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SYSTEMS VIEW OF THE SPATIO-TEMPORAL RESOLUTION OF INFORMATION DURING HURRICANES

Abstract

Geospatial technologies provide a diversity of data sources during disasters, but it can be a laborious process to identify spatial content that meets information needs at specific times in the emergency management environment. A fundamental question to address is the timely identification of which geospatial technologies provide relevant data that can be used to inform decision-makers at stages of the emergency management continuum. Typically, disaster studies focus on using a single source of data throughout an event or on fusing multiple datasets at narrow time periods in an event. A systematic view can be taken of what data are available over time and space throughout the disaster management cycle. A complex adaptive system frames the analysis so that actions taken to focus data collection can change the relevant information that can be received in the next steps of the process and patterns can emerge within the feedback loop. This adaptive system merges disparate data sources and synthesizes actionable intelligence for rapid response to natural disasters. In this system, spatio-temporal fusion involves the merging of remote sensing data and Volunteered Geographic Information (VGI) for impacted areas from before, during, and after a hurricane. NASA imagery from Landsat,Suomi NPP nightlight, Terra, etc. are used with machine learning techniques to classify areas of the imagery that are considered related to the event.Social media is used to pinpoint areas of interests through the use of logistic classifiers that group social media into areas of the emergency management continuum as well as specific topic categories related to a hurricane. While specific information needed for preparedness, response, recovery, and mitigation differ for each hurricane, systematic trends and limits in spatio-temporal resolution of information can be inferred from similar events.