A system of mining heatstroke hotspots for inbound tourists

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(1) Motivation:

With the policy of developing a tourism country, Tokyo attracts a lot of inbound tourists during summer holidays when there is a high risk of heatstroke for outdoor activities. The previous studies on heatstroke analysis mainly regard the residents as their research targets and seldom considered the risk of inbound visitors. Nevertheless, in order to provide better tourism service for inbound visitors and better prepare for the Tokyo Olympic Games, it is necessary to find out those potential regions that are popular among foreign visitors, but at the same time have higher heatstroke risk.

(2) Methodology:

In this study, we developed a system for mining heatstroke hotspots via heterogeneous data as shown in Figure 1. First, the candidate tourist attractions are extracted based on their popularity and types. Then the extracted points of interest (POI) are matched to regions of interest (ROI) from different data sources. Finally, with the generated ROI, we utilize several indicators to evaluate their heatstroke risk and extract the hotspots based on the indicators.
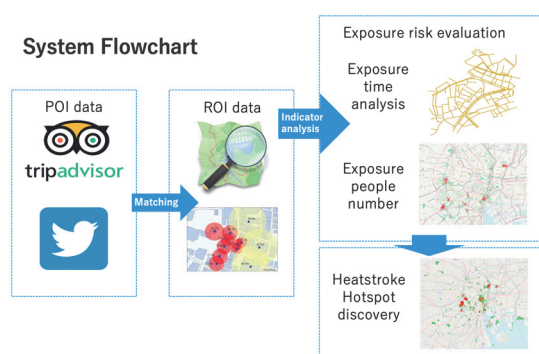

Figure 1: System flowchart

(3) Data:

This study utilizes heterogeneous data for either ROI generation or exposure risk evaluation:

· Point data: point data include TripAdvisor POI data and Twitter data (provided by Nightley. Inc) during high temperatures (filter by weather data). Point data are utilized for provide the information of ROI location and represent the popularity of the ROIs.

· Polygon data: polygons with clear boundaries are collected from OpenStreetMap and polygons without clear boundaries are generated from commercial accumulations provided by JoRAS and adapted from the work of Akiyama (2018). The generated polygon data are the ROIs which are hotspot candidates.

· Line data: line data in this study refers to the road network extracted from OpenStreetMap that are utilized for measuring the indicator values for ROIs.

(4) Results:

Figure 2 visualize the exposure risk of heatstroke calculated by different indicators in Tokyo 23 wards.
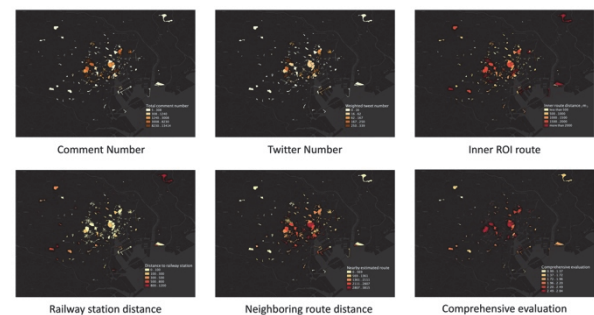

Figure 2: Heatstroke risk with different indicators

(5) Acknowledge:

(6) Reference:

Kasai, M., Okaze, T., Yamamoto, M., Mochida, A. and Hanaoka, K., 2017. Summer heatstroke risk prediction for Tokyo in the 2030s based on mesoscale simulations by WRF. *Journal of Heat Island Institute International* Vol, 12, p.2.

Yuki, A., 2018. Monitoring of the Spatial Distribution of Commercial Accumulations throughout Japan Using Micro Geodata. E-journal GEO, 13(1), pp.109-126.