

# Project Two: Testing Solution Quality

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## 1 Introduction

### 1.1 Purpose

The purpose of this project is to examine and measure the performance of different bin packing algorithms by experimentally determining the quality of solutions that the algorithms produce. This quality is determined by the waste  $W(A)$  of a bin-packing algorithm  $A$ , which is defined as the following:

*The number of bins used by algorithm  $A$  minus the total sum of all items in the given list.*

These will go over different algorithms to solve the bin-packing problem, using the observed waste for each algorithm to determine which is the most effective algorithm for this problem.

### 1.2 Experimental Setup

### 1.3 Outline

The paper will delve into the following algorithms:

1. Next Fit (NF)
2. First Fit (FF) and First Fit Decreasing (FFD)
3. Best Fit (BF) and Best Fit Decreasing (BFD)

The implementation and measure of performance of each algorithm will be done, with FF and BF having counterparts with modifications on the input to be compared to. Finally, the analysis will be done, with a verdict on which algorithm is the best for the bin-packing problem at the end.

## **2 Next Fit**

### **2.1 Implementation**

### **2.2 Performance**

### **2.3 Analysis**

## **3 First Fit and First Fit Decreasing**

### **3.1 Implementation**

### **3.2 Performance**

### **3.3 Analysis**

## **4 Best Fit and Best Fit Decreasing**

### **4.1 Implementation**

### **4.2 Performance**

### **4.3 Analysis**

## **5 Conclusion**