

Exploiting digital footprints to describe urban dynamics

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Me

- PhD candidate (2.5y) at Universitat Pompeu Fabra (advisor Josep Blat), Dpt. of Information and Communication Technologies
- Currently research assistant at MIT SENSEable City Lab (director Carlo Ratti), Dpt of Urban Studies and Planning
- Software engineering background, research in HCI and work in the context of the city



Digital traces

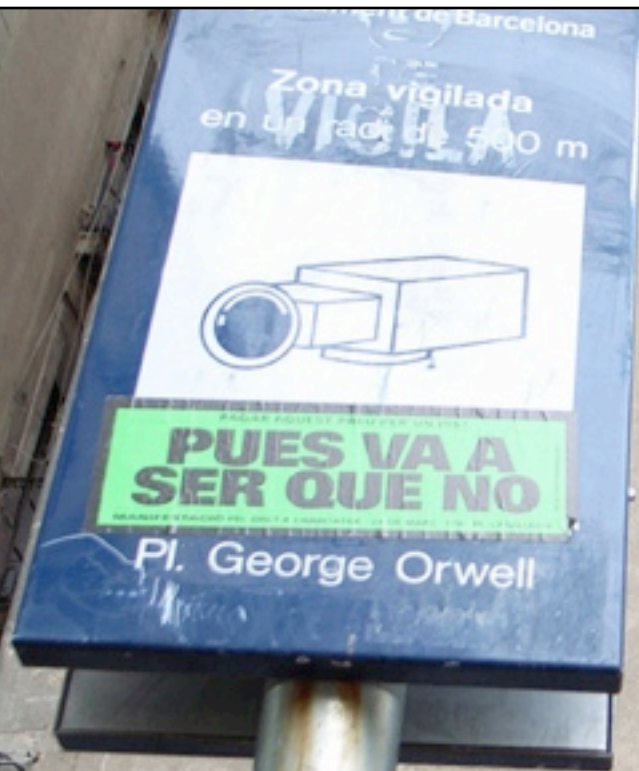


Records of
interactions in the physical space with digital means

“Digital footprinting”



Privacy



PLAÇA
DE
GEORGE ORWELL



Impact on social studies

- *“The consequences for the social sciences will be enormous: they can finally have access to masses of data that are of the same order of magnitude as that of their older sisters, the natural sciences”*

Bruno Latour (2007) in *Beware your imagination leaves digital traces*

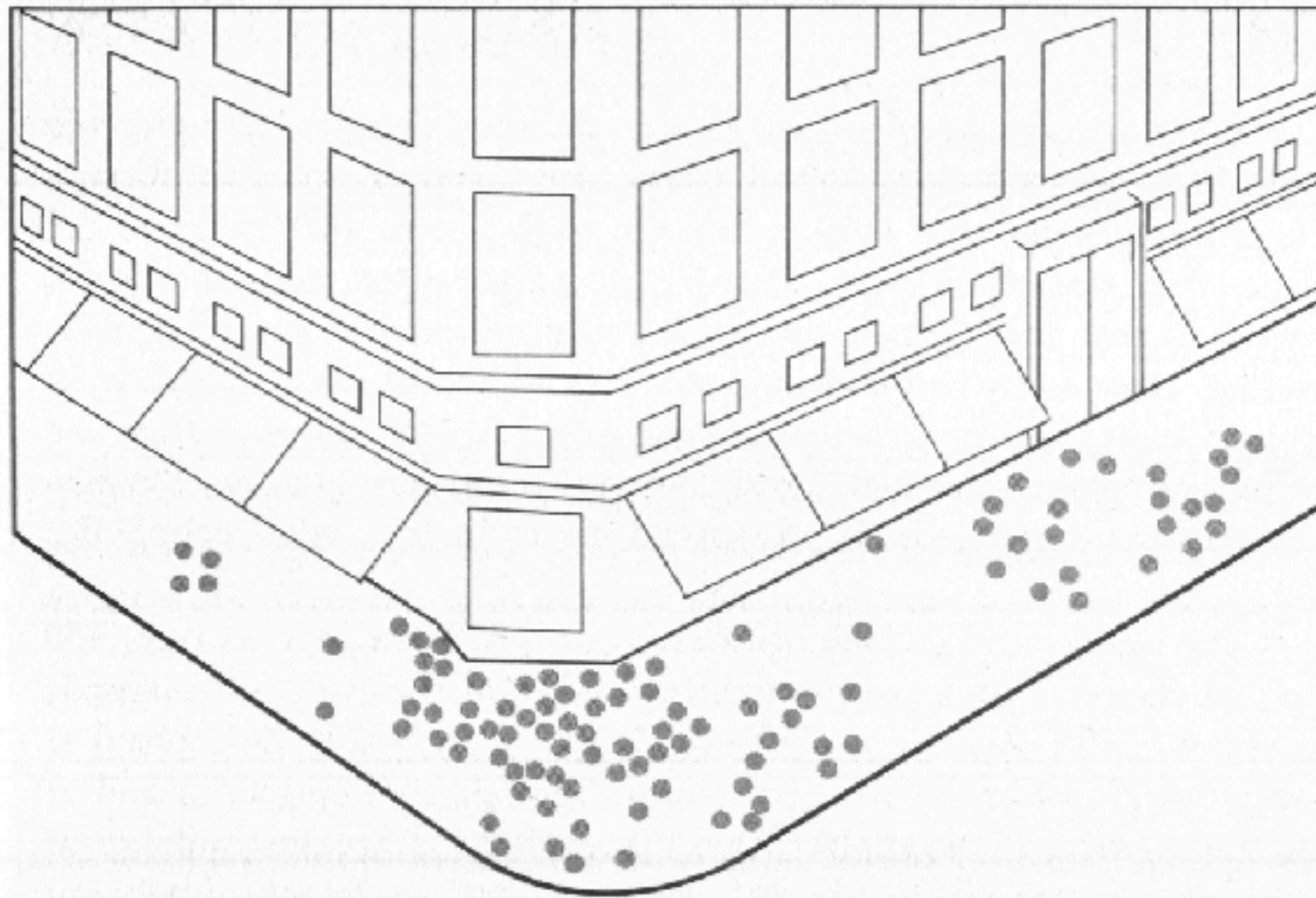
- Recent *“Understanding Individual Human Mobility Patterns”* in Nature.

