

Location Guard

browser extension for location privacy

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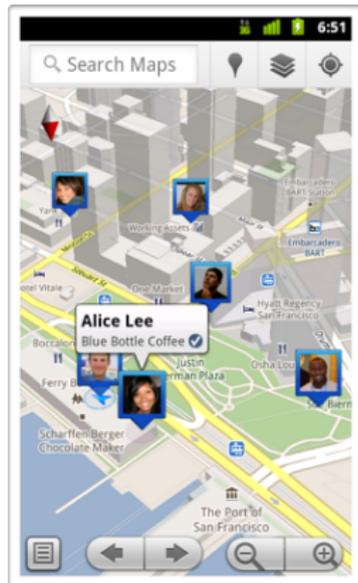
joint work with
Miguel Andrés, Nicolás Bordenabe,
Catuscia Palamidessi, Marco Stronati

CAPPRIS, Mar 25, 2015

Location-Based Systems

A **location-based system** is a system that uses geographical information in order to provide a service.

- ▶ Retrieval of Points of Interest (POIs).
- ▶ Mapping Applications.
- ▶ Deals and discounts applications.
- ▶ Location-Aware Social Networks.

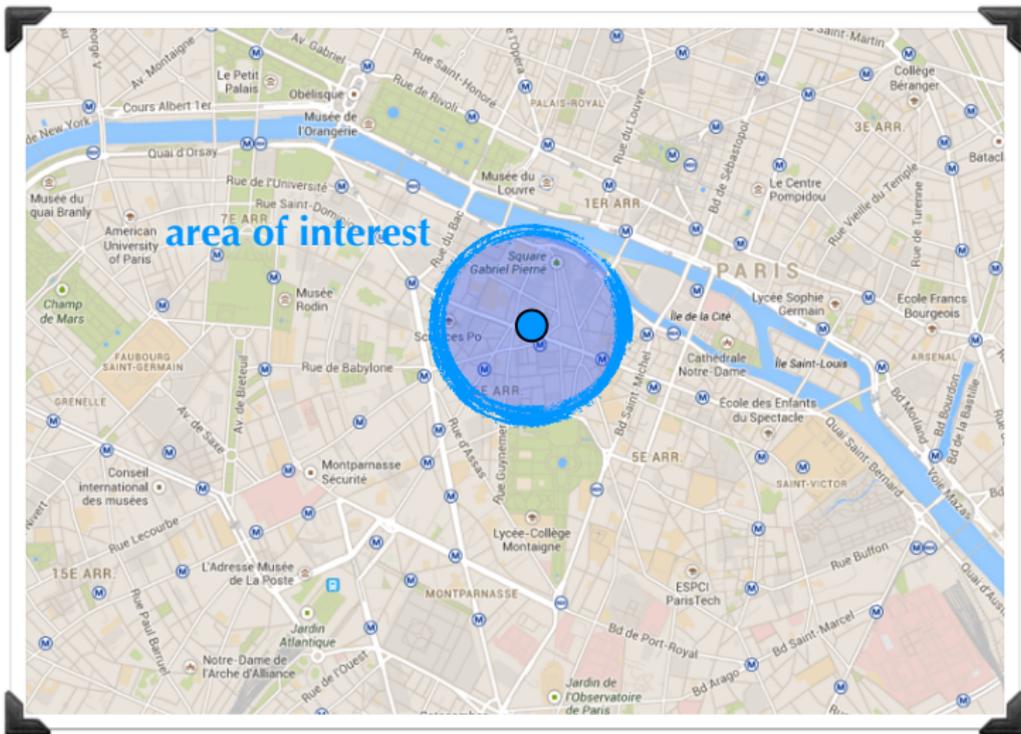


Example

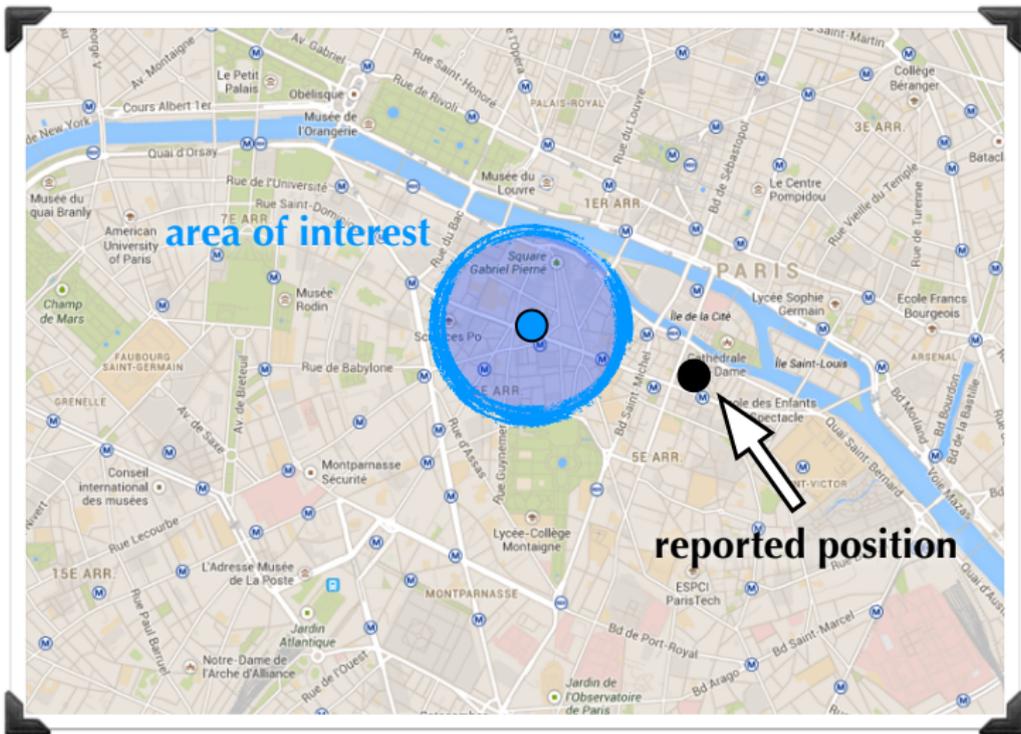
- ▶ Find restaurants within 300 meters.
- ▶ Hide location, **not identity**.
- ▶ Provide **approximate location**.



