⇒ Traffic flow balance at Road junction

let,

n_1 = traffic flow entering from North
n_2 = traffic flow from South
n_3 = traffic flow from East
n_4 = traffic flow from West

Assume,

At the junction;
• 40% vehicles go straight
• 30% turn left
• 20% turn right
• 10% take U-turn

∴ the interaction distribution matrix becomes:

$$A = \begin{bmatrix} 0.3 & 0.2 & 0.1 & 0.4 \\ 0.2 & 0.3 & 0.4 & 0.1 \\ 0.1 & 0.4 & 0.2 & 0.3 \\ 0.4 & 0.1 & 0.3 & 0.2 \end{bmatrix}$$

a_{ij} = fraction of vehicles from road j moving towards road i.

→ Measured outgoing Traffic:

$$B = \begin{bmatrix} 180 \\ 160 \\ 150 \\ 170 \end{bmatrix}$$

→ Conservation of Vehicles
Total inflow = Total outflow

So,

$$AX = B$$

$$X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$$

→ Matrix Equation

$$\begin{bmatrix} 0.3 & 0.2 & 0.1 & 0.4 \\ 0.2 & 0.3 & 0.4 & 0.1 \\ 0.1 & 0.4 & 0.2 & 0.3 \\ 0.4 & 0.1 & 0.3 & 0.2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 180 \\ 160 \\ 150 \\ 170 \end{bmatrix}$$

→ Linear Equations:-

$$0.3x_1 + 0.2x_2 + 0.1x_3 + 0.4x_4 = 180$$
$$0.2x_1 + 0.3x_2 + 0.4x_3 + 0.1x_4 = 160$$
$$0.1x_1 + 0.4x_2 + 0.2x_3 + 0.3x_4 = 150$$
$$0.4x_1 + 0.1x_2 + 0.3x_3 + 0.2x_4 = 170$$