

Lesson 10: ArrayList Algorithms

45 minutes

Overview

How can I modify standard algorithms to implement natural language processing techniques?

Students explore a new standard algorithm to obtain individual digits from an integer and learn how sentiment values are used in natural language processing. Students write an algorithm to find the sentiment value of a word and apply their algorithm to various scenarios to find the overall sentiment value of text.

Standards

Full Course Alignment

CSA Conceptual Framework

- **CON-2** - Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values

Agenda

Warm Up (10 minutes)

Breaking Up a Number

Activity (30 minutes)

**Obtaining Individual Digits
Sentiment Value**

Wrap Up (5 minutes)

**Show What You Know Week
Assessment: Check for Understanding
AP Classroom Topic Questions**

Objectives

Students will be able to:

- Apply standard algorithms to `ArrayList`s

Preparation

- Create code review groups if you are not reusing the same groups
- Print copies of the Unit 6 Study Guide (one for each student)
- Check the **Teacher's Lounge** for verified teachers on the CSA Forum to find additional strategies or resources shared by fellow teachers

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the students

- **U6L10 Extra Practice** - Handout
- **Unit 6 Study Guide** - Resource

Vocabulary


- **Sentiment Value** - The positive or negative emotional value of a word


Teaching Guide

Warm Up (10 minutes)

Breaking Up a Number

Group: Place students in pairs.

 **Do This:** Click through the animated slide to introduce the problem.


 **Do This:** Have students write pseudocode to solve the problem, then compare their solutions with another group.

Activity (30 minutes)


Obtaining Individual Digits (10 minutes)

Remarks

We have seen how we can reuse standard algorithms that we wrote to work with 1D and 2D arrays can also work with `ArrayList`s. Let's explore another standard algorithm.

 **Do This:** Review the lesson objectives.

Group: Place students in pairs.

 **Do This:** Direct students to Level 1 on Code Studio to investigate the program with a partner. Students make the changes to the program as prompted.

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Investigate: Obtaining Individual Digits

 **Discuss:** Click through the animated slide to display the prompts.

- *What do you notice about the code in this program?*
- *What do you wonder about the code in this program?*

Discussion Goal: Students notice that the method obtains the last digit of the original number using the mod operator then divides the number by ten to remove the last digit from the number. Students may wonder about scenarios where this algorithm might be useful.

 **Do This:** Click through the animated slide to explain the algorithm.

Sentiment Value (20 minutes)


Remarks

The standard algorithms we have worked with throughout the year are often implemented in natural language processing algorithms to analyze the structure of words and sentences, or human language syntax. Natural language processing is also used to analyze the semantics of text to understand its meaning. For example, the sentiment or tone of a word can influence the tone of the overall message.

 **Do This:** Click through the animated slide to define sentiment value.

Group: Place students in pairs.

 **Do This:** Have students write an algorithm to find the sentiment value of a word.

 **Do This:** Direct students to complete Levels 2 and 3 on Code Studio. On Level 2, students write a method to find the sentiment value of a word. On Level 3, students complete a choice level to find the sentiment value of text.




2-3

Finding the Sentiment Value

2

3

 **Do This:** Click through the animated slide to have students participate in the Code Review Call and Response.

 **Do This:** Direct students to complete a code review on Level 4.



4


Code Review: Finding the Sentiment Value


Wrap Up (5 minutes)

Show What You Know Week

Remarks

The next five lessons are an opportunity to Show What You Know! We begin with the unit project, then spend a day practicing answering AP-style free-response questions and wrapping up the unit with a multiple-choice assessment. You've learned so much in this unit, and now you're ready to show what you know!

 **Distribute:** Give each student a copy of the Unit 6 Study Guide.

 **Do This:** Introduce the Show What You Know week.

 **Do This:** Introduce the Natural Language Processing Project.

 **Do This:** Review the concepts covered in this lesson.

 **Display:** Key Vocabulary

Assessment: Check for Understanding

Check For Understanding Question(s) and solutions can be found in each lesson on Code Studio. These questions can be used for an exit ticket.

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 Check for Understanding

AP Classroom Topic Questions

To assign questions from the AP Classroom Question Bank that align with this lesson, create a custom quiz in AP Classroom by searching the Question Bank for the Essential Knowledge statements listed at

the top of this lesson plan. You can find instructions and video demonstrations to do this on **AP Central**.

The following Topic Questions in AP Classroom can be assigned as a formative assessment for this lesson:

- Topic Questions 7.4

Note: *Some Learning Objectives and Essential Knowledge statements in the suggested Topic Questions are covered in later units.*



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