This Issue 4 of Volume 2 comprises seven papers focusing on the issues of driving behavior and traffic flow in Asia. The first two papers examine the issues of traffic accidents: one looks at the influence of individual attributes of drivers, especially those younger and older drivers (Park et al.), and the other investigates the influence of road surface conditions on driving behavior (Ranjitkar and Nakatsuji). The third and fourth papers investigate the issues of driving speed: the former emphasizing the effects of vehicle attributes (Saifizul et al.) and the latter analyzing the characteristics of free-flow speed (Tseng et al.), while the fifth paper (Narupiti et al.) estimates travel time based on driving speed. The sixth paper (Lin et al.) explores the ability to simulate traffic situation using the refined cellular automaton modeling in both pure and mixed traffic situations. The last paper (Tsukai et al.) explores the effects of different toll discounting policies on traffic flows, which are decomposed into independent components. Each of the components captures different temporal characteristics of traffic flows. Contents and findings of these studies as well as future challenges are summarized below.

1. DRIVING BEHAVIOR AND TRAFFIC ACCIDENTS

Focusing on traffic accidents on expressways in Korea, Park et al. confirmed that segmenting traffic accidents based on drivers’ age can properly capture the characteristics of traffic accidents, and concluded, based on an ordered probit model, that younger drivers’ intentional violations increased injury severity and less physical capability of reaction and drowsiness were critical factors in case of older drivers. In fact, more influential factors are identified, but quite different across age groups. It seems important how to encourage drivers to enjoy safer driving by properly reflecting their heterogeneous driving propensities. From a different angle, Ranjitkar and Nakatsuji investigated three major human factors that affect the occurrence of traffic accidents, namely, perception response time, sensitivity factor, and stability factor. The three factors are directly linked with drivers’ acceleration/deceleration behaviors under different road surface conditions. Car-following experiments were conducted on a test track using Real Time Kinematic GPS receivers in winter and summer seasons. It is concluded that icy and slippery road conditions in winter significantly influence driving behavior. The response time was higher in icy conditions than in other conditions while the sensitivity factor was not influential. In this study, the importance of heterogeneity is re-confirmed in capturing the features of these three human factors.

2. DRIVING SPEED ANALYSIS

Understanding driving speed is essential for traffic engineering studies. Three studies were
3. TRAFFIC FLOW MODELING

Capturing the spatiotemporal dynamics of traffic flow is essential to make decisions on traffic control and management measures. For this purpose, cellular automaton (CA) is a promising approach, but the challenge is how to properly reflect actual traffic situations. In line with this consideration, Lin et al. explored traffic patterns and the associated phase transitions for both pure and mixed traffic in the context of multilane roadways based on an improved CA simulation model. Two new methods of extracting local traffic parameters, i.e., Arithmetic Average (AA) and Unweighted Moving Average (UMA), are proposed. It is revealed that complicated phase transitions can be better captured using the UMA method and the global traffic features can be properly reflected using the AA method. Based on the analysis, minimum time interval for measuring either AA or UMA traffic data is also recommended. Since traffic flow is usually influenced by various factors, which further across space and over time and sometimes vary from context to context. Tsukai et al. applied an Independent Component Analysis (ICA) approach in order to evaluate the influence of toll policies on daily traffic on expressways in Japan. By using the ICA approach, continuously observed traffic time series data are decomposed into independent series, with different traffic patterns, that implicitly reflect the influence of different types of factors.

In conclusion, common challenges observed from the above studies are, 1) how to represent drivers’ behavioral heterogeneity, 2) how to properly describe the mixed traffic situations, which are especially important in the Asian context, and 3) how to effectively capture the spatiotemporal dynamics of traffic flow. More efforts should be made to creatively resolve these important issues by integrating more operational scientific tools and practical wisdoms.