When Geo Meets Social

-Amazing things happen

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Geographic information

- information about specific characteristics of places on or near the Earth's surface
- <x, z> where x is a location in space-time, z is a set of general properties associated with x
- information about pairs of locations
- <x¹,x²,z> where z is distance, interaction, travel cost, travel time, connectivity, direction, *etc*.

Traditional sources of geographic data

- By authorities and their experts
 - USGS
 - U.S. Census Bureau TIGER files
 - NGA
 - military in many countries
 - state and local governments
 - data companies



Geospatial technologies

- Positioning on the Earth's surface
 - GPS, RFID
- Acquisition systems
 - remote sensing
 - field measurement
- Web GIS and mapping
 - Google Earth
 - OpenStreetMap



New sources of geographical data

- Volunteered geographic information (VGI; Goodchild 2007)
 - a phenomenon of the 21st Century
 - user-generated content
 - asserted information
 - the empowerment of millions of private citizens
 - largely untrained
 - no obvious reward
 - no guarantee of truth
 - no authority
- Spatio-temporal footprints generated by social media
 - Twitter, Flickr, etc.

www.wikimapia.org

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www.openstreetmap.org



OpenStreetMap vs. Google Maps



Geographic data from online communities

- Twitter: a social networking site
- Flickr: online photo management service
- Georeferenced tweet messages in Twitter and georeferenced photos in Flickr



tanquerayA55 kinya.matsuda

私は、GCF懇親会の入場券をブラチナチケットと呼んでいます。この場 で知り合った方々を伝手に、様々な活躍の場が広がりました。RT (2783783:「ちょっとした疑問を聞ける機会がとても大きい」という意見 を本日伺いました。GISコミュニティフォーラムは情報交換の場と した。GISコミュニティフォーラムは情報交換の場と

4 minutes ago

acrosscanada Sam Vekemans

From Google Reader: Feeling CAD-fused or GIS-organized? (CAD to GIS): Here I am at last year's Esri Internationa... http://bit.ly/mEglyu •

14 minutes ago

deepseadawn Dawn Wright Reminder of Esri ArcWatch February 2011 - Goodchild's Five Thoughts on the Future of GIS http://bit.ly/moW7UU • via @gisjourno 15 minutes ago

atlantapaving Michael Bush http://bit.ly/GB4dq OGIS Based Pavement Maintenance A Systematic Approach by Robert J Kmetz: Abstract According t... http://bit.ly/jkEcwU O 16 minutes ago

Tweets and photo metadata in the database

January 23rd to February 12th , 2011, more than 4 million tweets

tweet_id	tweet_text	created_at	geo_lat	geo_long	user_id
29085929314451456	I keep thinking about last night's nightmare. Im scared to sleep. #shit	2011-01-23 00:00:00	40.72002	-74.00278	46077760
29085933101912064	@AceaMillie : have a blast	2011-01-23 00:00:01	33.91661	-118.08867	132329640
29085936868397057	Break Time has: \$4 Jack & Bacardi drinks \$4 Vodka drinks \$ Soco & Lime shots \$3 Coors Lt aluminum pints - http://frnk.ly/aySnRV	2011-01-23 00:00:02	34.24080	-77.86830	92143231

January, 1st to February, 25th, 2011, about 800,000 photos

photo_id	photo_title	description	photo_tags	date_upload	date_taken	geo_lat	geo_long	owner_id
5380383436	marilyn_parker_hair.jpg	parker hair marilyn	marilyn parker notinaset	2011-01-23 00:00:03	2004-09-02 00:00:00	37.78651	-122.45484	66791947
5380383498	DaikokuYa_JM	Digital sketch Jan22 2011	tokyo little ramen sketchcrawl daikokuya	2011-01-23 00:00:05	2011-01-22 23:57:52	34.04994	-118.24014	91931702
5380383730		Mission Dolores Park, San Francisco	park street blue trees sleeping tower classic church field grass yellow brad shirt photography san francisco hill watch streetphotography shades steeple mission	2011-01-23 00:00:14	2011-01-22 12:58:58	37.75988	-122.42658	22774856

Georeferenced tweets within three weeks



A close-up of the georeferenced tweets in Los Angeles county



Density differences between Flickr photos and tweets



Temporal variation of tweets



Emergency response

- Disasters:
 - Hurricane Katrina, 2005
 - The Wenchuan Earthquake, China, 2008
 - The Haiti and Chile Earthquakes, 2010
- Time is critical
- What information would you want to know
 - if you are a victim who needs help?
 - if you are an emergency manager?
- Location!!of resources, of victims, etc.

