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Maximum Profit Of Building Computers By Using Artificial Intelligence With The Scheduling Algorithm

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ABSTRACT. *The current age is characterized by the pursuit of speed. As a result, artificial intelligence is widely applied. If a company receives a large number of order requests, we can utilize algorithms to calculate the optimal completion of orders obtained the maximum profit.*
Keywords*: scheduling, artificial intelligence* (*AI*).

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I. Introduction

In the current digital age, the demand for custom-built computers has been on the rise, with customers seeking tailored solutions for their specific computing needs. However, building custom computers is a complex process that requires selecting the appropriate hardware components, configuring them to work together, and optimizing their performance. To achieve maximum profitability, computer building companies need to minimize the time and resources spent on each build, while still meeting customer demands. Therefore, analysing data on component availability, labour costs, and customer demand, scheduling algorithms can optimize the scheduling of computer builds, resulting in reduced costs and increased profitability through the Use of Artificial Intelligence (AI).

The primary objective of this paper is to establish the effectiveness of employing AI-based scheduling algorithms in computer building, with the ultimate goal of enhancing profitability. This will be achieved by optimizing resource allocation, reducing idle time, and minimizing operational costs. These papers ([1],[2],[3]) provided the methods to optimize profit through order acceptance. If a company receives a large number of order requests, we can utilize algorithms to calculate the optimal completion of orders obtained the maximum profit.

II. Research Method

We determine three sequences of orders for maximizing profits through the following steps.

Step 1: Create a directed graph $D_0=(V_0,E_0)$, where V_0 is the requested orders. The arc AB of the set E_0 if order A of the end date is earlier than order B of the starting date, there are no more orders that can be inserted between them. In the directed graph D_0, there is an arrow pointing from A to B.

Step 2: Calculate the values of (a, Z, c) of the vertices in D_0, where " c" is the number of days of the requested order. The number "a" represents the biggest profit and "Z" represents the previous order.

Step 3: Calculate the largest amount α and the sequence P_1 of orders in D_0 by Step 2.

Step 4: Get a new directed graph $D_1=(V_1,E_1)$ by removing the vertices of P_1 from D_0.

Step 5: Repeat Step 2 & Step 3 to calculate the total amount β and the sequence P_2 of orders.

Step 6: Get a new directed graph $D_2=(V_2,E_2)$ by removing the vertices of P_2 from D_1.

Step 7: Repeat Step 2 & Step 3 to calculate the total amount γ and the sequence P_3 of orders.

During the progression, it has been identified that the highest profit α, the second-highest profit β and the third-highest profit γ. If there are three factories producing computers, then we got the maximum profit $\Delta=\alpha+\beta+\gamma$.

III. Simulation Process

To illustrate the concept, Table 1 below provides an exemplary representation of orders within the context of computer building.

Table 1: The requested orders

Orders	Time spent	Producing dates
A	3	1/7~3/7
B	3	2/7~4/7
C	6	5/7~10/7
D	4	5/7~8/7
E	3	1/8~3/8
F	9	18/7~27/7
G	3	15/7~17/7
H	4	28/7~31/7
I	3	1/9~3/9
J	4	2/9~5/9
K	3	28/8~30/8
L	8	9/8~16/8
M	7	14/9~20/9
N	7	11/7~17/7
O	3	7/7~9/7
P	5	4/8~8/8
Q	4	20/9~23/9
R	4	19/8~22/8
S	5	6/7~10/7
T	5	7/9~11/9
U	3	15/8~17/8
V	3	24/8~26/8
W	10	21/9~30/9
X	3	29/7~31/7
Y	3	28/9~30/9
Z	8	18/9~25/9

We determine three sequences of orders for maximizing profits through the following steps.

Step 1: Create a directed graph $D_0=(V_0,E_0)$(see Figure 1).

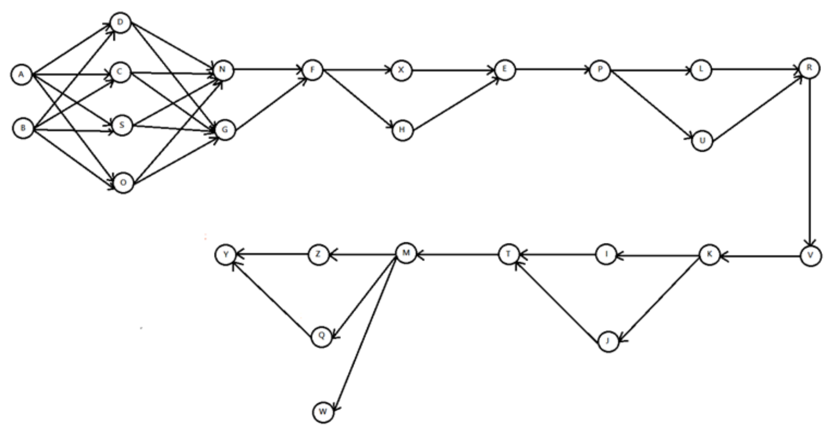

Figure 1. The directed graph $D_0=(V_0,E_0)$

Step 2: Calculate the values of (a, Z, c) of the vertices in D_0 (see Figure 2).