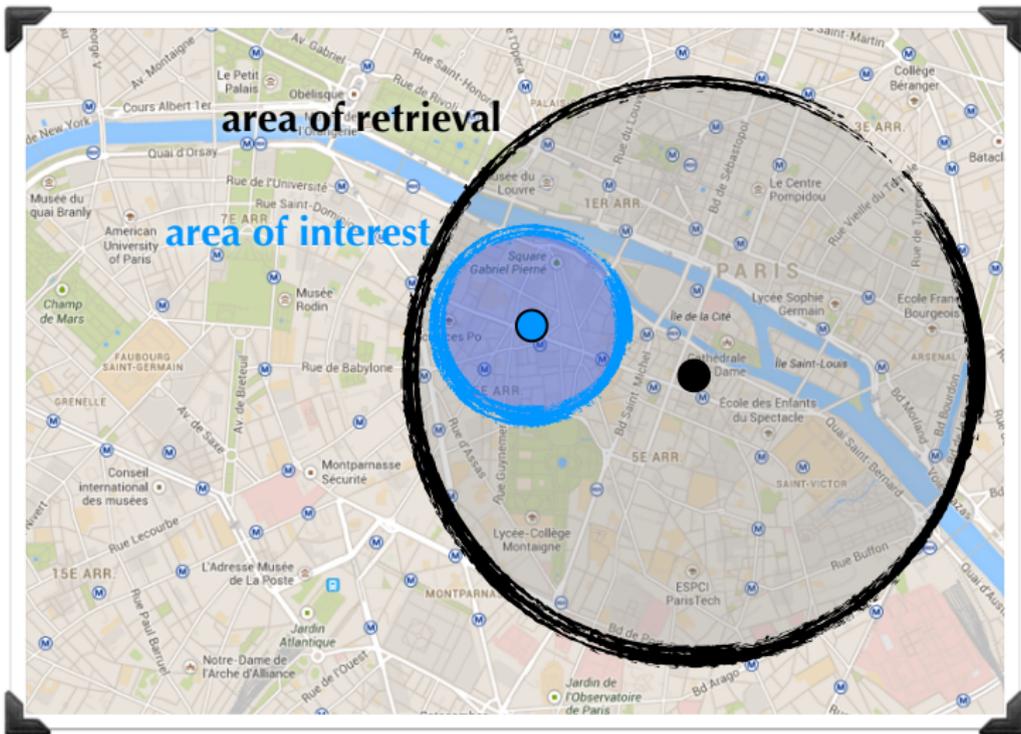
Obfuscation



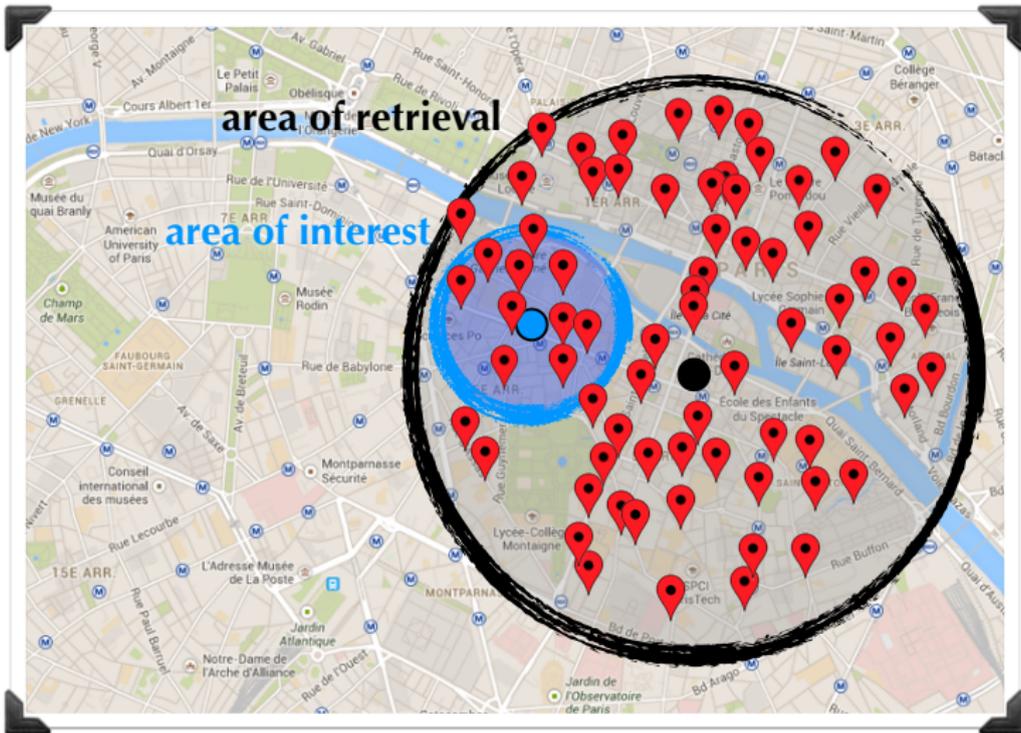
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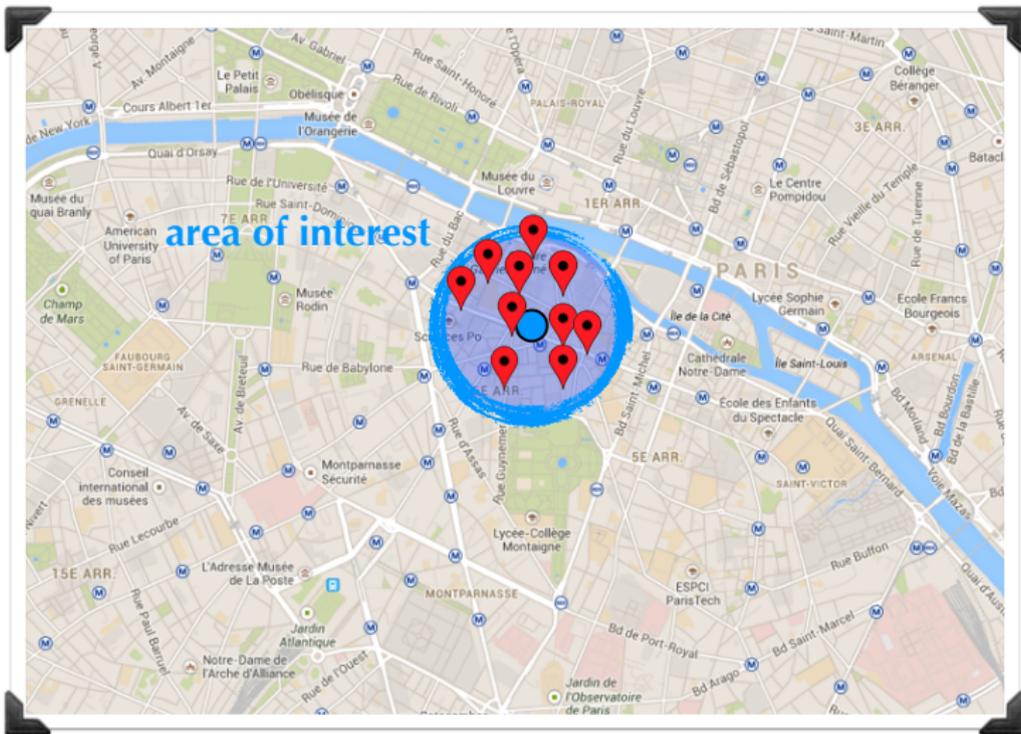
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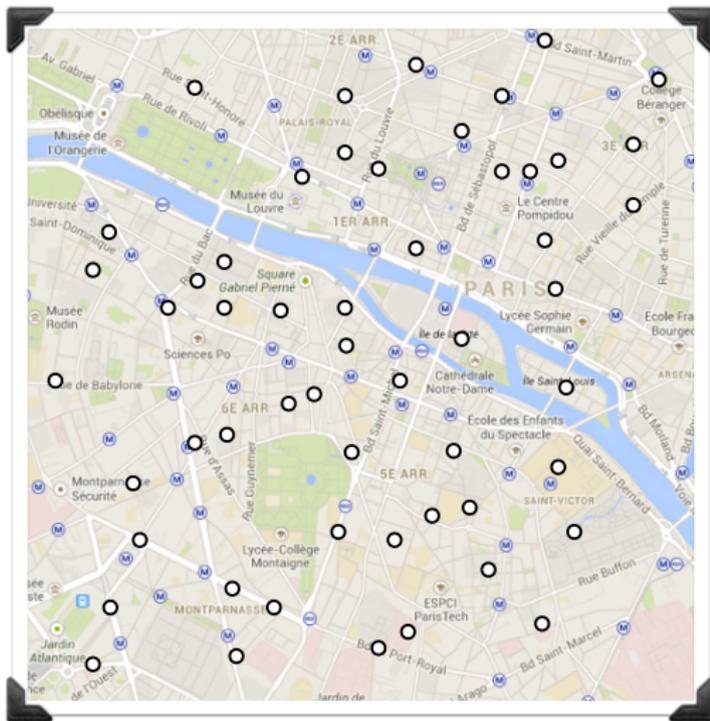


The Goals

- ▶ We want an **obfuscation mechanism**.
- ▶ Formal privacy definition, **independent from prior information**.
- ▶ **Easy to compute**, independently of the number of locations.
- ▶ No need of a trusted third-party.

