Gebze Techical University
Department of Computer Engineering
CSE 241/505
Object Oriented Programming
Fall 2016
Homework # 7
Inheritance, Templates, STL
Due date
Dec 29th 2016

You will write a class hierarchy for bigrams (2-Gram). A bigram is a specialization of N-Gram which “is a contiguous sequence of N items from a given data sequence”. For the bigram we take N=2. For example if we have a sequence of integers {1 4 6 3 7 1 4 7 2} then the number of {1 4} bigrams is 2, the number of {4 6} bigrams is 1, and the number of {3 4} bigrams is 0. Similarly, if the sequence is {qwe asd fgh sdf sdf} then the number of {qwe asd} bigrams is 0.

The base class will be Bigram which will have only pure abstract functions and nothing else. This class will not have any data members. Class bigram will have the following member functions:

- readFile: takes a filename as a string parameter, reads the file, calculates all the bigrams. Throws exceptions if there are problems with opening and reading the file.
- numGrams: returns the total number of bigrams calculated so far. For example, if we read an integer sequence file that contains {1 234 346 343 7234 341 434 72 234}, then numGrams() returns 8.
- numOfGrams: takes two elements as bigrams and returns the number of that bigram read so far. For example, if we read an integer sequence file that contains {1 4 6 3 7 1 4 7 2}, then numOfGrams(1,4) returns 2.
- operator<< prints all the bigrams and their occurences in decreasing occurent order.
- maxGrams: returns the bigram that has occurred most frequently. For example, if we read an integer sequence file that contains {1 4 6 3 7 1 4 7 2}, then maxGrams() returns std::pair<int, int>(4,3).

You will derive 2 concrete classes from this base class. The first class is BigramMap, which uses STL Map class to implement all the functions above. The second class is BigramDyn which does not use any STL classes or STL functions, it uses only old fashioned dynamic memory.

Write a test function that takes a Bigram reference and a file name, reads the file, runs all the member functions catches any exceptions thrown (prints the exception error on the screen)

Write your main function that takes these command line parameters

- filename: file that contains the sequence to read, there is no limit to the number of elements in the sequence.
- Data type: 1 for int, 2 for strings, 3 for doubles

- Class type: 1 for BigramMap , 2 for BigramDyn

For example: myProg datafile 1 2 will read file name datafile that should contain integers and my program would use BigramDyn class to run all the tests. Your main function will call the test function with suitable parameters.

Notes

- We will test your programs with many different files and other options including files with bad data.
- Your test function can not use any of the concrete classes. It will use only the class Bigram
- You may use intermediate/extra classes in your hierarchy if it makes your code better.