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The E2mc Project

The goal of the E2mC H2020 project is to demonstrate feasibility and usefulness of the integration of social media analysis and crowdsourced information within both the Rapid Mapping and Early Warning Components of Copernicus Emergency Management Service (EMS). In recent years, several operational experiences (large earthquakes such as the one in Central Italy in 2016/2017 or large hurricanes and floods such as Harvey in Texas in 2017) - have shown the high potential contribution of social media and crowdsourcing in the improvement of the overall quality and timeliness of satellite-based Rapid Mapping services. The E2mC project has accepted these challenges and designed an innovative approach.

E2mC has succeeded in implementing a prototype platform (the "Social&Crowd"platform) that implements the necessary modules to demonstrate under pre-operational conditions the added value of social media and crowdsourcing in a Rapid Mapping context. In particular, the "Social&Crowd"platform specific characteristics are: a) a multi-source social media and news crawling engine, b) a customized geocoding engine based on semantic analysis coupled with open source gazetteers, c) a deep learning engine to automatically tag media contents and filter out irrelevant contents, d) a multi-purpose crowdsourcing platform to manage simple micro-tasks to be assigned to the crowd such as keywords translation, media relevance assessment, content geolocation improvement, simple mapping tasks, etc. e) a web interface to interact with the platform, trigger ad hoc activations of the "Social&Crowd"platform, inspect and download the results, further integrate them into other generic GIS environments. In this way, the "Social&Crowd"platform demonstrates how crowdsourcing, data mining and Artificial Intelligence can be combined to deliver higher quality data-driven services (e.g. crowdsourcing data are used for feeding AI algorithm for image recognition, while AI is used for removing duplicated images automatically or for detecting false positive from images coming from previous disasters). The E2mC project has also made significant progress in the crowdsourcing component and it is now actively managing a hybrid crowdsourcing community composed by heterogeneous groups such as general purpose ones (e.g. BOINC, through CERN) and emergency specific ones (e.g. HOT, SBTF). In particular, the E2mC project has started a process to establish links and federate with other relevant crowdsourcing initiatives active in the emergency response domain to join forces and efforts in providing effective and timely answers to Copernicus EMS Rapid Mapping needs.

This paper presents the technological achievements of the E2mC project as well as the results of the testing and demonstration of the "Social&Crowd"platform during both past events (cold cases) as well as during real and time-critical Copernicus EMS Rapid Mapping activations. In particular, the results of the demonstrations have been used for a qualitative and quantitative assessment of the benefits and added value brought by the E2mC project to satellite-based mapping activities, alone or in combination with complementary data analysis techniques such as, for example, hydraulic modelling of large floods where the data generated by the Social&Crowd platform are integrated as ground truth for model calibration in time-critical operational conditions

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