

# Visualizing Shooting Spots using Geo-tagged Photographs from Social Media Sites

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**Abstract.** Hotspots, at which many photographs have been taken, might be interesting places for many people to do sightseeing. Visualization of hotspots reveals user interests, which is important for industries such as tourism and marketing research. Although several social-based techniques for extracting hotspots independently have been proposed, a hotspot has a relation to other hotspots in some cases. To organize those hotspots, we propose a method to detect and visualize relations among hotspots. Our proposed method detects and assesses relations of shooting spots and photographic subjects. Our approach extracts the relations using sub-hotspots, which are split from a hotspot that includes photographs of different types. We demonstrate our approach by discovering relations using photographic metadata such as tags, photograph orientation, and photograph locations from Flickr.

## 1 Introduction

According to the increasing popularity of mobile devices such as digital cameras and smart phones, numerous photographs taken by photographers have been uploaded to photo-sharing web services such as Flickr<sup>1</sup> and Panoramio<sup>2</sup>. Recently those devices have included embedded global positioning systems (GPSs). Using them, photographers can readily take photographs with photographic metadata such as location and photograph orientation information. Particularly, photographs with a photograph-orientation feature have become numerous recently (Zheng et al., 2011). In addition, many photographs on social media sites have metadata that are annotated by users through social tagging.

Many people might take photographs of subjects such as landscapes based on their own interests. Then they might upload those photographs to social media sites. As locations at which many photographs have been taken, these places might also be interesting places for many people to sightsee or visit. As described in this paper, we define such places as **hotspots**. Figure

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1. <http://www.flickr.com/>

2. <http://www.panoramio.com/>