Truth Discovery in Crowdsourced Detection of Spatial Events

ABSTRACT

The ubiquity of smartphones has led to the emergence of mobile crowdsourcing tasks such as the detection of spatial events when smartphone users move around in their daily lives. However, the credibility of those detected events can be negatively impacted by unreliable participants with low-quality data. Consequently, a major challenge in quality control is to discover true events from diverse and noisy participants' reports. This truth discovery problem is uniquely distinct from its online counterpart in that it involves uncertainties in both participants' mobility and reliability. Decoupling these two types of uncertainties through location tracking will raise severe privacy and energy issues, whereas simply ignoring missing reports or treating them as negative reports will significantly degrade the accuracy of the discovered truth. In this paper, we propose a new method to tackle this truth discovery problem through principled probabilistic modeling. In particular, we integrate the modeling of location popularity, location visit indicators, truth of events and three-way participant reliability in a unified framework. The proposed model is thus capable of efficiently handling various types of uncertainties and automatically discovering truth without any supervision or the need of location tracking. Experimental results demonstrate that our proposed method outperforms existing state-of-the-art truth discovery approaches in the mobile crowdsourcing environment.