C950 WGUPS Algorithm Overview

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C950 Data Structures and Algorithms II

# Introduction

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# A. Algorithm Identification

The algorithm that I used to delivery packages is the greedy algorithm. I use the min function in python to find the closest route and through-out of the delivery process. As packages are delivered, they are removed from a list until no packages is left. Once that happens the truck returns to the Hub from last delivery.

# B1. Logic Comments

Trucks are manually loaded and assign to a specific truck. Once loaded the trucks begin their deliveries. The following pseudocode demonstrates how I used the greedy algorithm.

loadTruck1 = manually load packages

loadTruck2 = manually load packages

loadTruck3 = manually load packages

total\_mileage = 0

delivery\_process(truck)

packages = truck.packages

current\_position = 0

mileage\_list = mileage distances for current locations

duplicate\_list = handles duplicate distances on route

while len(packages) > 0  
 shortest\_route = min(mileage)

total\_mileage += shortest\_route

duplicate\_list.determine the right package that needs to be delivered

update.packages

update.current\_position

remove(package) from packages

return truck mileage

# B2. Development Environment

This program used Python 3.10 and Pycharm for the IDE. The OS use was Windows 11. GitHub was used as the repository. This allowed me to work on the project on two different machines, my laptop and desktop.

# B3. Space-Time and Big-O

HashTable.py

def \_\_init\_\_() = Space-time complexity O(1)

def insert() = Space-time complexity O(n)

def search() = Space-time complexity O(n)

def remove() = Space-time complexity O(n)

Main.py

def address\_list() = Space-time complexity O(n)

def package\_list() = Space-time complexity O(n)

def distance\_list() Space-time complexity O(n)

def load\_package\_data() = Space-time complexity O(1)

def delivery\_process() = Space-time complexity O(n^2)

def remove\_delivered\_package = Space-time complexity O(n)

def find\_indices() = Space-time complexity O(n)

def ui() = Space-time complexity O(1)

# 4. Scalability and Adaptability

For larger deliveries this program is scalable due to it’s ability to handle duplicate values of mileage and determine how to update those packages. Its space-time complexity would change much for larger package handle. The program’s adaptability could be improved by creating a more specific hash table, the current hash table is limited on what it can do.

# B5. Software Efficiency and Maintainability

This software is efficient since majority of its spacetime complexity is O(n) or O(1). The program should be easily maintained since there are not a lot of code to source through. This makes it easy to quicky find classes, functions, variables, etc, and alter as needed.

# B6. Self-Adjusting Data Structures

Text goes here

# C. Original Code

Text goes here

# C1. Identification Information

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# C2. Process and Flow Comments

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# D. Data Structure

Text goes here

# D1. Explanation of Data Structure

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# E. Hash Table

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# F. Look-Up Function

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# G. Interface

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# G1. First Status Check

Text goes here

# G2. Second Status Check

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# G3. Third Status Check

Text goes here

# H. Screenshots of Code Execution

Screenshots (and possibly labels) go here

# I1. Strengths of Chosen Algorithm

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# I2. Verification of Algorithm

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# I3. Other possible Algorithms

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# I3A. Algorithm Differences

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# J. Different Approach

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# K1. Verification of Data Structure

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# K1A. Efficiency

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# K1B. Overhead

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# K1C. Implications

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# K2. Other Data Structures

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# K2a. Data Structure Differences

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# M. Professional Communication

Text goes here

# L. Sources - Works Cited

Text goes here

An example:

Lysecky, R., & Vahid, F. (2018, June). *C950: Data Structures and Algorithms II*. zyBooks.

Retrieved March 22, 2021, from <https://learn.zybooks.com/zybook/WGUC950AY20182019/>