CSCI 230 – Homework 2

List ADT Personalization & Complexity

Part 1: Personalize Your List

Objective

- Review a classic computer science problem, i.e., palindromic strings.
- Apply specialized functions in a list and personalize it.

Background information

A palindrome is a word, number, or other sequence of characters which reads the same backward as forward, such as “madam” or “racecar”. The word "palindrome" was first published by Henry Peacham in his book, "The Truth of Our Times" (1638). It is derived from the Greek roots *palin* (πάλιν; "again") and *dromos* (δρόμος; "way, direction"). (Source: https://en.wikipedia.org/wiki/Palindrome).

Assignment

Add the following new method in your OrderedList class from HW1:

- **removePalindromes –** a parameterless method that removes all strings that are palindromes from the OrderedList. Implement your method as efficiently and smartly as possible.

Part 2: Evaluate the complexity a List ADT

Objectives

- Evaluate the complexity of your code and understand why it is useful to use the asymptotic notation.
- Apply worst, best, average case complexity analysis to a real problem.
- Experiment with the System Time methods and demonstrate why this may not be the optimal method to evaluate algorithmic complexity.

Background information

Ch. 4 – Algorithm Analysis, Shaffer textbook

Assignment

Analyze your code from the OrderedList class from HW1 as to the computational efficiency of the methods: **remove**, **contains**, **printList, removePalindromes**. Your analysis should include two parts:

1. Theoretical analyses using the asymptotic notation for the best, worst, and average cases.
2. Practical analyses using the java API and your System Time. Make sure that you will place the timestamps at the appropriate points in your code. You will need to submit a graph of your system time that shows a trend as the size of the input increases.

Write up the analyses in paper form following directions given below.

- Model your efficiency analysis off the discussion in class and what you read Chapter 4 of Shaffer text, or whatever you find online. Cite specific parts of the code in discussing its complexity. You don't have to analyze every operation in a method, focus on that part of the method that does the most work. Don't just give an answer (like O(n) or order n), explain why the efficiency is what you say it is. Cite any sources that you use, including the textbook.
- Include the graphs from step 2. with a short explanation of what you did to create these.
- The paper format to be used is the ACM proceedings template with can be found in MS Word version on Oaks.

What to submit:

- Your analysis in a pdf paper as described above,
- Modified OrderedList code that includes the new method "removePalindromes" and the System Time calls in the appropriate locations in the code, and
- The tests that you used to create the graphs.
- Convert your paper to PDF, name it LastNameFirsInitial_HW2.pdf, mine would be MountrouidouX_HW2.pdf
- Create a zipped folder with all the code and pdf. Name it: LastNameFirsInitial_HW2.zip.

Source

Modified by Dr. McCauley's Homework assignments.