Automated GLIDE Number Resource Consolidation for Rapid Disaster Location Identification

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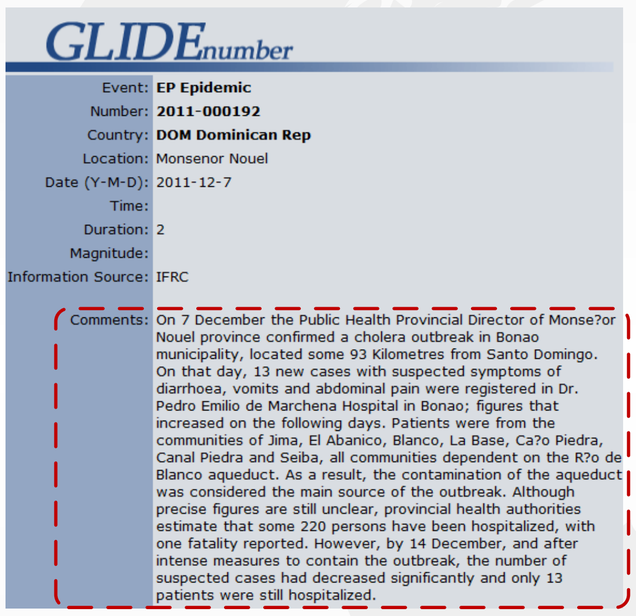
Introduction

As the geographic scale, operational complexity and frequency of disasters continues coupled with ever-increasing amounts of information related to disaster response activity, the crisis management practitioner and research communities are calling for new methodologies for processing and visually representing disaster information [1]. More specifically, there is a growing body of research focused on how analytical outputs based on remote sensing and Geographic Information System (GIS) such as disaster impact assessments can be formatted into usable information products for crisis management practitioners[2]

Research Goals

- Automatically generate Area of Interest (AOI) polygon around a disaster area based on text-based qualitative data
- Display AOI polygons on a map
- Allow AOI polygon to be downloaded in either KML or shapefile (SHP) format

Process and Methods



1.) Parameters for the model are aggregated or manually entered from disaster descriptions on the client side and passed to the server.

2.) The qualitative data is parsed for location information such as place, city and country names

3.) Location data is passed to Google map's Geolocation[3] service to return Latitude and Longitude points

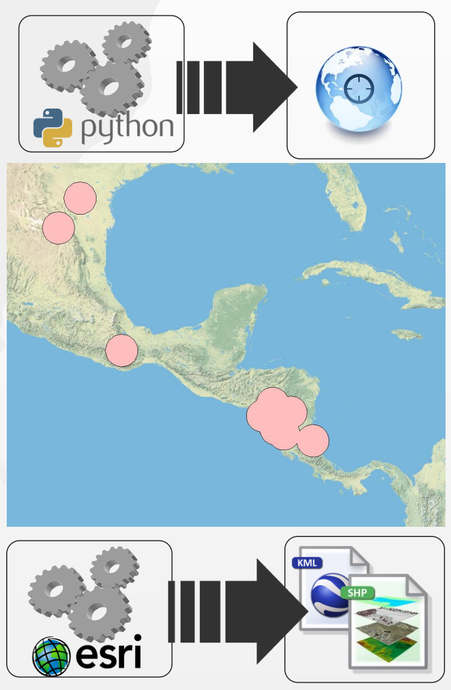
4.) Location data has a buffer of variable distance which is run on each point

5.) The buffer and locations are then turned into a feature envelope polygon to identify the larger area of interest (AOI)

6.) The resulting feature envelope Polygon is exported through the geo-processing service back to the client side map

7.) The now identified area of interest is overlaid on a map utilizing web services

8.) The area of interest polygon can be downloaded as a Shape or KML file after generation via the web-interface



Literature Cited

[1] Harvard Humanitarian Initiative, "Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies", Washington, D.C. and Berkshire, UK, 2011.

[2] J. van Aardt, D. McKeown, J. Faulring, N. Raqueño, M. Casterline, C. Renschler, R. Eguchi, D. Messinger, R. Krzaczek, S. Cavillia, Geospatial disaster response during the Haiti earthquake: A case study spanning airborne deployment, data collection, transfer, processing, and dissemination, Photogrammetric engineering and remote sensing, 77 (2011) 943-952.