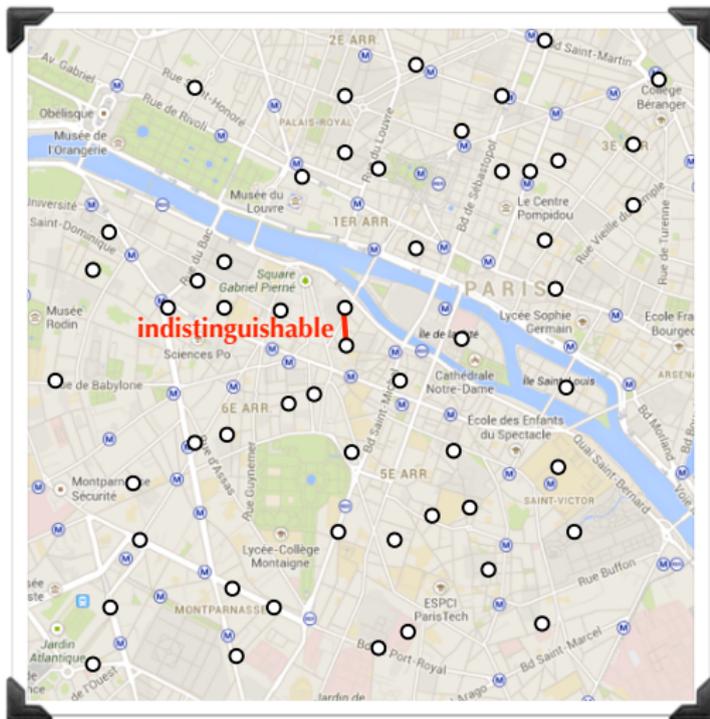
Towards a Definition

- ▶ Secrets are **locations**.
- ▶ Attacker's goal: **distinguish** location x from x' .
- ▶ The closer two locations are, the more indistinguishable they should be.



