



A
PROJECT
REPORT
ON
**ATM MACHINES USING GREEDY
ALGORITHMS TO DISPENSE CASH.**

Submitted in partial fulfillment of the requirement for the IV semester
of

**BACHELOR OF
TECHNOLOGY**

IN
DESIGN AND ANALYSIS OF ALGORITHM

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18CSC204J- Design and Analysis of Algorithms

Mini Project

Record Work

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Date:

Examiner-1

Examiner-2

CERTIFICATE

This is to certify that the project entitled “**ATM MACHINES USING GREEDY ALGORITHMS TO DISPENSE CASH.**” carried out by
under my supervision at Department of Computing and
Technology, SRM Institute of Technology,
Kattankulathur, Chennai.

The work is original, as it has not been submitted earlier
either in part or full for any purpose before.

Mrs. Anita R
(Asst. Professor)

DECLARATION

I, hereby declare that the work presented in this dissertation entitled “**FINDING SHORTEST PATH AND IT’S DISTANCE BETWEEN TWO LOCATIONS**” has been done by me and my team, and this dissertation embodies my own work.

Approved By:
Mrs. Anita R

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AIM : ATM Machines using Greedy Algorithms to dispense cash.

Description:

ATM Machine is something, everyone uses frequently, and very much needs a good algorithm, so that it dispenses cash with the most maximum efficiency, and the cash lasts for a longer time in the ATM Machine.

Hence, an algorithm is required in such machines, which dispenses the maximum amount with less number of notes.

This, problem statement is solved with Greedy Algorithm.

What is Greedy Algorithm?

A greedy algorithm is an approach for solving a problem by selecting the best option available at the moment. It doesn't worry whether the current best result will bring the overall optimal result.

The algorithm never reverses the earlier decision even if the choice is wrong. It works in a top-down approach.

This algorithm may not produce the best result for all the problems. It's because it always goes for the local best choice to produce the global best result.

Advantages of Greedy Algorithm:

- The algorithm is easier to describe.
- This algorithm can perform better than other algorithms (but, not in all cases).

Drawbacks of Greedy Algorithm :

- As mentioned earlier, the greedy algorithm doesn't always produce the optimal solution. This is the major disadvantage of the algorithm.

Time complexity of Greedy Algorithm: $O(n \log n)$

Algorithm for minimal coins/ notes with maximum amount:

- Create an empty solution-set = $\{ \}$. Available coins are $\{5, 2, 1\}$.
- We are supposed to find the sum = 18. Let's start with sum = 0.
- Always select the coin with the largest value (i.e. 5) until the sum > 18 . (When we select the largest value at each step, we hope to reach the destination faster. This concept is called greedy choice property.)
- In the first iteration, solution-set = $\{5\}$ and sum = 5.
- In the second iteration, solution-set = $\{5, 5\}$ and sum = 10.
- In the third iteration, solution-set = $\{5, 5, 5\}$ and sum = 15.
- In the fourth iteration, solution-set = $\{5, 5, 5, 2\}$ and sum = 17. (We cannot select 5 here because if we do so, sum = 20 which is greater than 18. So, we select the 2nd largest item which is 2.)
- Similarly, in the fifth iteration, select 1. Now sum = 18 and solution-set = $\{5, 5, 5, 2, 1\}$.

Code:

```
#include <bits/stdc++.h>
using namespace std;
int notes[] = { 1, 2, 5, 10, 20, 50, 100, 200, 500, 2000 };
int n = sizeof(notes) / sizeof(notes[0]);
void minchange(int sum){
    vector<int> coins;
    for (int i = n - 1; i >= 0; i--) {
        while (sum >= notes[i]) {
            sum -= notes[i];
            coins.push_back(notes[i]);
        }
    }
    for (int i = 0; i < coins.size(); i++)
        cout << coins[i] << "\t";
}
int main(){
    int n = 3253;
    cout << "The minimum number of coins/notes that sum up " << n << " is \t ";
    minchange(n);
    return 0;
}
```

Result: A simple code for ATM using Greedy Algorithm to find Minimum number of Coins.