Impact on travel studies

- No need of ad-hoc infrastructure
- Low costs
- No fatigue effect in travel surveys
- Scale

Impact on urban studies

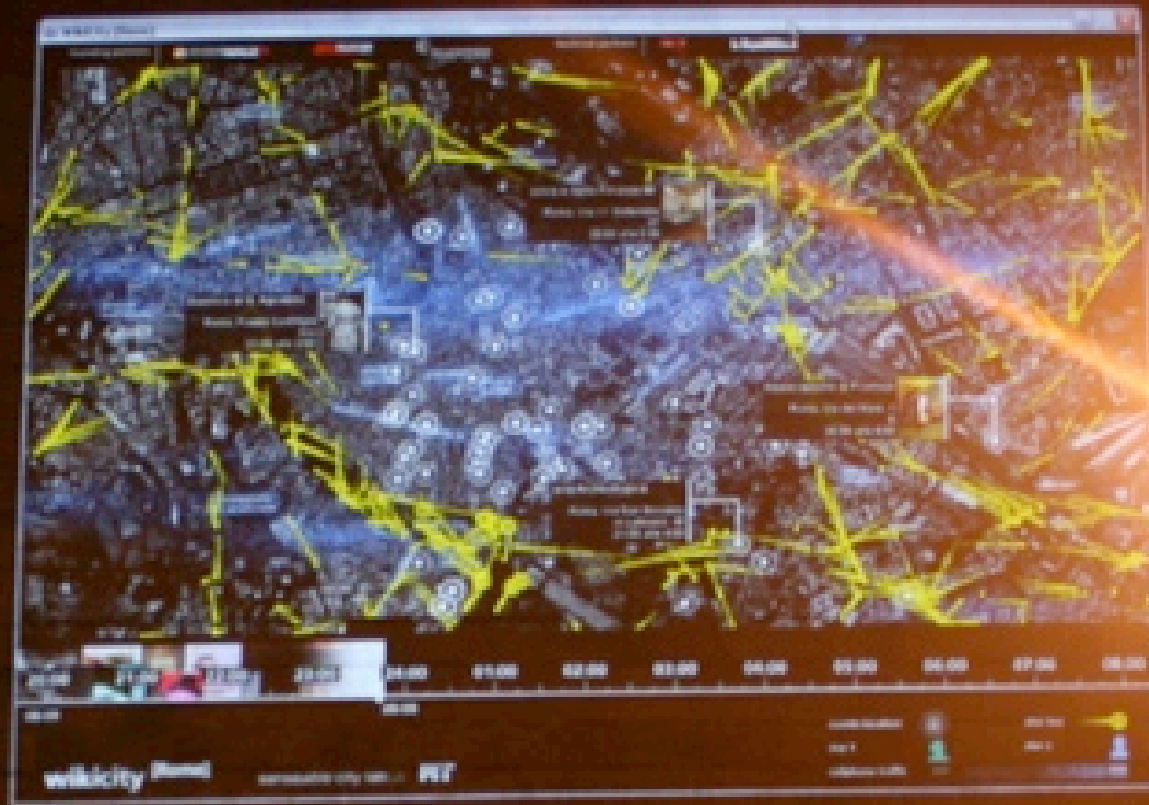
- Evidence-based urbanism (Space syntax)
- Remote control urbanism
- Post-occupancy evaluation



