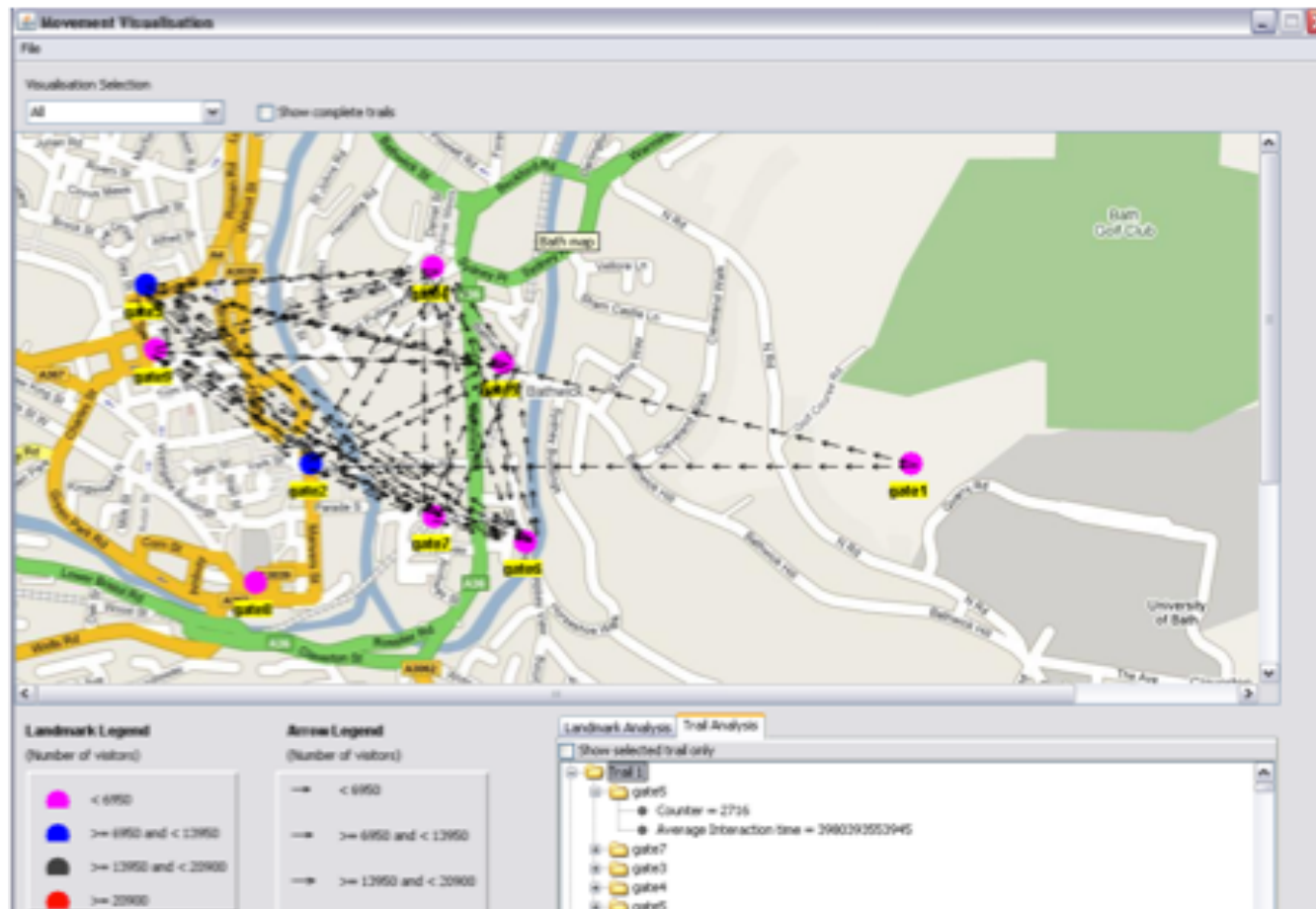


Mobile Sensing, BYOD and Big Data Analytics for Museum Visitor Studies

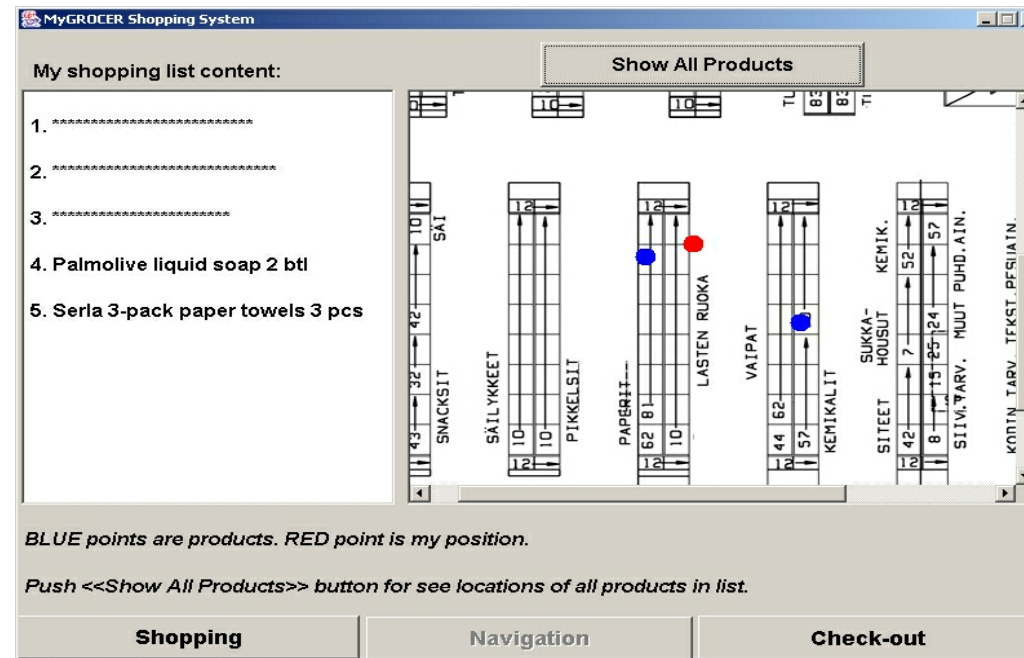
Theano Moussouri
UCL Institute of Archaeology

