

Preface

Advances in mobility are most clearly illustrated by the spread of motorized traffic and transport, the development of the transportation industry, including vehicle manufacturing and its associated infrastructure. These developments represent one of the main challenges for information science and intelligent technology. The discipline of Intelligent Transportation System (ITS) is widely applied to solve transportation problems including congestion, accidents and pollution emissions.

Since our daily life and work are closely related to traffic and mobility, traffic demand has increased dramatically. Following this increase, we additionally have to balance the increasing desire for mobility and efficiency with the societal concerns about traffic problems. Today's traffic demand is predominantly served by individual motorized vehicles, which are the primary means of transportation. As the traffic demand has continuously grown faster than the construction of infrastructure over the last decades, traffic congestion has become a severe problem in many countries. Meanwhile, as vehicle speed is increasing, traffic safety has also become an important and socially relevant topic, which has impact on social and economic developments. Additionally, the environmental impact and energy consumption caused by traffic systems also arouse great public concern.

The engineers and scientists in different areas are seeking solutions as to how the traffic system could be used more efficiently and how operations could be improved by using new technologies and new methodologies. Recently, computational intelligence methods have received considerable attention regarding their potential as a powerful technique for traffic and mobility problems. Computational Intelligence (CI) is the study of adaptive mechanisms enabling or facilitating intelligent behaviour in complex and changing environments. As such, CI combines artificial neural networks, evolutionary computing, swarm intelligence and fuzzy systems. The characteristic of 'intelligence' is usually attributed to

humans. The concept of intelligence is directly linked to reasoning and decision-making. Nowadays, CI is widely used to develop models, algorithms and approaches for traffic and mobility operations.

This book includes the 15 final revised and extended chapters from 28 proposed chapters. Aiming at summarizing the state-of-the-art of CI in the context of modern traffic systems and the debate on the traffic problems, this book intends to introduce and discuss the developments and applications of CI in traffic and mobility from the perspective of intelligent transportation systems. The book provides the methods of CI in a manner which allows the reader to easily implement the different methodologies, and to apply these methods to solve traffic problems such as traffic congestion, traffic accident and traffic environment pollution. In the whole book, the basic concept and methodology involved with CI as well as their application in traffic and mobility are introduced by a careful and considered approach. This book is appropriate for both the first-time reader, as well as individuals already active in all embracing fields of transportation engineering, computational intelligence and intelligent transportation system.

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