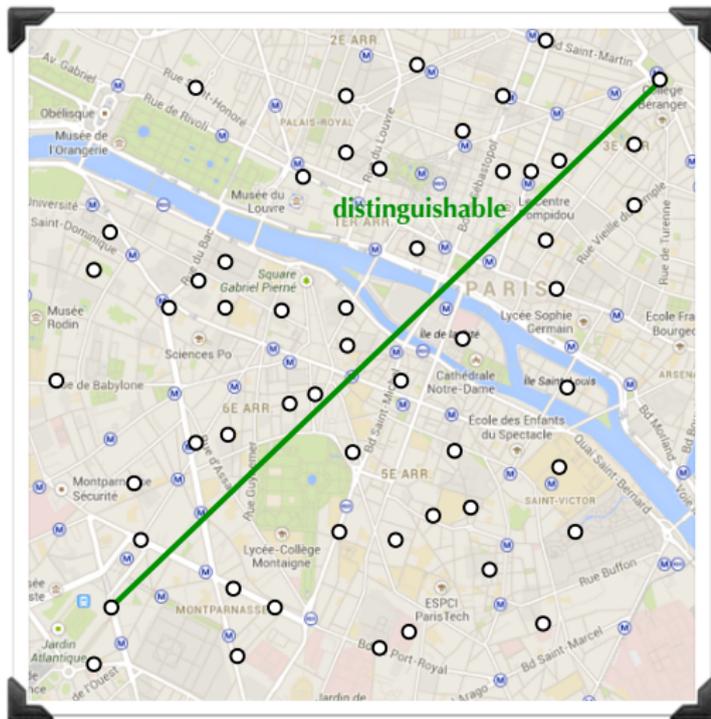
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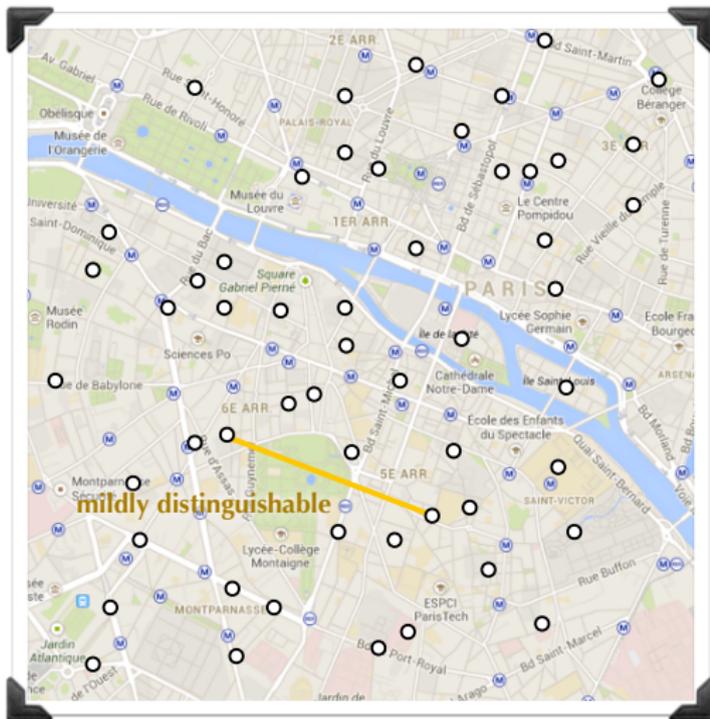
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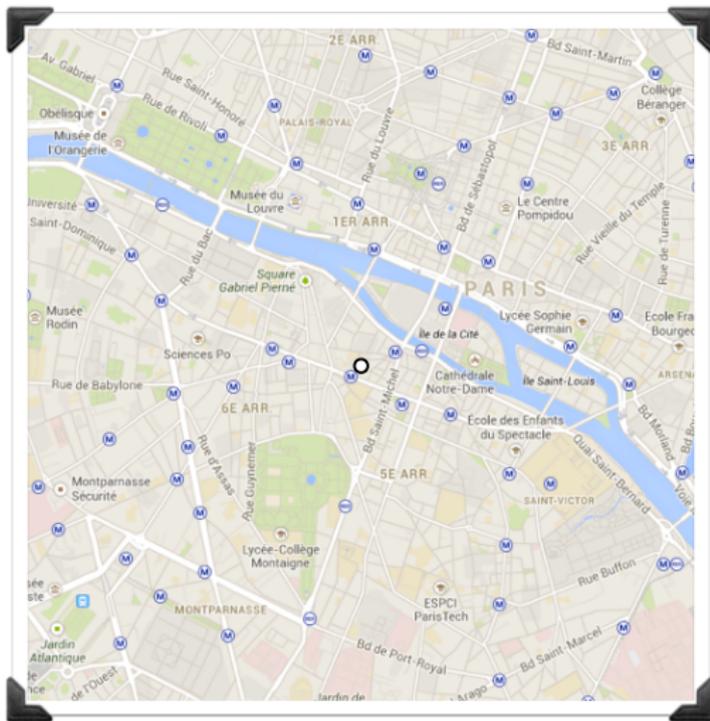
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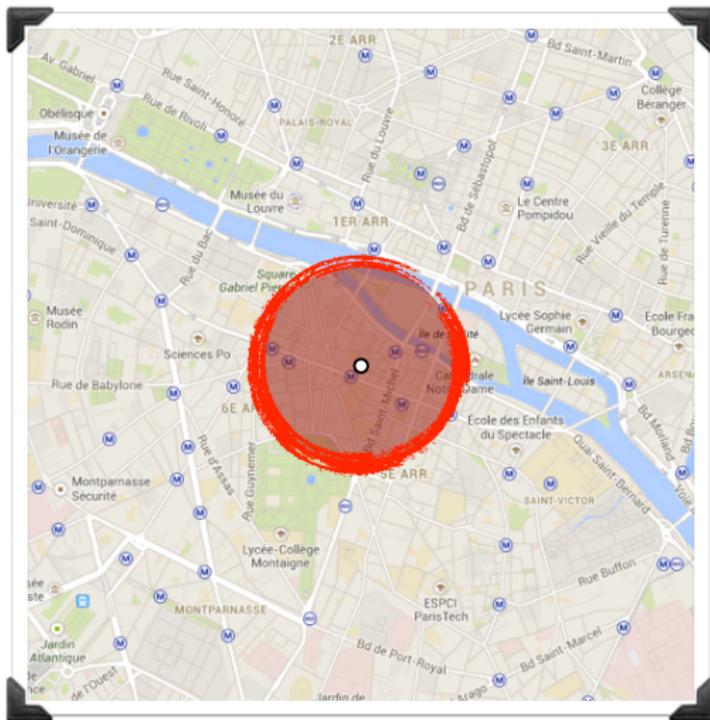
