International Journal of Advanced Research in Engineering Technology & Science

ISSN: 2349-2819

Email: editor@ijarets.org Volume-9, Issue-6 June – 2022 www.ijarets.org

An application of queuing theory to the management of the transportation system

Nishant Kumar Sinha

M.Phil, Roll No: 141405

Session: 2014-15

University Department of Mathematics

B.R.A Bihar University, Muzzaffarpur

Abstract

The issues of traffic management are the course of expanded aggravation in the development of traffic. In India the traffic congestion is quickly expanded because of expanding vehicles out and about which produces numerous issues. In the ongoing paper more has been audit about the queuing theory and its significant applications. This paper examines the significance of queuing theory in the field of traffic management system for this Bhopal, Indore, Ujjain city which were situated in the India is picked. This paper surveys the scope of queuing theory brings about the area of waiting time, use examination and design of system the traffic swarm follows a repeatable example during the day and the legitimate individuals acknowledges it as a day to day daily practice.

Keywords: Waiting time, System design, Repeatable, Congestion, Queuing theory, Traffic Management

Introduction

Because of persistent ascending of vehicles recently applying methods in the creation system of those vehicles, likewise expanded adaptability of working individuals and so on the transportation request expanded consistently

and in second case the stock which implies for transportation system including like street. Any vehicle system of public. They don't pursue this direction with time which shapes increasingly more traffic on the streets brings about the expanded in congestion because of congestion the voyaging time increment, diminishes the stream. Boost the fuel utilization which show adverse consequence on the climate which emerges the issues of traffic congestion. It is what is going on street network which more slow speed. Longer outing time and rises the Vehicular queuing to beat this traffic management issue the queuing theory alongside its applications are utilized. It is a numerical method which decreases waiting time of specific queuing theory have been reads up for this traffic administration which was useful for overseeing traffic stream system.

Traffic congestion happens in occupied and populated regions. It tends to be extremely disappointing a direct result of the postpone it causes on vehicular development for suburbanites and thing conveyance. It is periodical and has a few causative elements relying upon the area. The reasons for congestion incorporate absence of inner course extension, terrible streets and numerous vehicles on the way, unfortunate pressing by business vehicles and such. Traffic congestion is normal in Lagos since it is vigorously populated with a little expanse of land. Mala et al (2016) depicts traffic congestion as a circumstance on street network which happens as its utilization increments. It is described by more slow paces, expanded trip times and queuing of vehicles. It is consequently important to apply the rule of queuing theory to streamline the waiting time in queuing system as knowledgeable about traffic congestion.

The impact of traffic congestion incorporates workers' disappointment, vehicle crash and fuel wastage. Traffic congestion likewise has overflow impact from clogged fundamental courses to optional streets and side-roads as elective courses are looked for. Such overflow impact brings about defers which thusly prompts late appearances for gatherings and business exercises in the region. Mala et al (2016), declare that traffic congestion happens when a mass of traffic requires space more prominent than the accessible street limit.

Queuing Theory

Queuing theory was created to give models fit for anticipating the way of behaving of systems that offer support for haphazardly emerging requests. Queuing theory manages the investigation of lines (waiting lines). The earliest utilization of queuing theory was in the design of a phone system; haphazardly emerging calls would show up and should be dealt with by the switchboard, which had a limited greatest limit.

Generally queuing theory works in three steps which include

1. **Statistical Interference:**

In this step, the numerical models are utilized for settling the information which was helpful for taking care of the issues of traffic management system in light of Queuing theory and give the legitimization of queuing system.

2. **The Inectia of System:**

Specifically, the likelihood of routineness of nature of the waiting time of client, purchasing period dissemination consistent state under measurable balance and second is the prompt state.

3. **The System Optimization Problems:**

Its motivation is to make all system produce best outcome two groups containing the system design advancement and the system control improvement. The previous is known as static enhancement issue which have mean to cause the system to accomplish greatest advantage or under a recently system applied as called dynamic streamlining issue.

Characteristics of Queuing System

In designing a decent queuing system, having a decent data about the model is fundamental. The trademark recorded underneath would give adequate data

1. **Arrival Pattern:**

This is how appearances happen, arraigned by the between appearance time between any two back-to-back appearances. For our stochastic demonstrating system, the between appearance time might shift and might be depicted by a particular likelihood circulation that best portrays the appearance design noticed.

2. **Service Pattern:**

This is how the help is delivered and is determined when taken to finish an assistance. Like the appearance design, conveyance of the help time should be indicated under stochastic displaying contemplations.