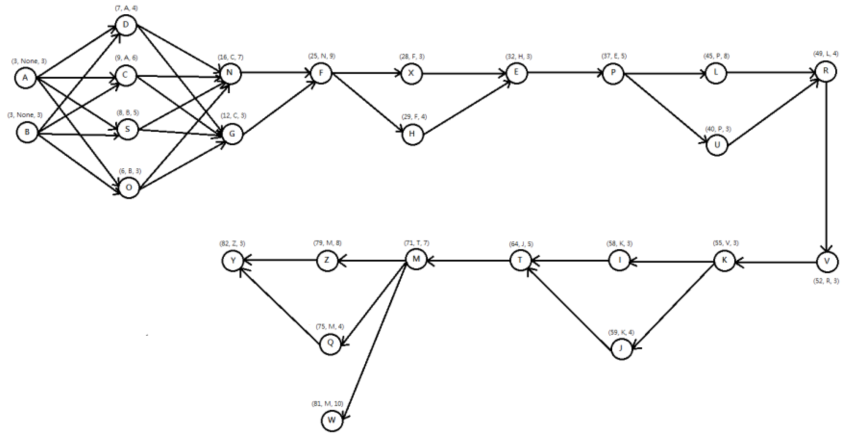

Figure 2. The values of (a, Z, c) of the vertices in D_0

Step 3: Calculate the largest amount α and the sequence P_1 of orders in D_0 by Step 2, where α=82 and P_1 : A,C,N,F,H,E,P,L,R,V.K,J,T,M,Z,Y.

Step 4: Get a new directed graph $D_1=(V_1,E_1)$ by removing the vertices of P_1 from D_0 (see Figure 3).

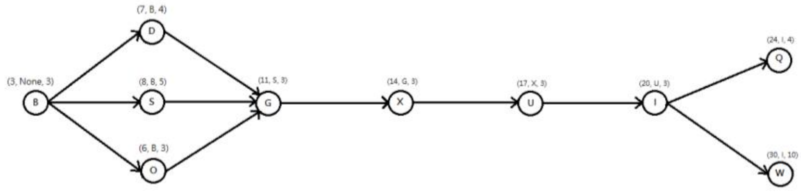

Figure 3. The directed graph $D_1=(V_1,E_1)$

Step 5: Repeat Step 2 & Step 3 to calculate the total amount β and the sequence P_2 of orders, where β=30 and P_2 : B,S,G,X,U,I,W.

Step 6: Get a new directed graph $D_2=(V_2,E_2)$ by removing the vertices of P_2 from D_1 (see Figure 4).

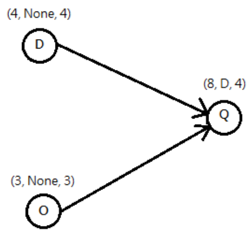

Figure 4. The directed graph $D_2=(V_2,E_2)$

Step 7: Repeat Step 2 & Step 3 to calculate the total amount γ and the sequence P_3 of orders, where γ=8 and P_3 : D,Q.

During the progression, it has been identified that the highest profit α, the second-highest profit β and the third-highest profit γ. If there are three factories producing computers, then we got the maximum profit Δ=α+β+γ=82+30+8=120.

IV. Conclusion

In situations where there is a high volume of orders, attempting to complete all of them becomes impractical, resulting in wastage of resources and time. Therefore, implementing an efficient scheduling system becomes essential to effectively prioritize and optimize operations. Scheduling enables the calculation of the maximum profit by strategically managing the allocation of resources and coordinating tasks. By prioritizing orders based on factors such as profitability, urgency, and resource availability, scheduling can ensure that the most profitable orders are given priority while considering operational constraints.Furthermore, when customers' orders entail more requirements, the task of calculating the maximum profit becomes more complex. However, with adequate time and diligent calculation, it is possible to determine the optimal sequencing and allocation of resources to maximize profitability for the company. The additional effort and calculation required for orders with greater complexity can be justified by the potential increase in profitability and customer satisfaction.

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