Geographic information for emergency response

- Data needs: reliable, accurate, timely geographic data
- Data problems:
 - Data provided by government: inadequate
 - Data from remote sensing: only phenomena visible from above
 - Not enough GIS data experts
 - Not enough professional emergency workers
- The response efforts during Katrina "were significantly hampered by a lack of information from the ground" (a report to the US Congress on Hurricane Katrina, by Secretary of Homeland Security Michael Chertoff, 2005)

Information sharing in emergencies

- Important to facilitate coordination
- Important between emergency managers and local residents
- Important for local residents for emotional reasons

- Existing communication channels: neither sufficient nor adequately used
- Alternative: online and mobile social networking services

Jesusita Fire

- May 5-18, 2009
- 8,733 acres burned
- 80 homes destroyed; 15 homes damaged
- Estimated costs \$17 million



Data about Jesusita Fire

- **Community web: Independent**
- **Social networks: Twitter, Flickr, Facebook**
- Television and radio: both traditional and online
- **Government and official outlets**
- Satellite imagery
- **Newspaper stories**
- **Conversations with first and secondhand eyewitnesses**





Jesusita Fire @jesusitafire 6 May 09 RT @Ddanetra: #jesusitafire SBPD is now closing several streets from state and parts of APS



6 May 09

FEMA Funding to Help California Fight Jesusita Fire

Release Date: May 7, 2009 Release Number: R9-09-012



2010 Haiti 7.0 Mw earthquake

- 16:53 local time on Tuesday, 12 January 2010
- three million people were affected
- an estimated 316,000 people died
- 300,000 were injured and 1,000,000 made homeless
- 250,000 residences and 30,000 commercial buildings collapsed or severely damaged.



Ushahidi



OpenStreetMap, Haiti



OpenStreetMap, Haiti



Outcomes

- <u>http://wimeo.com/9182869</u>
- Complementary technologies (open geographic data and reports from victims) integrated
- Fast cycle, open maps and data saved lives
- Partnerships and community formed





Can social media rescue street children?

- Street Children are often excluded from the mainstream society.
- Child beggars are prevailing in China. (1 to 1.5 million homeless with 20,000 children abducted every year)









Data

- Dataset 1: "Street Photos to Rescue Child Beggars", Sina Weibo Twitter (<u>http://www.weibo.com/jiejiuqier</u>)
- Dataset 2: "BaoBeiHuiJia", web community ran by a NGO. (<u>http://www.baobeihuijia.com</u>)
 Baby come home: missing children database



Ohio State University



VGI Data

- The raw data is collected and interpreted via a java application.
- The data is then geocoded into shapefile.

厦门市中山路 流浪女童

Updated Feb 17

2010年

@懲疇戰也:2010年,撒于厦门中山路,小女孩很同怜,挂着鼻滞,对于我 的打扰好像很不善,当天我发现那天街上最起码有三个边祥的小孩,劳迫还 跟个大孩子。



获取路线 搜索周边 更多▼

1 个附近的结果,共 3 个 下一页

× 1



@恩哼哦也:@随手拍照解救乞讨儿童2010年, 摄于厦门中山路, 小女孩很可怜, 挂着鼻涕, 对于我的打扰好像很不满, 当天我发现那天街上最起码有三个这样的小孩, 旁边还跟个大孩子。









Spatial Distribution





Research by Xining Yang and Daniel Z. Sui, OSU

Challenges (Li and Goodchild, 2010)

- data access and data quality
 - How to discover relevant information?
 - How to validate VGI?
- How to synthesize geographic data
 - Uncertainty
 - Data conflation
- How to use social networks to support crowdsourcing mapping?

Privacy

Locations of tweets for a user



Locations of tweets for another user



Future trends

- Location-based services in mobile devices
- Know the position of almost everything
- Let geospatial technologies do the geo part, we people are responsible for the social part
- Volunteered geographic analysis and modeling

Thank you!

If you have any questions, comments, or suggestions, please let me know.

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