Interpolation Heuristic Model Regarding Extrapolation

Ashok Kumar Arya
Ph.D (Mathematics)
J. P. University, Chapra (Bihar)

I. Introduction

The classical deterministic inventory model is considered for the case of constants time between each replenishment and linear trend in demand. The optimum policy is derived and shown to apply to both positive and negative trends. Progress has recently been made with no-shortages inventory policy for the case of al in ear trend in demand over a finite time horizon.

The present investigation first introduces the extrapolation heuristic with respect to two groups, generalize it, to three or more groups, formalize the computational steps and then discuss the convergence of the procedure.

II. Objectives

The present investigation would be revealed with the interpolation.

III. Methods, Results and Discussions

The interpolation heuristic works well if only two groups are desired with more than two groups, convergence of the procedure will be slow.

The present investigation defines B_m **as** the highest valued index in the set S_m or the upper boundary of S_m, when sets Sm-1 and S_m are optimal. Note that B_o always equals 0, and B_1 is varied (B_1= 2, 3,... etc) t o generate several solutions for B_2, Bs ...Bm .

Therefore, the condition for S_2 t o be optimal t o S_1= l, ..., j can be written **as**

$$T_{j+1.\,B_2} \quad \frac{t_j^2 - T_{kj} \quad a_j \,/\, F(j.\,B_2)}{T_j - a_j \,/\, F(j - B_2)}$$

By

If the items are ranked i $T_{j+1.\,B_2} \frac{t_j^2}{T_{1j}}$ ıg order of b, D_i/ a_i, then the optimality condition can be written as ;

$$T B_{k+1},\ B_{k+1} \quad \frac{t_{Bk}^2}{T B_{k-1} + 1.\,Bk} \quad T_{Bk} \ + 1,\ B_{k+1} - 1 \qquad (1)$$

If only two groups are to be created, then (1) can be written as:

$$T_{B_1} + 1,\ B_2 \ \frac{t_{B_1}}{T_1 - B_1} \ T_{B_1} + 1,\ B_2 - 1 \qquad (2)$$

If N items are to be divided in to two groups, then for values of B_1 = 1, 2 ... etc., we compute the values o f B_2 using (2) till the condition.

$$T_{B_1} \ +1.\,N \ \frac{t_{B_1}^2}{T_1.\,B_1} \ T_{B_1} + 1.\,N - 1 \qquad (\text{Note} : B_2 \ - N)$$

Is satisfied,

To create three groups from N items, a set of the following two inequalities similar to (2) will be used:

$$T_{B_1} + 1 \cdot B_2 \frac{t^2_{B_1}}{T_1 \cdot B_1} T_{B_1} + 1 \cdot B_2 - 1 \quad (3)$$

and, $$T_{B_2} + 1 \cdot B_3 \frac{t^2_{B_2}}{T_{B_1+1} B_2} T_{B_2} + 1 \cdot B_3 - 1 \quad (4)$$

For values of $B_1= 1 , 2$ ... etc. B_2 is computed using (3) which is then used in (4) to compute B_3, B_1 is incremented till $B_3 = N$. For creation of m groups, we shall have m-1 inequalities, which will be used to compute B_2 to B_m (for some value of B_1).

Again, B_1 is incremented in units of one, and when $Bm=N$, the optimum groups are established.

In the context of implementation, it may not always be possible to find B_m value, consistent with B_1 to B_{m-1} , which equals N. That is we may have a situation where B_m N for $B_1=J$ and B_m N for $B_1 =J+ 1$. In such a case we fix $B_1=J$ and create m—1 groups from the items $J=$ l to N. The above procedure can be generalized by sequentially fixing B_2, B_3 etc. It is easy to see that the way the extrapolation heuristic is designed; it will never fail to converge. The number of interative steps equals the number of cases required to be tested to ensure that $B_m =N$. This equals the cumulative number of unit increments in B_1 to B_{m-1} required for B_m to equal N. In the worst case, when $Br=B_{-1}+ 1\ 1$, $r=2 - m$ we shall required $N —_{m+1}$ com putational steps to divide N items in to m groups.

REFERENCES:

[1] Cheng, T.C.E. (1989): Optimal production policy for decaying items with decreasing demand. Eur. J. Opl. Res. 43, p. 69-173.

[2] Gurhani, C. (1993): Economic analysis of inventory systems Int. J., Prod. Res. 21, p. 261-277.

[3] Max, A. C, and D. Cardea (1984): Production and Inventory Management, Prentice-Hall, Englewood Cliffs.

[4] Ritcher, E. (1994): The EOQ for linear increasing demand-a simple optimal solution. J. Opl. Res. Soc. 35, p. 942-952.

[5] Tersime, R. J, and Toelle (1985): Lot-size determination with quantity discounts. Prod. Invest, Mgnt. 26,p. 1-23.