Crisis Mapping and Community Health: How Direct Relief is Improving Health Emergency Response with Facebook Disaster Maps

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Breakout Session
Crisis Mapping and Community Health
How Direct Relief is Improving Health Emergency Response with Facebook Disaster Maps
Direct Relief Responds to the Thomas Fire
Santa Barbara and Ventura, CA
December, 2017
How does Facebook population movement mapping work?

The disaster maps datasets are aggregated across time and space in the following ways:

- **Temporal aggregation:** While timely data is needed during a disaster, feedback from our partners indicated that organizations do not process and respond to new inputs in real time. For this reason, we share data at regular intervals (e.g., every hour, every six hours, every 24 hours). [2]

- **Spatial aggregation:** We aggregated geolocalized points to 360 square meter grid or local administrative boundaries.

- **Spatial smoothing:** Once we have calculated each metric (e.g., the number of people in administrative or pixel unit $x$ during time period $y$), spatial smoothing is performed. For each spatial location, we compute a weighted average of the value in the tile itself with the values in neighboring tiles; tiles that are closer have a bigger contribution to the final result. This local averaging results in a map with a smoother, clearer signal, reducing noise due to random variation while preserving the key signal and further protecting privacy.
<table>
<thead>
<tr>
<th>crisis_name</th>
<th>time_window</th>
<th>area_id</th>
<th>n_baseline</th>
<th>density_baseline</th>
<th>n_crisis</th>
<th>density_crisis</th>
<th>n_diff</th>
<th>percent_change</th>
<th>z_score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Flood in Country X&quot;</td>
<td>t1</td>
<td>a1</td>
<td>x1</td>
<td>x1 / total n_baseline at t1</td>
<td>y1</td>
<td>y1 / total n_crisis at t1</td>
<td>y1 - x1</td>
<td>100*(y1 - x1)/x1</td>
<td>(y1 - x1)/(var(y1 - x1)^0.5)</td>
</tr>
<tr>
<td>&quot;Flood in Country X&quot;</td>
<td>t2</td>
<td>a2</td>
<td>x2</td>
<td>x2 / total n_baseline at t2</td>
<td>y2</td>
<td>y2 / total n_crisis at t2</td>
<td>y2 - x2</td>
<td>100*(y2 - x2)/x2</td>
<td>(y2 - x2)/(var(y2 - x2)^0.5)</td>
</tr>
<tr>
<td>&quot;Flood in Country X&quot;</td>
<td>t3</td>
<td>a3</td>
<td>x3</td>
<td>x3 / total n_baseline at t3</td>
<td>y3</td>
<td>y3 / total n_crisis at t3</td>
<td>y3 - x3</td>
<td>100*(y3 - x3)/x3</td>
<td>(y3 - x3)/(var(y3 - x3)^0.5)</td>
</tr>
<tr>
<td>&quot;Flood in Country X&quot;</td>
<td>t4</td>
<td>a4</td>
<td>x4</td>
<td>x4 / total n_baseline at t4</td>
<td>y4</td>
<td>y4 / total n_crisis at t4</td>
<td>y4 - x4</td>
<td>100*(y4 - x4)/x4</td>
<td>(y4 - x4)/(var(y4 - x4)^0.5)</td>
</tr>
<tr>
<td>&quot;Flood in Country X&quot;</td>
<td>t5</td>
<td>a5</td>
<td>x5</td>
<td>x5 / total n_baseline at t5</td>
<td>y5</td>
<td>y5 / total n_crisis at t5</td>
<td>y5 - x5</td>
<td>100*(y5 - x5)/x5</td>
<td>(y5 - x5)/(var(y5 - x5)^0.5)</td>
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</tbody>
</table>

Where:

- **crisis_name**: The name of the event.
- **time_window**: The hour(s) during which the data are recorded.
- **area_id**: The tile name. In the raster form, this represents a given raster pixel on the map which can be spatially aggregated to be interoperable with other data sets. In the administrative form, the area_id represents the administrative boundary name of an area that can be joined with other administrative datasets (e.g. census data).
- **n_baseline, density_baseline**: The average number of people in the same area during the same time window, but averaged over the previous three weeks. This estimates how many people we expect to be in each area during the specified time.
- **n_crisis, density_crisis**: The number of people observed in the tile during the time period $t$.
- **n_diff**: The difference between the population at the time of the crisis and the population during the baseline.
- **percent_change**: The percentage difference between the population at the time of the crisis and the population during the baseline.
- **z_score**: The number of standard deviations by which the crisis population differs from the baseline.
Connecting Health Centers after Cyclone Idai
Beira, Mozambique
March, 2019
Helping Organizations Respond to Health Emergencies

By Laura McGorman and Alex Pompe, Data for Good

When planning public health campaigns or responding to disease outbreaks, health organizations need information on where intended beneficiaries live, as well as real-time insights from the field. However, in much of the world, information from the most recent census is often out of date and timely insights from remote communities are scarce.

The above map shows movement between Greater London and surrounding areas by day. These data are useful to public health organizations looking at the spread of infectious diseases, such as the flu.
Facebook's Data for Good program includes tools built from de-identified data on our platform, as well as tools that we develop using satellite imagery and other publicly available sources. When data is shared responsibly with the communities that need it, it can improve wellbeing and save lives.
Predicting the Spread of Cholera in Mozambique as Case Count Rises

Modeling aims to target vaccination campaigns and protect more people against the disease.
Thank you

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Questions?