

Assessment of accessibility to a facility using a Geographic Information System: Case study of a food desert problem in a suburban area of Tokyo

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Abstract

We develop an assessment system regarding accessibility to a facility, which runs on a geographic information system. The system takes into account contribution by public transportation systems. With this system, we can analyze the locations of grocery stores along with accessibility. A food desert problem is addressed and the efficiency of the resulting solution is confirmed. With respect to food desert problems, the existing studies assess accessibility of grocery stores only with walking distance or time measure. However, in most districts in Japan, a bus transportation system is available to reach destination. In particular, many elderly people have physical limits, thereby those living in depopulated area play a central role in the problem. To make a proper assessment for food deserts, it is necessary to take into account contribution of local transportation systems, as well as the traditional walk-based measure. In this study, we calculate two time measures, one is walking distance and the other is time distance by walking and bus transportation on GIS. We implement our method for QGIS, then a validation is made. Focusing on a suburban area of Tokyo, we demonstrate an influence on the proximity measure considering the effect of bus transportation.

Keywords

Food desert, Traffic accessibility, Geographic information system, elderly people.

Biographies

Shun Odahara is currently a student of the advanced course in Production Systems Engineering, Salesian Polytechnic, Japan. His research interests include geographic information system and operations research.

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.