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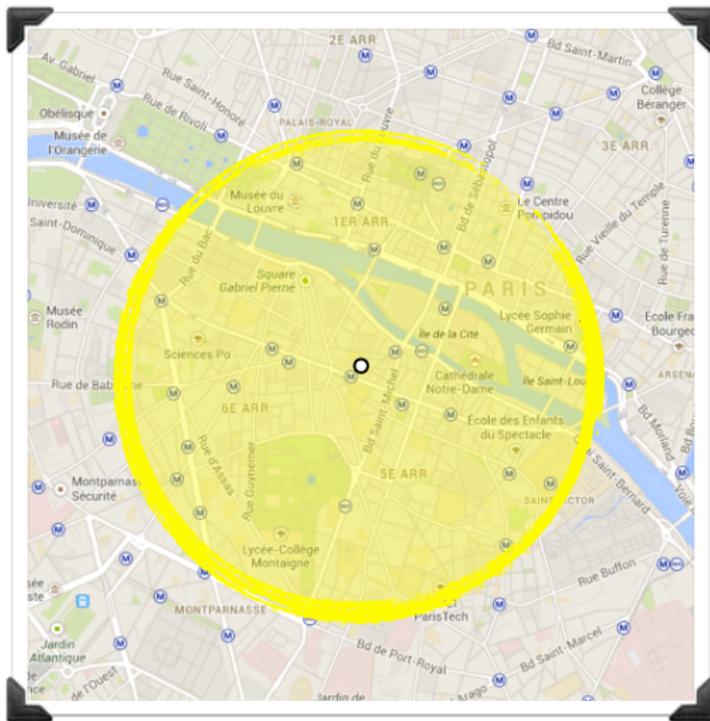
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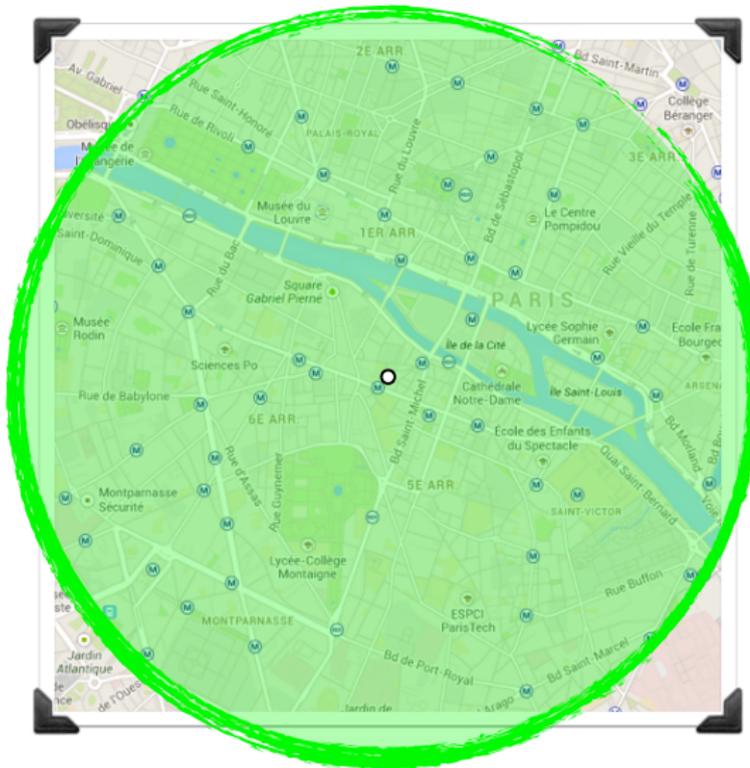
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Line of work

