On the Locations of Electric Vehicle Charging Facilities using a Geographic Information System

Yohei Kakimoto and Hirotaka Takahashi
Department of Information & Management Systems Engineering
Nagaoka University of Technology
Niigata, Japan
s143375@stn.nagaokaut.ac.jp, hirotaka@kjs.nagaokaut.ac.jp

Yoichi Shimakawa
Department of Computer Science & Technology
Salesian Polytechnic
Tokyo, Japan

simakawa@salesio-sp.ac.jp

Hiroyuki Goto
Department of Industrial & System Engineering
Hosei University
Tokyo, Japan
goto-h@hosei.ac.jp

Abstract

In this study, we analyze a location obtained by an electric vehicle (EV) charging facilities location model, using Geographic Information System (GIS) and organize what kind of consideration are necessary for location points obtained by numerical calculation. Generally, existing location model locate facilities to minimize a traveled distance to a facility of demands ranged spatially. However, demands of the facilities are traffic flows going through a road link and that is needed to locate without overlap. The model considering the traffic flow as a demand was proposed by Hodgson et al. as the flow-capturing location-allocation model (FCLM). In FCLM, "Cannibalization" that multiple facilities consume demands flowing on a same route makes the problem difficult. To avoid the cannibalization, FCLM is modeled to minimize the number of facilities located on a same route. However, EV has the feature that the driving distance is short so multiple facilities should be arranged on a sufficiently long route in order not to run out of battery. We have proposed a model considering the driving distance of EV to this problem. In this study, we analyze the obtained location and organized issues. Aiming for that the solution obtained by our model is used in business.

Keywords
Transportation; Location; Combinatorial Optimization; Flow-capturing; Geographic Information System;

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Biographies
Yohei Kakimoto is a currently graduate student in the Department of Information and Management Systems Engineering, Nagaoka University of Technology (NUT), Japan. His research interests include operations research and geographic information science. He is a student member of the Operations Research Society of Japan.

Hirotaka Takahashi is currently an Associate Professor of the Department of Information and Management Systems Engineering, Nagaoka University of Technology (NUT), Japan. He received his D.Sci. from the Graduate School of Science and Technology at Niigata University, Japan in 2005. He was a PD at Max Planck Institute for Gravitational Physics (Albert Einstein Institute) in Germany from 2005 to 2007. His research interests include Controller Design for Discrete Event Systems, Data Mining and Physics (General Relativity). He is a member of the Operations Research Society of Japan (ORSJ) and the Physical Society of Japan (JPS).

Yoichi Shimakawa is a Professor and Director of the Department of Computer Science and Technology, Salesian Polytechnic Japan. He received his B.S. and M.Sc. degrees from Chuo University in 1990 and 1996. In 1998, he joined the staff as a research assistant on the research project "Integrated Geographic Information Systems" at Chuo University. He received his D.E. degree from Chuo University. He received paper awards from the Operations Research Society of Japan(ORSJ) in 2002. He is a member of ORSJ and the Geographic Information Systems Association of Japan.

Hiroyuki Goto is a professor in the department of Industrial & System Engineering, Hosei University, Japan. He received his B.S. and M.S. degrees from The University of Tokyo in 1995 and 1997. He received his D.E. degree from Tokyo Metropolitan Institute of Technology in 2004. His research interests include operations research, geographic information science, and high-performance computing. He is currently a research scholar at the University of California at Santa Barbara.