Location of street conversations lasting two minutes or more at Saks Fifth Avenue and Fiftieth Street. Cumulative for five days in June. Note main concentration at corner, secondary one outside entrance.

Video animation: **Real-time Rome**

<http://senseable.mit.edu/realtimerome/sketches/movies/wmv/s6.wmv>



Feedback loop

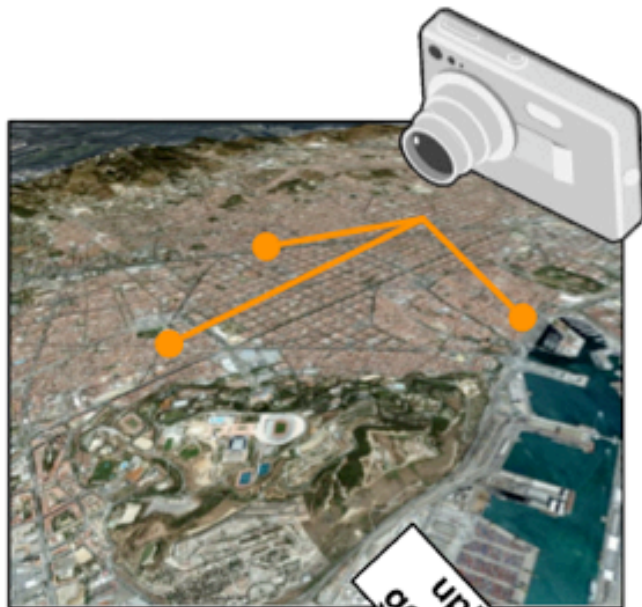
Video animation: **Revealing Paris Through Velib' Data**

<http://www.girardin.org/fabien/tracing/velib/>

Video animation: **Bicing Activity**
<http://www.girardin.org/fabien/tracing/bicing/>



Tracing the visitor's eye



upload and
geo-reference

Data set

Photo

id
latitude
longitude
taken_datetime
accuracy
owner_id
poi_id

User

id
nationality
active_periods

OD

id
origin_coord
dest_coord
photo_id

POI

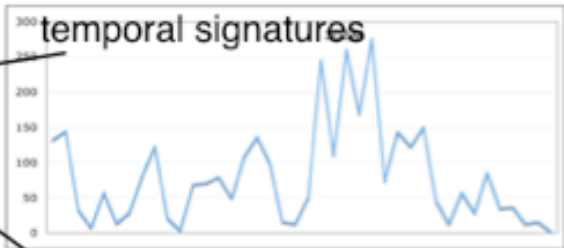
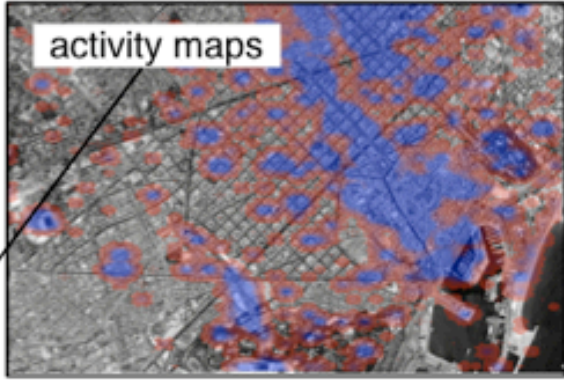
id
name
area_coordinates



retrieve with
Flickr API



Urban Dynamics software



2 years (2005-2007)