[PETS'13] privacy under general metrics

[CCS'13] application to location privacy, planar Laplace

[CCS'14] mechanisms of optimal utility

[PETS'14] protecting location traces

[sub. PETS'15] metrics adapted to the semantics of the map (Marco)

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Tool: **Location Guard**

Location Guard: goals

Provide a **simple solution**, for **sporadic, real-time** LBS access

Can we make it simple enough so that people **actually use it**?

Understandable, configurable by human beings

Low-level, **application-agnostic** solution

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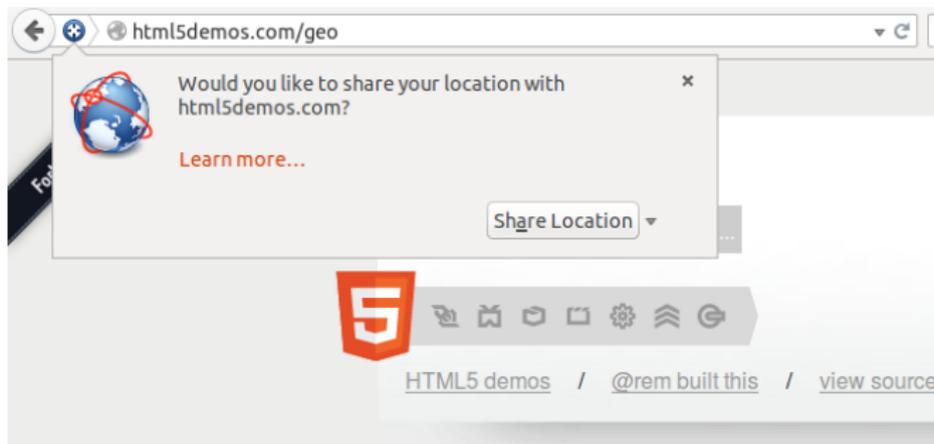
Understandable, configurable by human beings

Low-level, **application-agnostic** solution

OS-level on smartphones (problem: **rooting** the phone)

Browser level (desktop & mobile)

HTML5 geo-location API



Asking the browser for the user's location

Location Guard: adding noise

```
navigator.geolocation.getCurrentPosition(function(pos)
    alert(
        "Latitude: " + pos.coords.latitude +
        "Longitude:" + pos.coords.longitude
    );
);
```

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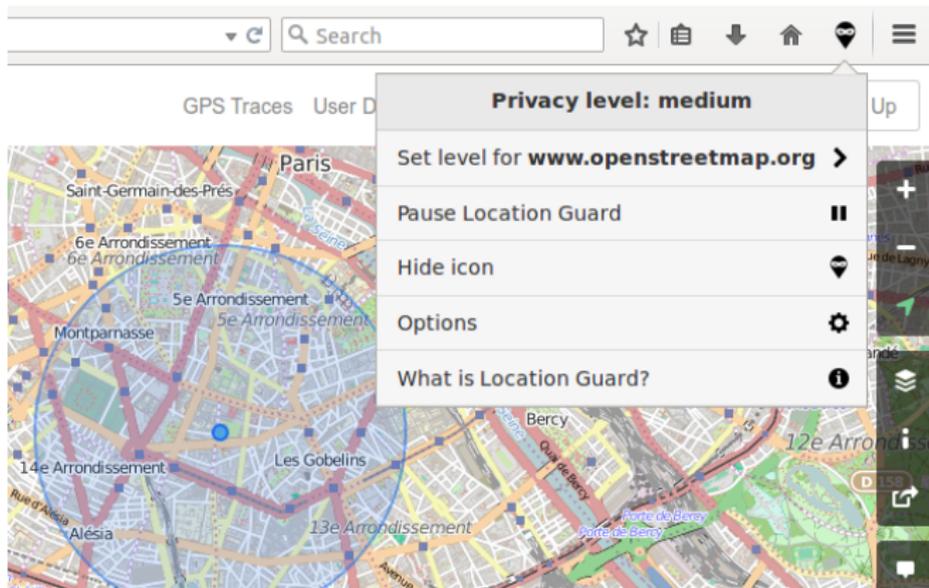
Intercept the javascript call

