

Case ID:M21-043P^

Published: 9/22/2021

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Efficient Topic Tracking of Social Streaming Data for Disaster Support

Background Social media has become an indispensable tool in the face of natural disasters due to its broad appeal and ability to quickly disseminate information. For instance, Twitter is an important source for disaster responders to search for (1) topics that have been identified as being of particular interest over time, i.e., common topics such as "disaster rescue"; (2) new emerging themes of disaster-related discussions that are fast gathering in social media streams i.e., distinct topics such as "the latest tsunami destruction." To understand the status quo and allocate limited resources to most urgent areas, emergency managers need to quickly sift through relevant topics generated over time and investigate their commonness and distinctiveness. A major obstacle to effective usage of social media, however, is its massive amount of noisy and undesired data. Hence, a basic method, such as set intersection/difference to find common/distinct topics, is often not practical. Invention Description To address this challenge, researchers at Arizona State University have developed a new method to efficiently search for accurate information during emergency response efforts. This is achieved by an online Nonnegative Matrix Factorization (NMF) scheme that conducts a faster update of latent factors, and a joint NMF technique that seeks a balance between the reconstruction error of topic identification and the losses incurred by discovering common and distinct topics. Extensive experimental results on real-world datasets collected during Hurricane Harvey and Florence reveal the effectiveness of this framework.

In contrast to prior online topic tracking methods that implicitly model time dependencies between latent factors, this innovation furthers this effort by explicitly modeling the dynamic relationships between learned topic representations generated in time. Specifically, the framework actively searches for common as well as emerging topics in an online manner, ultimately improving storage and computation efficiencies. Potential Applications • Social media language processing • Resource allocation for disaster relief Related Publication: [Tracking Disaster Footprints with Social Streaming Data](#)[Faculty Profile of Professor Huan Liu](#)[Faculty Profile of Professor Kasim Candan](#)

