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

Natansh Shah (202201445)[*] and Tirth Modi (202201513)[†]
Dhirubhai Ambani Institute of Information & Communication Technology,
Gandhinagar, Gujarat 382007, India
CS302, Modelling and Simulation

This study aimed to perform data analysis on Bimodal traffic flows due west and due east during a period of one day and draw conclusions on them.

I. BIMODALITY IN TRAFFIC FLOWS

A. Model

The model function is given by,

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

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

B. Results

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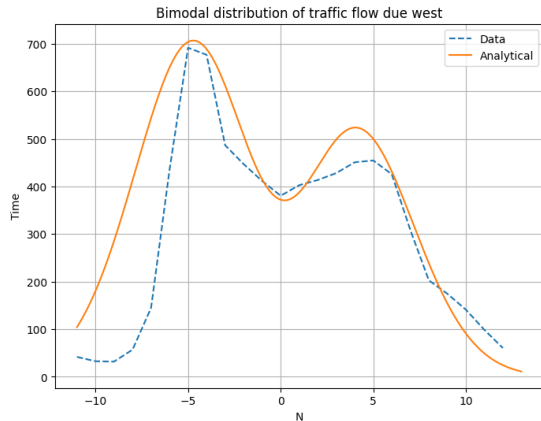

FIG. 1: Here A=44.0 , $\mu = 8.53$, $\lambda = 0.19$, $\beta = -0.09$ and $\Delta t = 0.01$.

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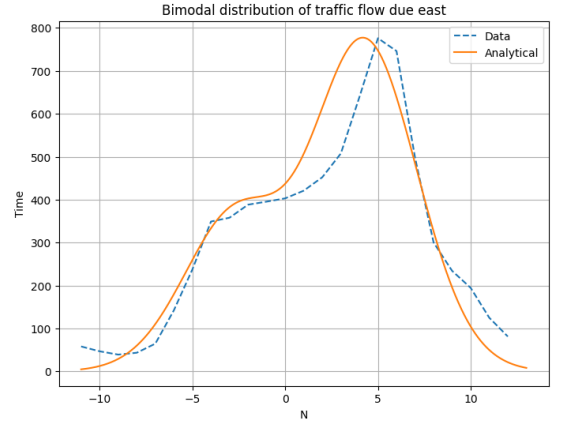

FIG. 2: Here A=44.1 , $\mu = 10.5$, $\lambda = 0.22$, $\beta = 0.24$ and $\Delta t = 0.01$.

C. Statistical analysis of traffic flow

Zone	Mean	Standard deviation
West	-0.0856	0.5395
East	0.7234	2.3252

D. Conclusions

⇒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.

⇒ 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.

⇒The introduction of parameters such as μ and β

_____

*Electronic address: 202201445@daiict.ac.in
†Electronic address: 202201513@daiict.ac.in

allows for the investigation of symmetry breaking and illustrate how changing these parameters influences the system's behavior.

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