Content-script, running in separate javascript environment

Inject code in the page, replace `navigator.geolocation`

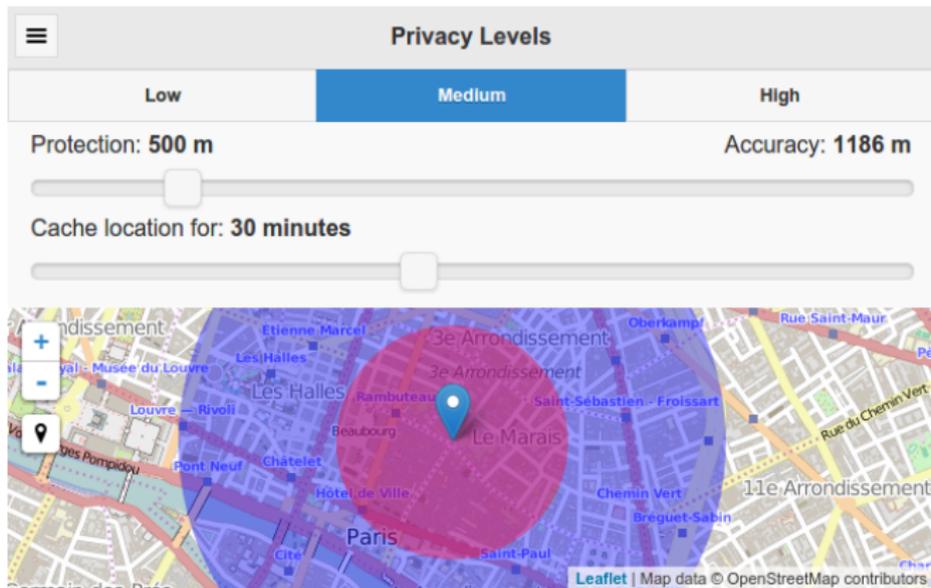
Transparent to the user

User interfaces are hard



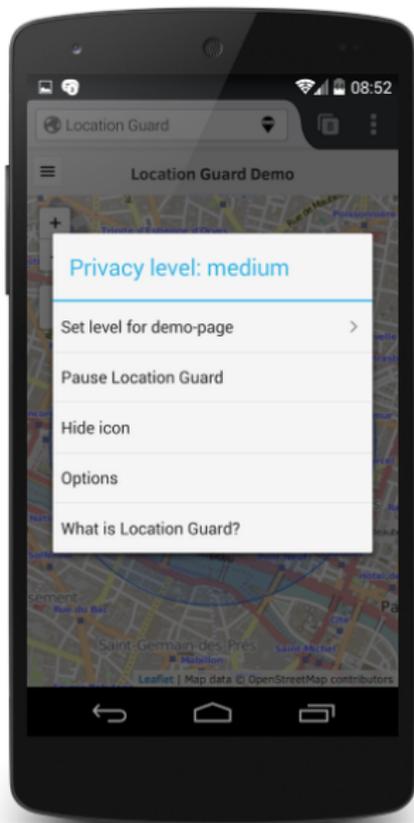
No initial setup, user configuration if needed

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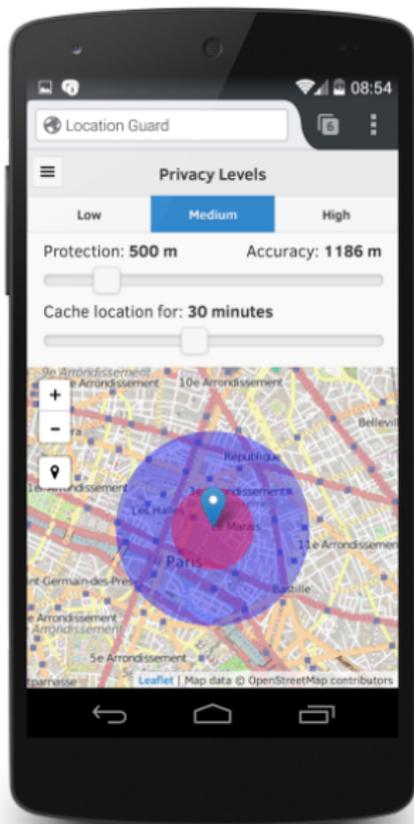


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Mobile support



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User adoption

Timeline

Nov 2013: Chrome

Jul 2014: Firefox

Feb 2015: Firefox Mobile

Feb 2015: Opera

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Current users

Chrome: 6224 active

Firefox: 4642 active

Firefox Mobile: 370 active

Opera: 2134 downloads

How do users discover Location Guard?

No publicity

Huge number of extensions (1367 in Firefox **privacy** category alone!)

