CSCI3901 – Assignment1

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File: CourseSelector.java

Objective:

To provide course recommendations to students based on the input data file.

Assumptions:

1. Input and output files are assumed to be a text file.
2. Input and output files will be shared with the full path.
3. Student data need to be refreshed whenever we call read method.
4. showCommon method will print a message in case if the course inputted is not in the data file.
5. Output file content is replaced with new content on the showCommonAll method call.
6. Used the main method shared in the assignment section.

Data Structures and Java classes used:

1. Map, TreeMap, HashMap.
2. List, ArrayList.
3. Scanner, File.
4. FileWriter, BufferedWriter.

Technical code flow:

1. A Map is used to store the student information line wise with line number as key and list of strings as the value.

2. **removeSpace** is a common method used to remove unwanted space between courses in the input string. It is called from recommend and showCommon methods before proceeding with the logic.

3. **read method**
    a. Takes filename with path.
    b. Basic string validation is applied on the filename.
    c. Existing student data will be erased from the map.

d. Line content will be validated, uppercased and removed of all unwanted spaces, tabs, etc.,
e. Line content is converted into list of string with each course is converted into a string.
f. Student data will be created as a map with key as student number and list of courses as value.
g. Eexceptions are not thrown, or stack traced but shown valid error messages to the user based on the exceptions.

4. **recommend method**
    a. Support and recommendations values are validated so that they are not negative or ZERO.
    b. Validation is added to check whether the read method is called before calling recommend.
    c. Support should be less than total number of students in data file. Validation is added.
    d. Basic string validation is done on taken variable.
    e. Prepared a map with the intersection of file data and the inputted course list. This map will have the student number as input and list of strings as value. This will have even if 1 course in the method input is taken by the student.
    f. Removed students who don't have all the courses provided in method input. In case only one course from course combination is taken by that student then that student is removed from the map
    g. A map is prepared with the course and number of students with the combination.
    h. The map is sorted based on the values in the descending order so that we can recommend the popular course first.
    i. The return list is formed accordingly.
    j. In case tie between the courses, we will return both the courses.
    k. In case of no tie, the return list will match the recommendations requested.
    l. Exceptions are not thrown, or stack traced but shown valid error messages to the user based on the exceptions caught.

5. **getCoursesFromFile** is a common method used to prepare a sorted list of all the courses from the data file. It is called from showCommon, getTwoDimArray and showCommonAll methods.

6. **showCommon method**
    a. Input is validated.
    b. Calls getCoursesFromFile method to get the sorted list of courses from the data file.
    c. Calls getTwoDimArray method to get the overall 2D array.
    d. Validation is added to check whether the read method is called before the showCommon method.
    e. Method inputted course list size is set as boundary conditions for the loops.
    f. Prints the 2D array for the inputted course combination in the same order as inputted.
    g. Prints a message at the end in case any course is inputted which is not in the data file.
    h. Exceptions are not thrown, or stack traced but shown valid error messages to the user based on the exceptions caught.

7. **getTwoDimArray** is a common method used to return the 2D array of all the courses in the data file.

8. **showCommonAll method**
    a. Input is validated.
    b. Validation is added to check whether the read method is called before the showCommonAll method.
    c. The file content will be overwritten in case if it is an existing file.
    d. 2D matrix is received from the getTwoDimArray method.
    e. GetCoursesFromFile method is called for the course list.
    f. FileWriter and BufferedWriter are used to write the content into a text file.
    g. Exceptions are not thrown, or stack tracked but shown valid error messages to the user based on the exceptions caught.

Test scenarios:

1. All the test cases provided in the assignment are tested in local and in bluenose server and results are as expected.
2. All exception scenarios are covered and tested the catch blocks.
3. Tabs are given between the courses and tested in input for recommend, showCommon.

Assignment take away and improvements:

1. Organized the program and added a couple of new methods to reduce redundancy.
2. Covered all the test cases.
3. Could have reduced a couple of for loops and can try optimizing the recommend method.
4. Even complex problems can be solved if we split into segments.

References:

Refreshed the concept for that particular code snippets.

1. https://beginnersbook.com/2014/07/ - to sort the map based on values
2. https://mkyong.com/java/ - to write the content into a file.