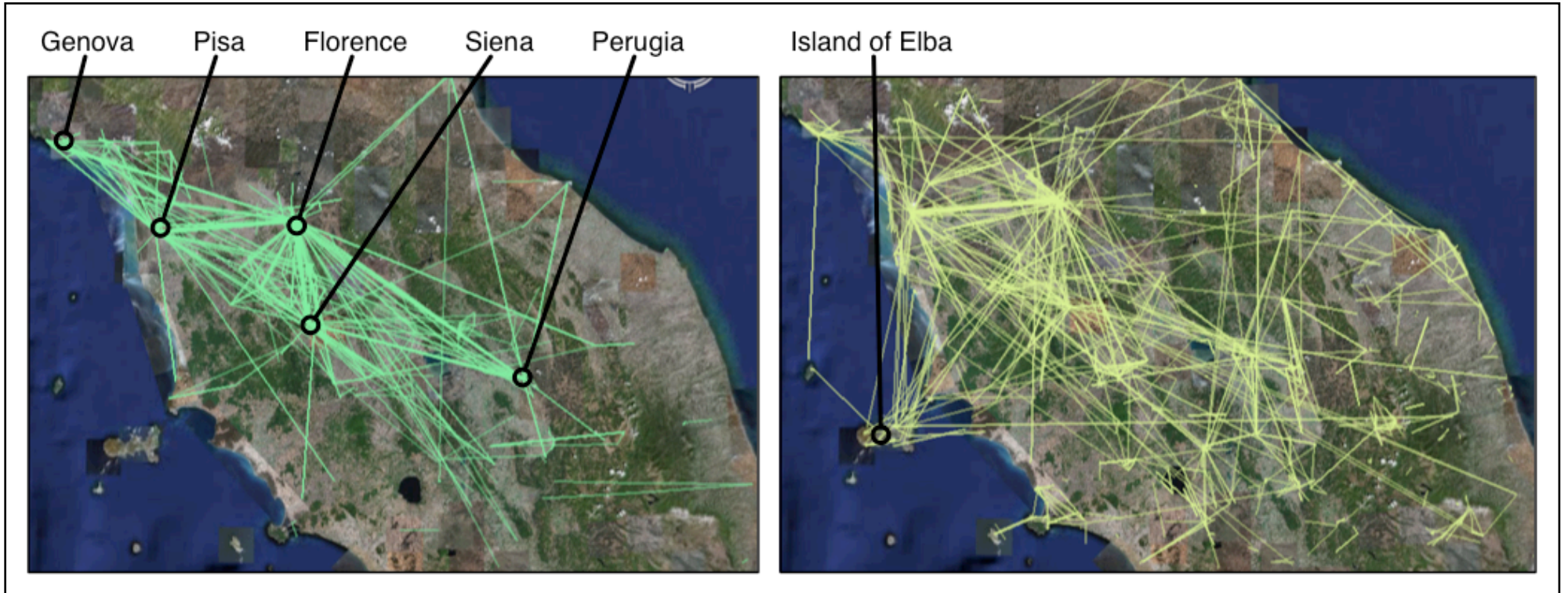
Region	Photos	Photographers
Barcelona	154,106	5818
Province of Florence	81,017	4280
Rome	144,501	6018

Tourists and locals can be recognized from their practice
60% of users disclose their home country