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Occasional promotion by Google/Mozilla

Mostly by **searching** (users care about privacy!)

“location”: position 1-2

“privacy”: position 35-40

ghacks.net article

You are here: [Home](#) > [Firefox](#) > [Change your location in Firefox using Location Guard](#)

Change your location in Firefox using Location Guard

by [Martin Brinkmann](#) on December 1, 2014 in [Firefox](#) - Last Update: December 1, 2014

Geolocation, the retrieval of a connecting user's location in the world, can be beneficial to both user and website operator. When you connect to a weather website for instance, it is often the case that you want weather information for the location you are at.

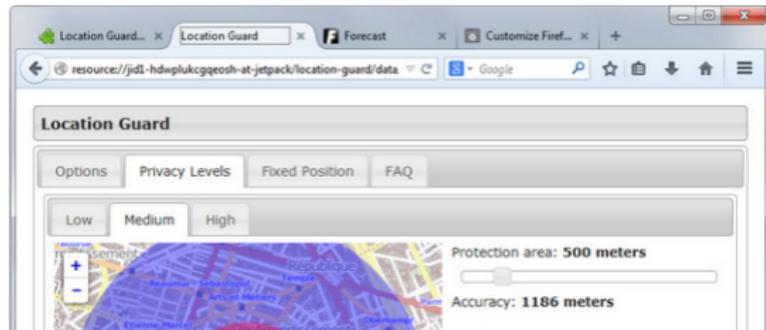
It can also be comfortable to be redirected to a country-specific version of a website.

Sometimes however, geolocation can backfire. This can be the case if you want to look up weather information for another location, if you don't want to be redirected automatically, or if the location that the service discovers is incorrect.

Privacy is usually not part of the problem and the main reason for that is that browsers such as Firefox display prompts before websites may access your location. Then again, if you allow it you may dislike that it can pinpoint your location precisely.

Location Guard is a relative new extension for the Firefox web browser that can be configured individually for each domain you visit that wants to access location-based features.

It offers two main features: the first enables you to add noise to your location so that it cannot be pinpointed with accuracy anymore. The second feature on the other hand sets your location to any place in the world.



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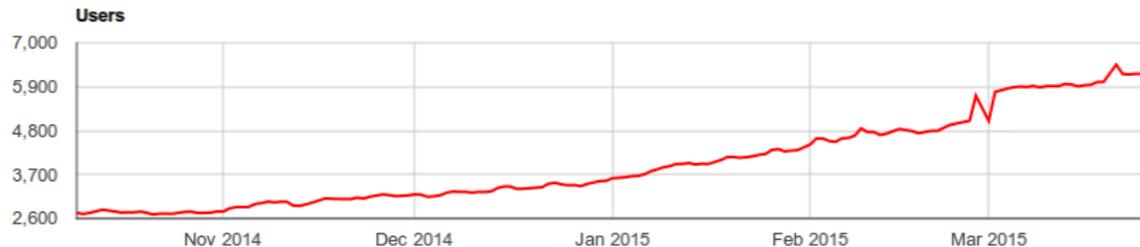
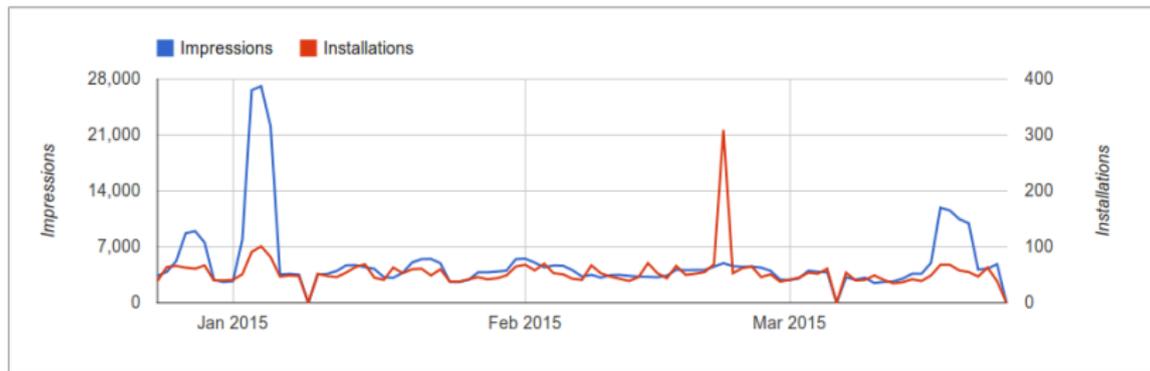
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ghacks.net article



Chrome: linear growth



Reviews

5 stars

Works as advertised. I like that there is an option that allows a user to set their location to where ever they choose.

Also, I like the idea of having a fixed location instead of just adding noise to the geo.

Reviews

1 star

After installation, I can not find any icon / starting point on FireFox!

We added a demo page...

Reviews

1 star

It doesn't work, weather.com and wunderground.com hit on my zip code immediately. I restarted the computer and it still doesn't work.

Reviews

5 stars

Very awesome idea, I didn't try this but I think it's a great idea.

Future directions

Try new **research ideas**

Adapt the noise to the semantics of the location

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Try new **research ideas**

Adapt the noise to the semantics of the location

Study the users' **behaviour**

Collect statistics (with the user's consent)