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Homework 5
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<MonitoredData>*. 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 <String, Integer> 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<Integer, Map<String, Integer>> 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<String, DateTime> 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<String> containing only the distinct activity names and write the result in a text file.

Note. The file *Activities.txt* is downloaded from [2].

REFERENCES:

[1] Ordóñez, F.J.; de Toledo, P.; Sanchis, A. Activity Recognition Using Hybrid Generative/Discriminative Models on Home Environments Using Binary Sensors. Sensors 2013, 13, 5460-5477.

[2] Available online at
https://archive.ics.uci.edu/ml/datasets/Activities+of+Daily+Living+(ADLs)+Recognition+Using+Binary+Sensors