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Programming Techniques

Homework 5

**Problem Specification**

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Stream Processing using Lambda Expressions

**Description**

A smart house features a set of sensors that may be used to record the behavior of a person living in the house. The historical log of the person’s activity is stored as tuples (startTime, endTime, activityLabel), where startTime and endTime represent the date and time when each activity has started and ended while the activity label represents the type of activity performed by the person: Leaving, Toileting, Showering, Sleeping, Breakfast, Lunch, Dinner, Snack, Spare\_Time/TV, Grooming.

The attached log file Activities.txt contains a set of activity records over a certain period of time.

Define a class MonitoredData having startTime, endTime and activityLabel as instance variables and read the input file data into the data structure monitoredData of type List. Using stream processing techniques and lambda expressions introduced by Java 8, write the following set of short programs for processing the monitoredData.

1. Count the distinct days that appear in the monitoring data.
2. Determine a map of type that maps to each distinct action type the number of occurrences in the log. Write the resulting map into a text file.
3. Generates a data structure of type Map> that contains the activity count for each day of the log (task number 2 applied for each day of the log) and writes the result in a text file.
4. Determine a data structure of the form Map that maps for each activity the total duration computed over the monitoring period. Filter the activities with total duration larger than 10 hours. Write the result in a text file.
5. Filter the activities that have 90% of the monitoring samples with duration less than 5 minutes, collect the results in a List containing only the distinct activity names and write the result in a text file.

This project is focused on working with lambda expressions and with streams. Both of these features have been introduced in Java 8. Lambda expressions allow the user to implement functions more easily, while streams allow the user to process data with the help of some aggregate operations.

After reading the information from the given text file, we have to process data and then put them into text files.

For example in solving the first problem, counting the distinct days, I mapped the “day” values and collected the distinct values into a List of integers, for finding the exact number of days, I used the size method of the list.

In the second problem where we have to find the distinct activities the number of apparitions in the text file. I collected the labels by grouping them in function of their names while counting them.

The third problem is like the second problem but separated for each day. The only difference that they are grouped first after day.

The fourth exercise asks us to find the total duration of an activity and put in the text file if it has over 10 hours. So I grouped again after the activity label and then added the number of milliseconds each activity took. Converted the sum into hours and if it was bigger than 10 put it into the file.

In the fifth exercise, we have to find the activities that take under 5 minutes in 90% of cases. The solution is similar to that of problem 4, I took the milliseconds for each activity and converted into minutes, if it took more than 5 minutes I incremented the overCounter and if it took less the underCounter, then with the simple mathematical expression: underCounter>= (overCounter+underCounter)\*90/100), which represents that 90% of cases the activity takes under 5 minutes, I put the values into the text file.