

Programming Project I, First Report

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1 Abstract

Smartphone users launch many apps everyday, however one of the most fundamental things a smartphone does is abstracted away: memory management.

Although smartphones have advanced significantly in many ways compared to their first predecessors (RAM, architecture, processors), deactivation, or the process of “the operating system needing to choose and remove some apps from the memory”, a subproblem of **memory management**. is a solution that is often less-than-perfect. Although Java’s **Garbage Collection** and Swift’s **Automatic Reference Counting** (ARC) have sufficed, there are other methods.

In this project I propose to solve this problem using three techniques:

- Brute Force
- Dynamic Programming
- Greedy Solution

2 Introduction and Motivation

As stated previously, memory management is solved in a less-than-perfect manner. Although current technology suffices, we would like to compare algorithms to show the significant gains via three different approaches (Brute Force, Dynamics Programming, and Greedy).

3 Proposed Solution

For our project we decided to take a more **skeuomorphic** and object oriented approach, modeling objects after their real world counterparts, such as `Application` or `Smartphone`. As for the approaches, we have the following solutions:

3.1 Brute Force

For the brute force method, we knew that we have to check every possible subset (and for a set of size n)

```
knapsackBrute(items, knapsackSize)
    max = 0
    for i = 0 to  $2^n - 1$ 
        subset = binaryToInteger(i)
        sum = 0

        for i to subset.length
            sum = sum + item[i].benefit * subset[i]
            size = size + item[i].weight * subset[i]

        if size <= knapsackSize && sum > max
            max = sum
            greatestSubset = i

    subset = binaryToInteger(greatestSubset)
    for i = 0 to subset.size
        if subset[i] == 1
            optimalSolution.append(item[i])

    return optimalSolution
```

3.2 Dynamic Programming

3.3 Greedy Solution

4 Plan of Experiments

5 Team Roles

Illya Starikov Project Management, Development

Timothy Ott Development (Lead), Architecture

Claire Trebing Development, Quality Assurance, Documentation