Positioning
Spatial Computing – University of Minnesota
We’ll cover the following content-based positioning-related topics:

1. **Geoparsing**: Extracting place names from natural language text

2. **“Home Locations”**: The dynamics of location fields in user profiles (and more)
Slides for Spatial Computing MOOC

(By Brent Hecht)
A Crash Course in Modern Geography for Researchers and Practitioners

Thanks to the rise of ubiquitous computing, location-based ser content, and related phenomena, geography plays an increasing role in the work of HCI researchers and practitioners. Through recent advances, the geography and HCI communities have integrated the geography and HCI communities like last year's...

SITES: GOOGLE.COM

Unlike · Share

You and 6 others like this.

Happy to announce that Steph and I are engaged! — w
Edit Profile

Name
Brent

Picture
![Image of a red thumbtack]
Change Picture

Username
www.pinterest.com/bjhecht

About You

Location

Website
Verify Website

Visit Account Settings to change your password, email address, and Facebook and Twitter settings.

Cancel
Save Profile
Structure of the rest of this video:

Go over **how** to use location fields to position users.

Understand the advantages and disadvantages of location field positioning.

Wrap-up positioning with discussion of location-inference attacks.
Toponym
(a.k.a. place name)

Current City
Minneapolis, Minnesota

(44.98, -93.27)

Machine-readable Representation
(e.g. lat/lon coordinate)
The Google Geocoding API

This document discusses the Geocoding API v3. Note that the Geocoding API v2 has been turned down and is no longer available. Users of the Geocoding API v2 service should upgrade to v3.

This service is also available as part of the Google Maps JavaScript API, or with a Java client library.
## Locations API

Use the Locations API to get location information.

For an example of how to use the Locations API with Bing Maps AJAX Control 7.0, see Displaying Location Search Results Using the REST Services.

### In this section

<table>
<thead>
<tr>
<th>Find a Location by Address</th>
<th>Use these URL templates to get latitude and longitude coordinates for a location by specifying values such as a locality, postal code, and street address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find a Location by Point</td>
<td>Use this URL template to get the location information associated with latitude and longitude coordinates.</td>
</tr>
<tr>
<td>Find a Location by Query</td>
<td>Use these URL templates to get latitude and longitude coordinates that correspond to location information provided as a query string.</td>
</tr>
<tr>
<td>Location Data</td>
<td>Use this description to understand the results returned in the response to a Locations API request.</td>
</tr>
</tbody>
</table>

### MapQuest Geocoding API

Geocoding is the process of matching addresses with geographic coordinates. Easily access the MapQuest geocoder through a simple HTTP request. The Geocoding API offers functions: address, reverse, and batch.

### Geocoding API Resources

- **Documentation**: Instructions, code samples, and demos all combined in easy-to-follow, easy-to-use format.
- **Forums**: Discuss and collaborate with developers who are using the Geocoding API.

### Features

- **Address geocoding**: Provide either a single-line address or an address broken down into its components to get geocodes in order of confidence.

### Yahoo BOSS Geo Services

Yahoo BOSS is a suite of services that provides Developers premium API’s that can support Search and Geolocation applications. BOSS Geo services include two primary offerings today, Placefinder and PlaceSpotter, which allows developers to geo-enrich their applications and make them more location aware. Learn more about our offerings below.
“200 Union St. SE, Minneapolis, MN”
“United States”
“Minnesota”
“Minneapolis, MN”

Google Developers
The Google Geocoding API
Map users

Do a geographic sentiment analysis

Figure 2. Mapping “Gross Community Happiness” in Greater London (best seen in color).

(Quercia et al. 2012)
Questions you may be asking yourself at this point:

What do you mean by some applications?

How is geo/geo ambiguity dealt with?
Structure of the rest of this video:

Go over **how** to use location fields to position users.

Understand the **advantages** and **disadvantages** of location field positioning.

Wrap-up positioning with discussion of **location-inference attacks**.
Location Field Positioning

PROS 😊

CONS 😞

Many location fields are blank
Slides for Spatial Computing MOOC
(By Brent Hecht)
18% of Twitter user profiles have nothing in their location field

(Hecht et al. 2011)
Location Field Positioning

**PROS**

😊 Many location fields are blank
😊 Scale is sometimes insufficient

**CONS**

😣 Many location fields are blank
😣 Scale is sometimes insufficient
Geographic Scale (In Order of Increasing Localness from Left to Right)

Percent of Users Located in the USA

Country City Interstate Region State Intrastate Region City Neighborhood Address

(Hecht et al. 2011)
Geoweb Scale Problem

“Alaska”

“Minneapolis, MN”

“200 Union St. SE, Minneapolis, MN”
Anchorage, AK

>400km

Anchorage, AK

Slides for Spatial Computing MOOC
(By Brent Hecht)
Geoweb Scale Problem

The GSP occurs when latitude and longitude coordinates – the foundation of spatial representations on the geoweb – are not appropriate for the desired scale of a given spatial computing research project or application.

