Optimal Traffic Control: Urban Intersections
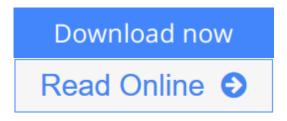
By Slobodan Guberinic, Gordana Senborn, Bratislav Lazic

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Despite traffic circles, four-way stop signs, lights regulated by timers or sensors, and other methods, the management of urban intersections remains problematic. Consider that transportation systems have all the features of so-called complex systems: the great number of state and control variables, the presence of uncertainty and indeterminism, the complex interactions between subsystems, the necessity to optimize several optimization criteria, and active behavior of the controlled process, to name just a few. Therefore, a mathematical approach to these systems can resolve their complex issues more elegantly than other methods.

Addressing both efficiency and traffic safety issues, Optimal Traffic Control: Urban Intersections examines the traffic control optimization problem and presents a novel solution method. Using an approach based on control theory, graph theory, and combinatorial optimization, the authors derive a full mathematical description of the traffic control problem and enumerate all combinatorial aspects. The result is a set of algorithmic solutions to various problems along with computer implementation that you can incorporate into real traffic control systems for immediate results. The book concludes by evaluating how the choice of a complete set of signal groups influences intersection performance.

Although modern cities throughout the world have a unique character influenced by culture, geography, and population, most of them share one main feature: busy intersections and the issue of controlling the traffic traveling through them. The development of information technologies, especially computer and telecommunications techniques, has changed the complexity of the problem and influenced the development of new solutions. Clearly stating the issues and presenting a possible solution, this book shows you how to take full advantage of all the capabilities of microprocessor-based traffic signal controllers.

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