IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 7, April 2024

Traffic Flow Optimization for Metropolitan Cities

Mohammed Amarnath[1], Muzammil Baloch[1], Maanav Gupta[1], Sahil Chaudhari[1], Dr. Irfan Landge[2]
Student, Department of Information Technology Engineering[1]
Associate Professor, Department of Information Technology Engineering[2]
M. H. Saboo Siddik College of Engineering, Mumbai, Maharashtra, India

Abstract: *This research paper presents the design and implementation of an adaptive traffic signal timer system that utilizes real-time traffic density calculation and an intelligent signal switching algorithm to optimize traffic flow at intersections. The proposed system leverages computer vision techniques like object detection to count and classify vehicles, and then dynamically adjusts the green signal durations based on the detected traffic density. A simulation module is also developed to visualize the system's performance and compare it to a static traffic signal implementation. The results demonstrate the effectiveness of the adaptive approach in reducing vehicle waiting times and improving overall intersection throughput.*

Keywords: Adaptive Traffic Signal, Computer Vision, Traffic Optimization, Simulation

REFERENCES

[1]. D. Gettman et al., "Data-Driven Algorithms for Real-Time Adaptive Tuning of Offsets in Coordinated Traffic Signal Systems," Transp. Res. Rec., vol. 2035, no. 1, pp. 1–9, 2007, doi: 10.3141/2035-01.
[2]. Mateen, S. Sher, M. Hanif, and T. Akhtar, "Autonomous Controllers for Urban Traffic Management," J. Traffic Logist. Eng., vol. 7, no. 2, pp. 47–52, 2019, doi: 10.18178/jtle.7.2.47-52.
[3]. K. A. Yousef, J. N. Al-Karaki, and A. Shatnawi, "Intelligent Traffic Light Flow Control System Using Wireless Sensors Networks," J. Inf. Sci. Eng., vol. 26, no. 3, pp. 753–768, 2010.
[4]. A. Hawbani et al., "Fuzzy-Based Distributed Protocol for Vehicle-to-Vehicle Communication," IEEE Trans. Fuzzy Syst., vol. 29, no. 3, pp. 612–626, Mar. 2021, doi: 10.1109/TFUZZ.2019.2957254.
[5]. D. Gettman et al., "Data-Driven Algorithms for Real-Time Adaptive Tuning of Offsets in Coordinated Traffic Signal Systems," Transp. Res. Rec., vol. 2035, no. 1, pp. 1–9, 2007, doi: 10.3141/2035-01.
[6]. H. X. Liu, J.-S. Oh, and W. Recker, "Adaptive Signal Control System with On-line Performance Measure for Single Intersection," Inst. Transp. Stud. UC Berkeley, Inst. Transp. Stud. Res. Reports, Work. Pap. Proc., vol. 1811, p. 10.3141/1811-16, 2002.
[7]. J. Redmon, S. Divvala, R. Girshick, and A. Farhadi, "You Only Look Once: Unified, Real-Time Object Detection," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., 2016, pp. 779–788, doi: 10.1109/CVPR.2016.91.
[8]. S. Ren, K. He, R. Girshick, and J. Sun, "Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks," IEEE Trans. Pattern Anal. Mach. Intell., vol. 39, no. 6, pp. 1137–1149, Jun. 2017, doi: 10.1109/TPAMI.2016.2577031.
[9]. Q. Guo, L. Li, and X. J. Ban, "Urban traffic signal control with connected and automated vehicles: A survey," Transp. Res. Part C Emerg. Technol., vol. 101, pp. 313–334, Apr. 2019, doi: 10.1016/j.trc.2019.01.026.