[3] "Geopy - A Geocoding Toolbox for Python - Google Project Hosting." Google Code. 2012. <http://code.google.com/p/geopy/>.

Preliminary Results

During testing, the model processed ~10 emails containing 10 unique glide numbers with around 100 locations. The program executed in ~46 seconds, including time to parse, run the model, generate the shape file, and zip up the data. These outputs are automatically displayed on the web service after completion, and are zipped for easy data transfer.

Below are three different maps each created with the parameter model after being fed in qualitative data from the respective glidenumber disaster description. Figure 1 demonstrates an epidemic in the Dominican Republic occurring 07-Dec-2011. Figure 2 demonstrates a flood in the northern and western region in Nicaragua; for this event several outliers can be seen of city and town locations which where in the disaster description. Figure 3 demonstrates a smaller technical disaster, an oil spill off the shore of New Zealand. All these events took place late 2011.

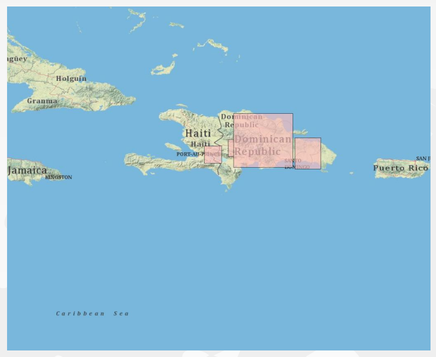


Figure 1: Glidenumber: EP-2011-000192-DOM

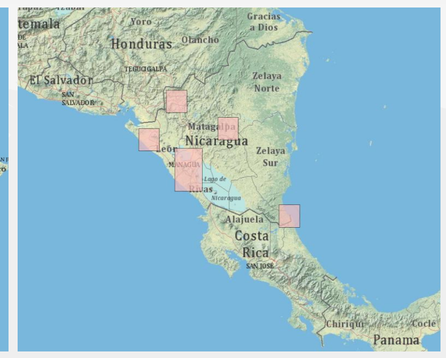


Figure 2: Glidenumber: FL-2011-000166-NIC

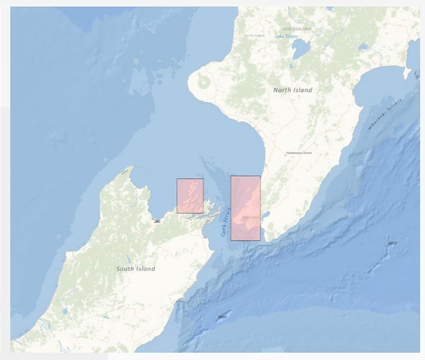


Figure 3: Glidenumber: AC-2011-000158-NZL

Prototype

Below is a screenshot of our early web application prototype.

- On top we have a Esri-map which using the Esri Javascript-API is able to render our Area of Interest polygon after a glide number was entered into the model. In this screen you can see a larger map of disaster event:

  EP-2011-000192-DOM

- Not visible; a download button allows the overlaid AOI polygon to be downloaded in the form of a shape or kml file

Text field to enter a Glidenumber, which then scrapes the glidenumber.net website for parameters

Button to run an automatic scrape for all recent disaster notification emails

Text field to enter manual parameters

HTML 5 application, scalable web application could be run from mobile devices

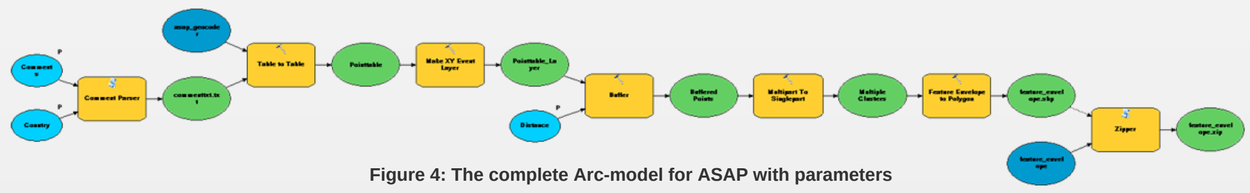


Figure 4: The complete Arc-model for ASAP with parameters

Acknowledgements

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For more information about this program, see:

http://www.cis.rit.edu/EnvironmentalForecasting

For a short video demonstration of the ASAP tool, see:

http://www.youtube.com/watch?v=hrQpNhKm7lQ

Demo-Video