(Hecht and Gergle 2011)
Location Field Positioning

**PROS**

😊

Many location fields are blank

Scale is sometimes insufficient

Lots of non-geographic information

**CONS**

😣

Slides for Spatial Computing MOOC (By Brent Hecht)
16% of Twitter location fields contain non-geographic information

(Hecht et al. 2011)
Location: “Loserville :)

Location: “With God”

Location: “Middle Earth”

Location: “justin biebers heart”
Popular Culture References

“BieberTown”
“PLZ Justin follow me”
“Bieberland...love!”
“JaeJoongs heart”
“Next to Waldo :D”
“Schrute Farms”

Privacy References

“Stalker City”
“MindingMyOwn”
“UM...STALKER!”
“kgb answers”
“stalker much?”
“for me to know n u to find out”

Negative Emotions Towards Current Location

“preferably anywhere but here”
“a hole in the ground”
“swirling in the abyss”
“Loserville :)”
16% Non-Valid Geographic Information

“Stalker City”, “NONE YA BISNESS”, “Justin Biebers Heart”, “The Void”, “Redneck Hell”, “In the Middle of Nowhere”, “yer mum”, “BSNBC”, “in God’s Graces’, etc…

(Hecht et al. 2011)
Location Field Positioning

**PROS**

- 😊 PROS
- 😊 PROS

**CONS**

- 😣 CONS
- 😣 CONS

- Many location fields are blank
- Scale is sometimes insufficient
- Lots of non-geographic information
- Disambiguation is hard
Slides for Spatial Computing MOOC
(By Brent Hecht)

Headed to Washington to do some apple picking, jamming out to Chicago! #spatialComputing #itshanging
Toponym Ambiguity

one place name (toponym) → more than one place

“Washington”
Location Field Positioning

**PROS**

😊 Sometimes is only way to position users

**CONS**

😣 Many location fields are blank

😣 Scale is sometimes insufficient

😣 Lots of non-geographic information

😔 Disambiguation is hard
**Location Field Positioning**

**PROS**

- Sometimes is only way to position users

**CONS**

- Many location fields are blank
- Scale is sometimes insufficient
- Lots of non-geographic information
- Disambiguation is hard
No geotags!

Only easily accessible geographic information
Location Field Positioning

PROS

- Sometimes is only way to position users
- Unique spatiotemporal scale

CONS

- Many location fields are blank
- Scale is sometimes insufficient
- Lots of non-geographic information
- Disambiguation is hard
OMG! Just drove on a lake!
#itscold

Go Gophers! Beat the Badgers!

Doing some recording for @SpatialComp MOOC

At dentist appt. #toothfail

OMG! Just drove on a lake! #itscold
Go Gophers! Beat the Badgers!

Doing some recording for @SpatialComp MOOC

At dentist appt. #toothfail

OMG! Just drove on a lake! #itscold

Headed to #Amsterdam!

Brent Hecht
@bhecht
Assistant Professor of Computer Science at the University of Minnesota
Data-driven ways to determine home regions:

- Region of Greatest Activity (e.g., Mustagh and Ganesan 2013)
- Spatiotemporal Threshold (e.g., Li and Goodchild 2013)

Geographic Median (e.g., Jurgens 2013)

Point pattern-based
Structure of the rest of this video:

Go over how to use location fields to position users.

Understand the advantages and disadvantages of location field positioning.

Wrap-up positioning with discussion of location-inference attacks.
Ayim Notellingü
@geoprivacy

I never reveal my location

Just picked up some local Wild Rice from Lunds!

Just had Snickers-on-a-stick at the fair, youbetcha!

Still happy the Gophers won last night!

Sure am loving these cheese curds!
Aim Notellingü
@geoprivity

I never reveal my location

I just picked up some local wild rice from Lunds!

I just had Snickers-on-a-stick at the fair, youbetcha!

Still happy the Gophers won last night!

Sure am loving these cheese curds!
<table>
<thead>
<tr>
<th>Sampling Strategy</th>
<th>Model Selection</th>
<th>Accuracy</th>
<th>Baseline Accuracy</th>
<th>% of Baseline Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country-Uniform-2500</td>
<td>Calgari</td>
<td>72.71%</td>
<td>25.00%</td>
<td>291%</td>
</tr>
<tr>
<td>Country-Uniform-2500</td>
<td>Count</td>
<td>68.44%</td>
<td>25.00%</td>
<td>274%</td>
</tr>
<tr>
<td>Country-Random-20K</td>
<td>Calgari</td>
<td>88.86%</td>
<td>82.08%</td>
<td>108%</td>
</tr>
<tr>
<td>Country-Random-20K</td>
<td>Count</td>
<td>72.78%</td>
<td>82.08%</td>
<td>89%</td>
</tr>
<tr>
<td>State-Uniform-500</td>
<td>Calgari</td>
<td>30.28%</td>
<td>5.56%</td>
<td>545%</td>
</tr>
<tr>
<td>State-Uniform-500</td>
<td>Count</td>
<td>20.15%</td>
<td>5.56%</td>
<td>363%</td>
</tr>
<tr>
<td>State-Random-20K</td>
<td>Calgari</td>
<td>24.83%</td>
<td>15.06%</td>
<td>165%</td>
</tr>
<tr>
<td>State-Random-20K</td>
<td>Count</td>
<td>27.31%</td>
<td>15.06%</td>
<td>181%</td>
</tr>
</tbody>
</table>

Table 2: A summary of results from the country-scale and state-scale experiments. The better performing model selection algorithm is bolded for each experiment. The CALGARI result reported is the best generated by $MinU = 2$ or $MinU = 5$. 

(Hecht et al. 2011)
Slides for Spatial Computing MOOC
(By Brent Hecht)

http://www.franken.senate.gov/?p=video&id=1497
Positioning
Spatial Computing – University of Minnesota

Attributions

Some maps © OpenStreetMap contributors (www.openstreetmap.org/copyright)