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Mobile Application Development for Crisis Data

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Abstract

With the reactive nature of disaster relief efforts, the response time of NGO's and humanitarian organizations is critical. Organizations cannot predict the next crisis, nor can they build a catch all solution for any future problem. Consequently, the quicker a system is in place following a crisis, the more data can be collected to improve the relief efforts. Data is vital in assessing the severity of a crisis, informing organizations on how to prepare or give aid, and informing the community about an event. Mobile phones in general, and smartphones in particular, are an ideal tool for the collection of this valuable data.

The development effort required to create smartphone applications is usually substantial. There are technical barriers to entry, and usually lengthy development times. Because of this, traditional mobile application development has been limited in its ability to help disaster relief. The Punya framework, presented in this paper, drastically shortens the development time required for Android applications, while supporting the communication and sensor features needed to acquire data during a crisis scenario. Punya's advanced sensor functionality, as well as its data capture and reporting components, allow organizations to build mobile applications quickly that can gather both user and context data as well as visualize results.

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Keywords: mobile apps; crisis data; punya; smartphones

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1. Introduction

Despite modern technological advances, humanitarian response and relief efforts suffer from a lack of co-ordination and data access. NGOs and humanitarian organizations face problems related to data collection and data management that can lead to a waste of resources. Several times relief workers end up resorting to slow manual work, because a potentially more efficient automatic system is difficult to use or simply does not work. The ubiquity of handheld computing technology has become invaluable in disaster management and relief operations. Data collection and management through handheld devices accelerates the aggregation and usability of the data, with the ability to connect to many other data sources as well.

In a world where key decisions are driven by data, human resources and information are some of the most important pieces in having a successful response during a crisis and post crisis for analysis. Crisis information is slowly becoming available through various APIs, like ReliefWeb [6] and CrisisNET [7], and through projects such as GDELT [8] that are not necessarily crisis-specific. Disaster information is not just important for relief organizations, but also for individuals who want to get an understanding of what happened and which organizations were involved. Individuals can use crisis information to get an understanding of a new environment they might be entering or of the history of their environment. The new publicly available datasets have created a need for a new way to enter, browse, understand, and consume crisis data.

2. Motivation

The volume, and variety of data being generated about the world is increasing at a rapid pace. Recently, it has been estimated that nearly all firms with more than 1000 employees across all sectors will generate at least 200 terabytes of data. For comparison, 200 terabytes was two times the size of Wal Mart's entire data warehouse in 1999 [1]. Going forward, even more industries ranging from healthcare to energy will be driven by data. Such tremendous increase in data generation has the potential to create value in different ways. Through analysis of such vast amount of data, key insights can be learned leading to potentially better decision-making.

Increased data generation has not only been limited to companies or large organizations. Individuals are also generating more personal data, known as digital traces, than ever before [2]. Often, individuals can post and access historical and real time information about their environment, interests, and other variety of topics through social media and micro-blogging platforms such as Facebook and Twitter. During cases of emergency and disaster, individuals often turn to social media platforms to disseminate relevant information on issues regarding their safety, status, and the overall condition of their immediate environment [4]. Going forward, several critical decisions are being driven by access to and analysis of data, hence it is crucial to provide platforms that enable easy access to and integration of various sources of data. In disaster management, data generated can often be used to drive key decision making capabilities; before, during, and after a crisis. In such applications, access to data is of critical importance in ensuring that key actionable insights are learned.

The types of data generated range from sensor readings from physical devices to status information from social media channels. Often, such data is unstructured consisting of combinations of images, text, and numeric data. A pressing and distinct challenge involves combining, querying, and analyzing data from such disparate sources. Given the need to infer future actionable insights from data, it is critical to develop platforms that can ensure that data from disparate sources, in various, often unstructured formats, can be combined, queried, and analyzed. In addition, such data would need to be combined across multiple time spans in order

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