3. **Number of Servers:**

The number of servers that are being use ought to be determined and in the way. They fill in as an equal server or a series server must be determined.

Some adverse effect of traffic congestion:

- Because of traffic congestion, there was a lot of wastage of time of drivers and travelers who hindered in traffic which straightforwardly impacted on monetary soundness of the countries.

- It additionally builds the wastage of fuel which expands the air contamination and carbon dioxide emanation.
- As a result of traffic congestion, the crisis vehicle might defer in coming to their objective where they are desperately reached.
- What's more, in view of postpones they were late appearance their work gatherings and training which brings about loss of business disciplinary activities and other individual misfortunes.

Conclusion

The queuing theory is a successful numerical strategy for tackling different traffic issues of any system as queuing theory zeroed in on portrayal of traffic circumstance by utilizing different numerical terms and equations its application covers an extensive variety of current circumstance including the traffic congestion. City arranging and metropolitan design practices can enormously affect level of future traffic congestion. The current work depends on the genuine overview of traffic stream at different times at various areas of Bhopal, Ujjain and Indore city. The use of the queuing theory is taken advantage of limited the traffic congestion at a specific time.

Reference

1. Webster, F.V. and Cobbe, B.M. –Traffic Signals. Road Research Laboratory Technical Paper nO. 56, 1966, HMSO.
2. Rathi, A.K.- "A Control Scheme for High Density Traffic Sectors". Transportation Research B, 22 B (2), 1988.
3. Pignataro, L.J. McShane, W.R. Crowley, K.W. et al – "Traffic Control in Oversaturated Street Networks" National Cooperative Highway Research Program Report 194. Washington DC: TRB. 1978.
4. May, A.D.-"Queue Management Project: strategies for the management of queues at upstream junctions" WP346 Institute for Transport Studies, University of Leeds, 1991.
5. Mauro, V. and Di Toaranto, C. (1989) UTOPIA-CCCT 89 –AFCET Proceedings September 1989-Paris France.
6. Longley, D.-"A Control Strategy for Congested Computer Controlled Traffic Network", Transportation Research. Vol.2, 1968.
7. Henry, J.J. (1989) PRODYN Tests and Future Experiments on ZELT. VNIS 89: Vehicle Navigation and Information Systems, IEEE Conference, Toronto, September 11-13, 1989.
8. Gordon, R.L. "A Technique for Control of Traffic at Critical Intersections", Transportation Science Vol 4, 1969.

9. Foraste and Scemama – INRETS (1987) " An Expert System Approach to Congestion".
10. Bretherton, R.D. (1989) SCOOT Urban Traffic Control System – Philosophy and Evaluation. IFAC Symposium on Control. Communications in Transportation. September 1989.
11. Mala, S.P and Varma (2016). Minimization of traffic congestion by using queuing theory, Muzaffarpur India.
12. Martin Anokye, Abdul-Aziz, A. R. and kwame Anin (2013). Application of queuing theory to vehicular traffic signalized intersection in Kumasi –Ashati region Ghana.
13. Qingyu, L., Zhicai, J., Baofeng, S., and Hongfei J. (2007). Method research on measuring the external costs of urban traffic congestion. Journal of Transportation Systems Engineering and Information Technology.
14. Tom Van Woensel, Nicole V and Aviel V (2000). A queuing-based traffic flow model, transport research D: Transport and environment Antwerp, Belgium.
15. Strasbourg, F., Laurent, D. and Anthony, Z. (2008). Road traffic congestion and public information. Journal of Transport Economics and Policy.
16. Jayaram K.S, Lincoln, W. (2007). The relative impact of consignee behavior and road traffic congestion on distribution costs. Transportation Research Part B: Methodological.
17. Chao, W, Mohammed, A.Q and Stephen, G. I. (2009). Impact of traffic congestion on road safety: A spatial analysis of the M25 Motorway in England. Accident analysis and prevention.
18. Glen, W., Don V., George T. (2003). Measuring economic costs of urban traffic congestion to business. Transportation Research Record, volume.
19. Intikhab, Q.A., Huapu, L. and Shi Y. (2008). Urban transportation and equity: A case study of Beijing and Karachi in Transportation Research Part A: Policy and Practice.
20. Lartey, Jojo Desmond (2014). Scientific research publication on predicting traffic congestion: A queuing perspective. Department of information technology, University college of Ghana.