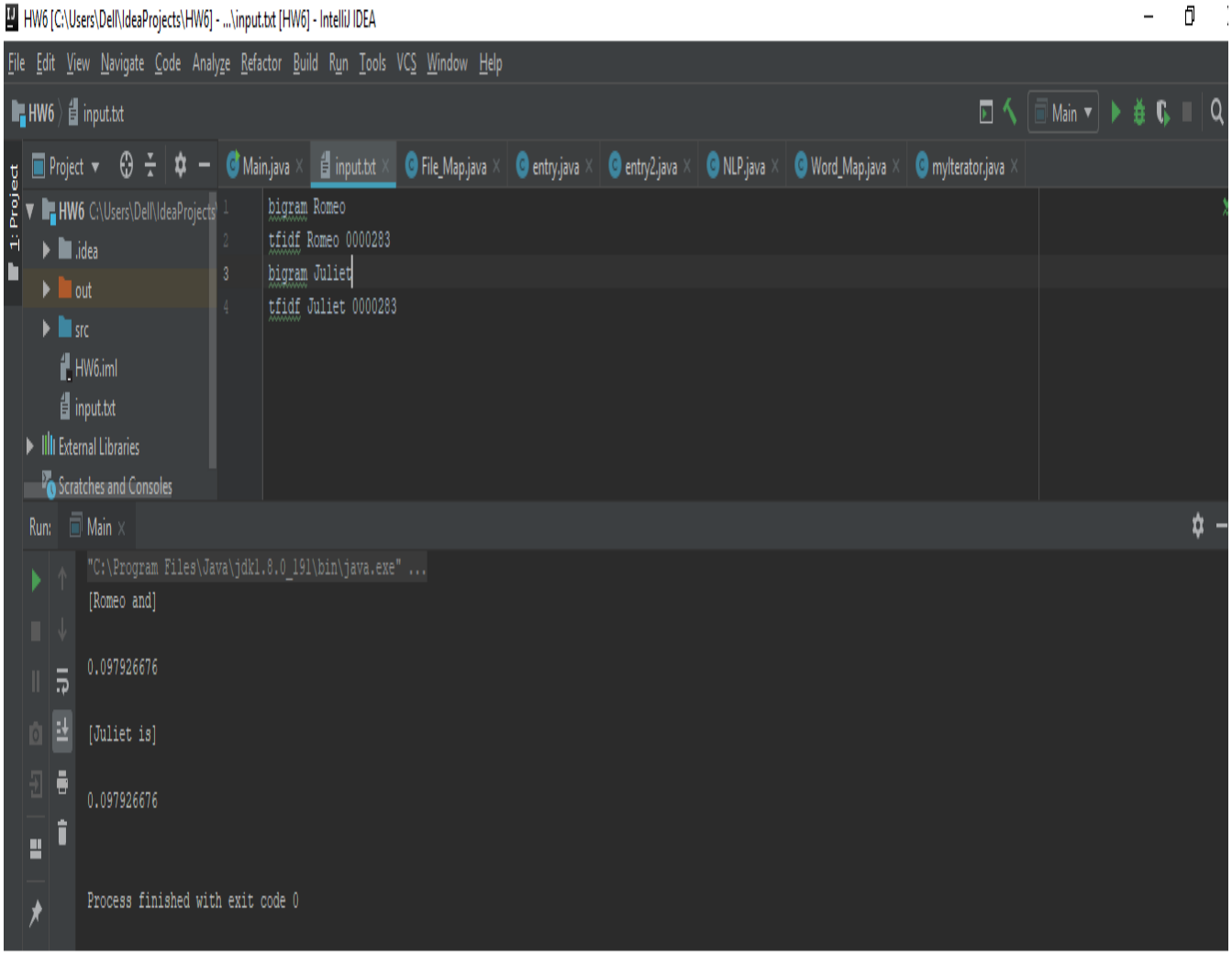
3.2 Running Results



It is the output with standart input file that is given by example.



With Different input File



With different dataset