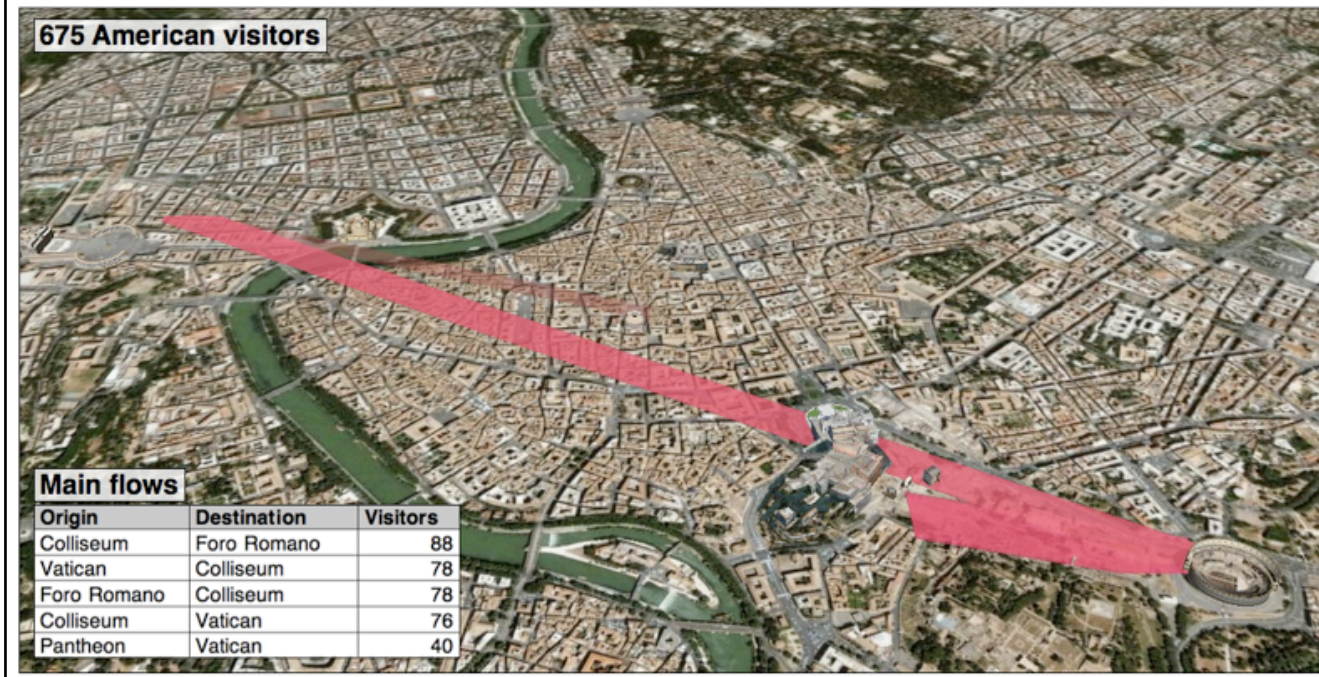
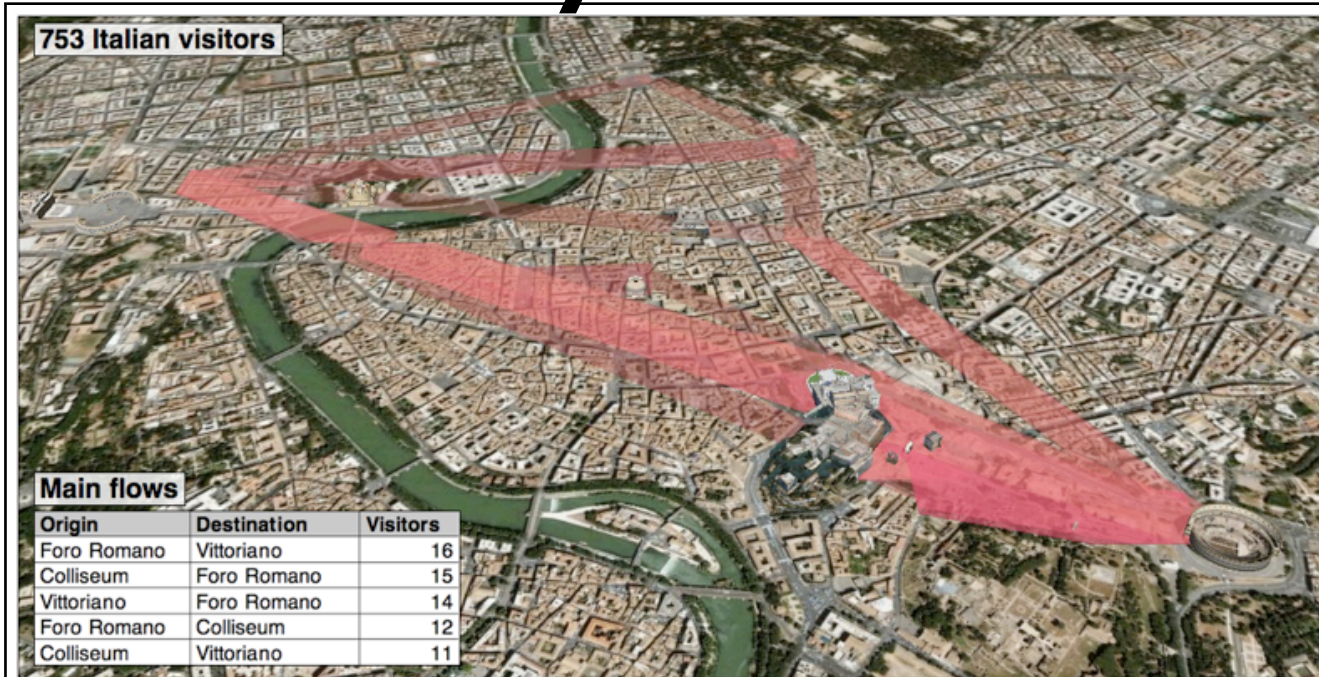


