

Set - 6: Modelling traffic flow data with a bimodal function

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In this lab, we modeled the traffic flow using the bimodal function. We also modelled the direction of the traffic flow for better conclusions.

I. BIMODALITY IN TRAFFIC FLOWS

A. Model

The model function is given by

$$N(t) = A(\mu + t^2) \exp[-(\lambda t - \beta)^2] \quad (1)$$

the time t , at which the traffic volume $N(t)$.

B. Results

Fig. 1 shows the bimodal distribution of the traffic flow due west, plotting the traffic volume, N , at time, t (hours).

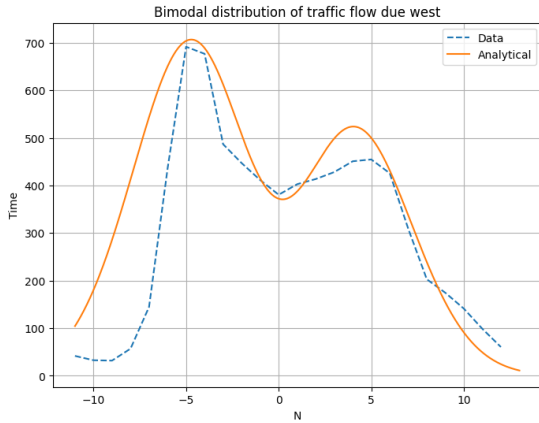


FIG. 1: Here $A=44.0$, $\mu = 8.53$, $\lambda = 0.19$, $\beta = -0.09$ and $\Delta t = 0.01$.

Fig. 2 shows Bimodal distribution of traffic flow due east, plotting traffic volume, N , at time, t (hours).

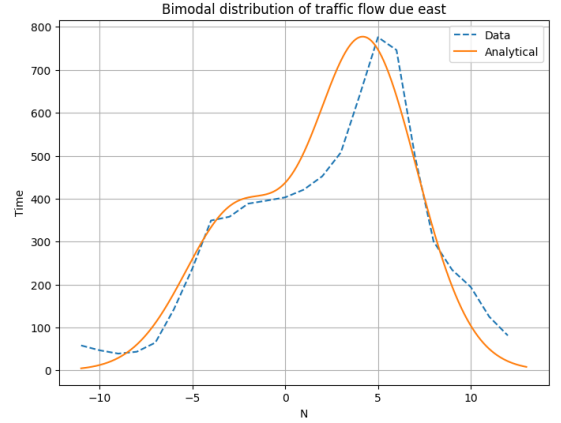


FIG. 2: Here $A=44.1$, $\mu = 10.5$, $\lambda = 0.22$, $\beta = 0.24$ and $\Delta t = 0.01$.

C. Statistical analysis of traffic flow

Zone	Mean	Standard deviation
West	-0.0856	0.5395
East	0.7234	2.3252

D. Salient Features:

1. Before noon, the traffic flow is greater towards the west. Afternoon, the traffic flow is more towards the east. This suggests that residential area is located in the eastern part of the city where as the western region contain more number of work places.
2. The two peaks have the different heights in the graph. Such behaviour is due to broken symmetry about $t=0$. The position of the peaks are also exchanged due to difference in amount of traffic at different time of the day.
3. The introduction of parameters such as μ and β allows for the investigation of symmetry breaking

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and illustrate how changing these parameters influences the system's behavior.

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- [1] Arjun Mullick and Arnab K Ray, '*Nonlinear dynamics of bimodality in vehicular traffic*'.