Pay In Coins Problem

# Overview:

The coin change problem is a fundamental problem in the field of computer science. While appearing simple on the surface, due to the potentially exceedingly large number of calculations needed, the problem can quickly become extremely computationally expensive for large inputs. The problem is defined by calculating an input value using the addition of a particular list of certain smaller numbers. For larger input values, the number of additions that must be performed by the program exponentially increases.

Many different approaches can be applied to solving this problem. For this project a recursive algorithm was used to generate the solutions to the inputs provided by the user.

# Algorithm Description

The program accepts inputs from a supplied text file; this file should always be named inputs.txt. The path to the file can be passed into the program through the command line as the first argument or if no arguments are provided, the user is prompted. The format for the inputs should list each input on a separate line where the first number on each line represents the value to be calculated and the subsequent two numbers represent the range of numbers in the addition.

Once input each problem is individually passed to the solver function to be processed. For this problem the array of input numbers are all prime numbers between 0 and the input value so an array of all possible primes in that range is calculated.

Once the prime array has been generated, a call to the recursive solver function is made. This function takes the input values and iterates through the prime array, creating a list of numbers, the value of each number added to the list is taken from the total value and the function is recursively called with the new inputs. If the total value of the numbers is equal to input, a count of answers is incremented.

Once all solutions to the input problems have been found, the number of solutions is appended to file named Output.txt located in the same directory as the executable file.

# Algorithm Pseudo-Code



# Result and Algorithm Analysis

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