Presence

Flows



Quantify the flows



Spatio-temporal

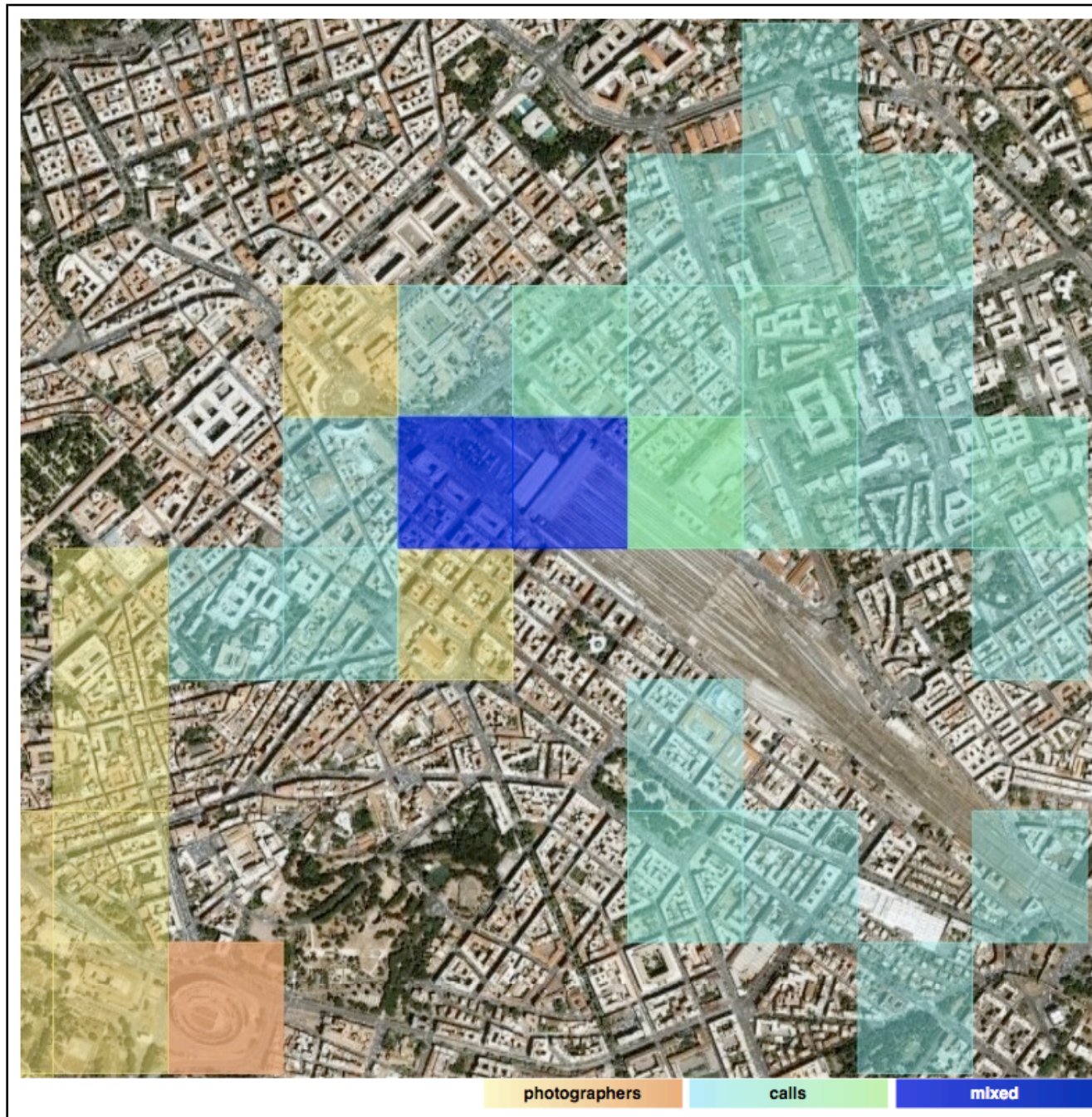
Video animation: **3D geospatial visualization of tourist density and flows**

