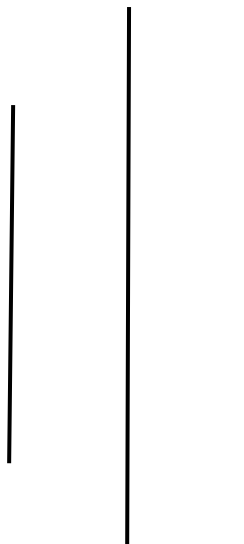


**NEPAL COLLEGE OF INFORMATION TECHNOLOGY
BALKUMARI, LALITPUR**



(Affiliated to Pokhara University)
Project Report on

Subject: Analysis and Design of Algorithm



Title:- Job Sequencing With Deadlines

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Year:- 2nd

Semester:- 4th

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Submission date:

2024/07/01

Abstract

This project report focuses on the Job Sequencing with Deadlines problem, a classic issue in scheduling and optimization. The goal is to schedule a set of jobs to maximize profit while ensuring each job is completed within its deadline. The problem assumes that each job takes exactly one unit of time to complete. A greedy algorithms used for solving the problem here.

Acknowledgement

I would like to express my special thanks of gratitude to Analysis and Design of Algorithm teacher Mr. Ashok Basnet sir for the guidance to prepare this project. His expertise, patience, and experience have been very much valuable to us. I am also thankful to do this wonderful project which helped me to do a lots of research within limited time.

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Introduction

Job sequencing with deadlines is a problem that involves scheduling a set of jobs to maximize profit while meeting to their respective deadlines. It is a classic problem in scheduling and optimization. This approach assumes that each job can be completed in exactly one unit of time.

Objectives

- To complete the given order of jobs within respective deadline.
- To maximize total profit by prioritizing higher profit jobs.
- To optimize resources

Literature Review

Minimizing the sum of the overheads of delayed jobs in a machine [1].It was solved by the single processor job sequencing with deadlines. They have used dynamic programming type algorithms to get best and optimal solutions[2] .

Dynamic Programming and it is a unique approach that always finds an optimal solution. By using this approach, a proper algorithm has been developed

in this paper. Besides, finding maximum profit and the sequence of the job to obtain maximum profit, this algorithm gives the sequence of jobs for a specific profit or near a specific profit.[3]

Methodology

1) Algorithm

- Step1 – Find the maximum deadline value from the input set of jobs.
- Step2 – Once, the deadline is decided, arrange the jobs in descending order of their profits.
- Step3 – Sort the jobs with highest profits, their time periods not exceeding the maximum deadline.
- Step4 – The selected set of jobs are the output.

2) Description

Job Sequencing with Deadlines is a problem to find the most optimal sequence of Jobs when executed in a single processor operating system, to obtain the maximum profit. Job Sequencing with Deadlines problem uses the greedy approach.

So we have to find the best method/option in the greedy method out of many present ways. In this method/ approach, we focus on the first stage, decide the output, and don't think about the future. Many optimization problems can be

determined using the greedy algorithm. Some issues have no efficient solution, but the greedy algorithm may provide a solution close to optimal.

3) Technology used

Code blocks:

It is an Integrated Development Environment (IDE) designed primarily for C, C++, and Fortran programming languages. It provides a user-friendly interface for writing, compiling, and debugging code.

Programming language:

C++ is a powerful general-purpose programming language. C++ supports OOP principles, allowing programmers to model real-world entities using classes and objects

Experiment and Result

Input data:

Jobs	J1	J2	J3	J4	J5	J6
Deadlines	5	3	3	2	4	2
Profits	200	180	190	300	120	100

Output data:

0	1	2	3	4	5
J2	J4	J3	J5	J1	

1. The optimal schedule is: J2 , J4 , J3 , J5 , J1
2. This is the required order in which the jobs must be completed in order to obtain the maximum profit.
3. Job J6 could not be completed within its deadline, hence optimal solution is obtained.

Time Complexity: $O(n^2)$,where n is the number of jobs. This complexity arises due to iterating through the jobs and checking available slots.

Space Complexity: $O(n)$,where n is the size of the array it is stored.

Conclusion

Job Sequencing with Deadlines is a problem to find the most optimal sequence of Jobs when executed in a single processor operating system, to obtain the maximum profit. There are many sequences of Jobs possible, since we need the most optimal sequence, hence it is a greedy problem. The greedy method involves sorting the jobs in decreasing order of their profit and then placing the jobs one by one in the free slot available just before the deadline to give the maximum profit.

In the job sequencing problem, only one processor is available for processing taking one unit of time to complete a job. In real life, job scheduling algorithms are widely used in the fields of optimal routing in networks.

References

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