Simulations means 'smarter traffic decisions'

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Kyoto University and IBM's Tokyo Research Laboratory have developed a system that can simulate urban transport situations encompassing millions of individual vehicles in complex traffic interactions. A simulation can predict, for example, what will happen if a new office building, sports arena or other major facility is built and lead to improved planning of roads and public transportation.

Although similar agent-based systems have been developed for simulations, this is the first traffic simulation system of its kind. It will address the booming congestion problem by driving transport measures, such as changing mass-transit to provide more trains or buses, optimizing traffic lights route planning to reduce jams, and other long-term solutions for the entire Kyoto metropolitan area.

The system simulates large-scale traffic situations involving millions of vehicles and shows the impact change will have. For example, the simulator can validate what kind of effect a new shopping mall opening or a traffic regulation will have on wide-area traffic. The system provides current status of traffic and the alignment of roads to drivers, including current speed and positions of vehicles, the distance between cars, the curvature and gradient of road on which the specific vehicle is running. City planners can use this data to model how each driver will react. In addition, by adding a variety of attributes to the model, the system can simulate traffic conditions with an eye to reducing carbon dioxide and potential accidents.

Led by Kyoto University and IBM's Tokyo Research Laboratory --with

support from the Ministry of Internal Affairs and Communications' Strategic Information and Communications R&D Promotion Programme, the joint research is intended to simulate transport on a large scale using drivers with a variety of driving characteristics and human intentions. The Ishida & Matsubara Research Lab at the Kyoto University Graduate School of Informatics created a system which models a variety of drivers, including seniors and young drivers.

"Imagine having the ability to ease congestion while curtailing pollution and accidents," said Prof. Toru Ishida, Department of Social Informatics, Kyoto University. "IBM and Kyoto University have found a way to do this before expensive and disruptive construction and other changes impact Kyoto's economy and its citizens. This is an example of how technology can aid smarter decision-making."

In order to perform large-scale, high-speed simulations of traffic based on these varied driver models, IBM's Tokyo Research Laboratory developed the "IBM Zonal Agent-based Simulation Environment" platform as well as the "IBM Mega Traffic Simulator" which runs on top of the IBM Zonal Agent-based Simulation Environment platform.

The results of observations of traffic volume made in Kyoto in October 2007 during the experimental program called "Enjoy Walking in the City" conducted by Kyoto City's Traffic Policy City Planning Bureau were compared with the results of the IBM Mega Traffic Simulator's simulation. "This result indicates that the IBM Mega Traffic Simulator exhibits good reproducibility," said Dr. Sei Kato, researcher at IBM's Tokyo Research Laboratory.

IBM Zonal Agent-based Simulation Environment provides a large-scale, multi-agent simulation environment that can increase the number of "agents" (the unit used on a server to indicate individual drivers) from hundreds of thousands to several million under a single processor on a

PC server, or to further increase the number under a parallel computing environment. In addition to traffic simulations, the system platform can also be used to perform evacuation guidance simulations, emissions trading market simulations, auction simulations, and other simulations.

Source: IBM