<http://www.girardin.org/fabien/tracing/flows/>

Semantics



Tourist activities

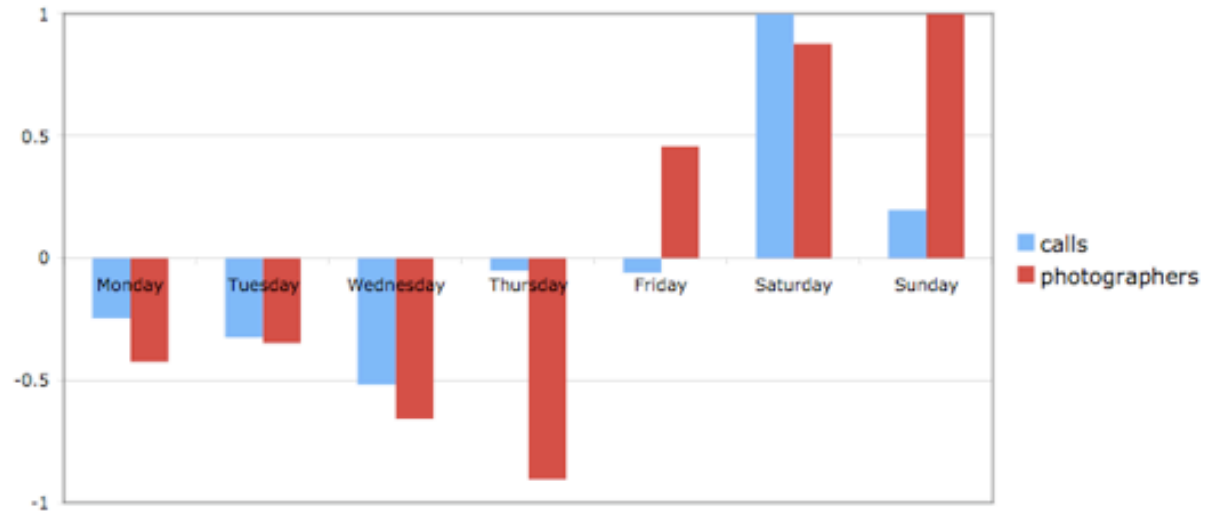


Tourist activities

Temporal comparison of days of the week. September-November 2006



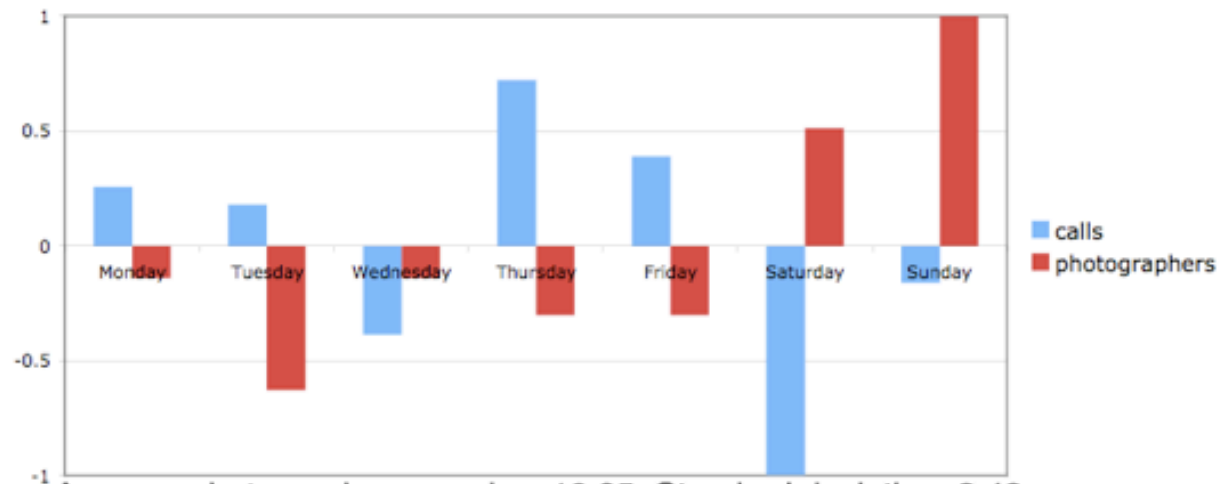
Colloiseum



Average photographers per day: 331. Standard deviation: 49.5
 Average phone calls per day: 620.47. Standard deviation: 99.65



