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Spatial Temporal Tracking of Landslide Events: A Crowdsourced Mobile App

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Monsoons are characterised by the widespread occurrence of landslides. Tracking each landslide event, developing early warning thresholds, understanding triggers, and initiating disaster rescue and relief efforts are complex for researchers and administration. The ever increasing landslides demand real-time data collection of events to enhance disaster management. In this work we designed and developed a dedicated crowd sourced mobile application, for systematic way of collection, validation, summarization, and dissemination of landslide data in real-time. This unique design of mobile app uses a scalable real-time data collection methodology for tracking landslide events through citizen science, and is available on Google Play Store for free, and at http://landslides.amrita.edu, with software conceived and developed by Amrita University in the context of the UK NERC/FCDO funded LANDSLIP research project (http://www.landslip.org/). This work implemented a structured database that integrates heterogeneous data such as text, numerical, GPS location, landmarks, and images. This methodology enables real-time tracking of landslides utilizing the details such as GPS location, date & time of occurrence, images, type, material, size, impact, area, geology, geomorphology, and comments in real-time. The mobile application has been uniquely designed to avoid missing landslide events and to handle the tradeoff between real-time spatial data collection without compromising the reliability of the data. To achieve this a multi level user account was created based on their expert levels such as Tracker, Investigator, Expert. A basic tracking form is presented for the Tracker level, and an extensive form is presented to the Expert level. The reliability of landslide data enhances as the user level increases from Tracker to Expert. Unique UI designs have been utilized to capture, and track the events. The tracking interface is divided into multiple screens; the main screen captures the landslide location through GPS enabled map interface and captures the date/time of the occurrence. Three additional screens capture images, additional details and comments. The 40 questions for landslide event collection used by the Geological Survey of India has been adapted through the collaborative effort of LANDSLIP partners to collect the additional details. The

submitted landslides are immediately available for all users to view. The User can view entered landslides through the landslide image listing, Google maps interface, or tabular listing. The landslides can be filtered by date/time and other parameters. The mobile app is designed to be intuitive and fast, and aims to increase awareness about landslide risk through the integrated short documents, and videos. It has guidelines for safety, capturing images, mapping, and choosing the data from the multiple options. The uniqueness of the proposed methodology is that it enhances community participation, integrates event data collection, event data organizing, spatial and temporal summarization, and validation of landslide events and the impact. It pinpoints, maps and alerts real-time landslide events to initiate right disaster management activities to reduce the risk level. The Landslide tracker app was released during the 2020 monsoon season, and more than 250 landslides were recorded through the app.