TRANSPORTATION PROBLEM -
AN ALGEBRAIC APPROACH VIA
MATRICES

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The raw data obtained from the Transport Corporations are transformed into time-dependent matrices. We form the time dependent matrix where the different time periods are taken as rows and the variables considered for the analysis represent the columns. The entries corresponding to the intersection of each row and column are obtained from the raw values which are collected from a real route network model. Thus, we formulate a $7 \times 4$ matrix and call this matrix as the Average Time-dependent Data matrix (ATD matrix). Here, we wish to mention that we are the first one to formulate the data into such a matrix.

We use the simple average method to convert the above ATD matrix into a matrix with entries $e_{ij} \in \{1, 0, 1\}$ where $i$ represents the $i^{th}$ row and $j$ represents the $j^{th}$ column.
We call this newly formed matrix as the Refined Time-dependent Data matrix (RTD matrix). The main purpose of introducing the RTD matrix is only to minimize the time involved in performing the simple arithmetic calculations. The RTD matrix is obtained arbitrarily from the raw data for an interval of our own choice. The value of the entry $e_{ij}$ corresponding to each intersection is determined from the interval and this interval is obtained strictly by using the average and the standard deviation calculated from the real raw data. The choice of the interval selected by us may not be the best solution in determining the maximum benefit for the transportation sector, hence, we introduce and define a parameter $\alpha$ which enables us to get the best solution.

Finally, we bring in the notion of the Combined effect time-dependent data matrix (CETD matrix) which gives the Combined effect of all the matrices obtained by varying the parameter $\alpha$. The CETD matrix plays a vital role by identifying the maximum utilization of the time period of the day and in predicting the overall utility of the routes.