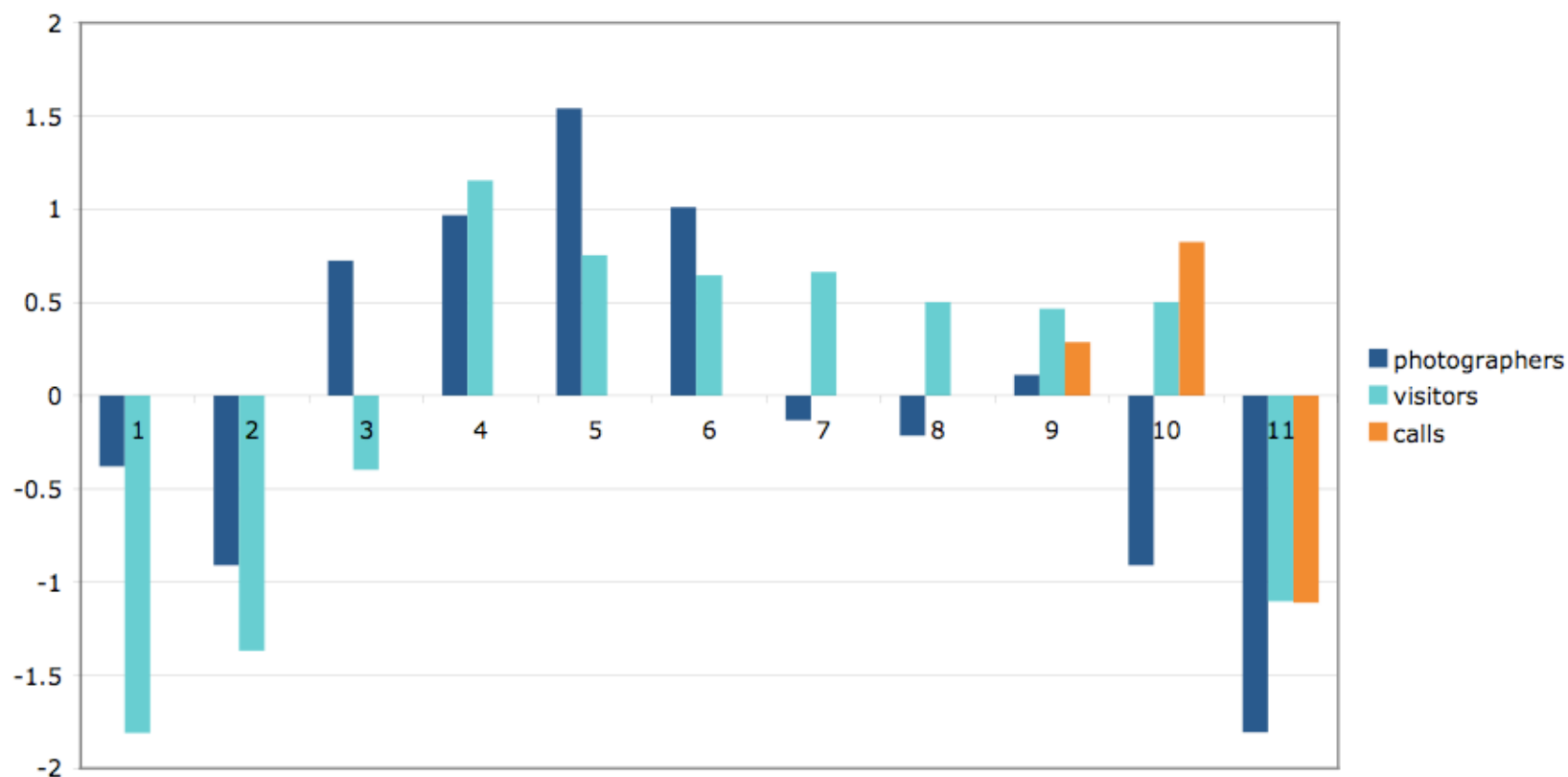
Train station



Average photographers per day: 10.85. Standard deviation: 3.43
 Average phone calls 1165.35 per day. Standard deviation: 198.43.

Representativeness

Temporal comparison of Colloseum for months January-November 2006



Average photographers per month: 95.27. Standard deviation: 24.48

Average visitors (tickets) per months: 351499. Standard deviation: 107734

Average phone calls per month (September-November): 17074. Standard deviation: 5793

Limitations

- Sense what is “cheap” to sense
- Reveal phenomena. But does not explain them
- Therefore, need to study the practice that create these digital footprints (current ongoing study)

Current work