George Roussos
Department of Computer Science
Birkbeck College

Commuter



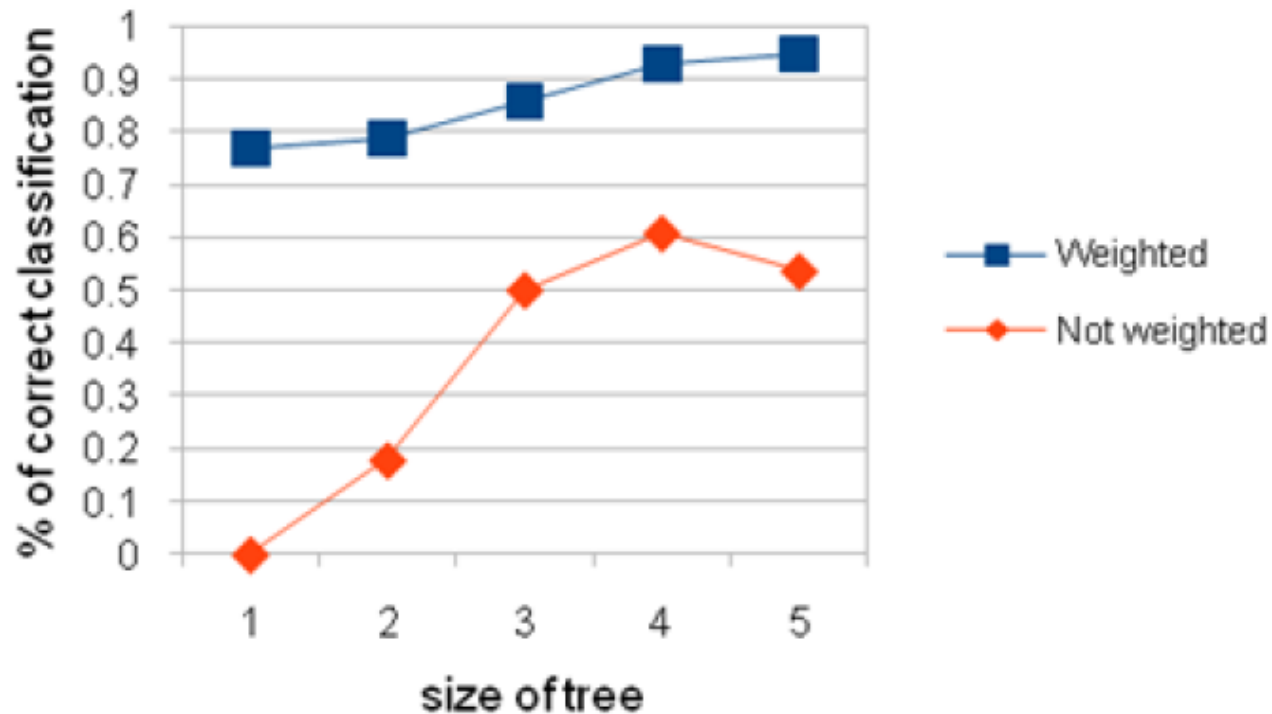
Supermarket Shopping



(Daily) Routines



Identifying individual without ID



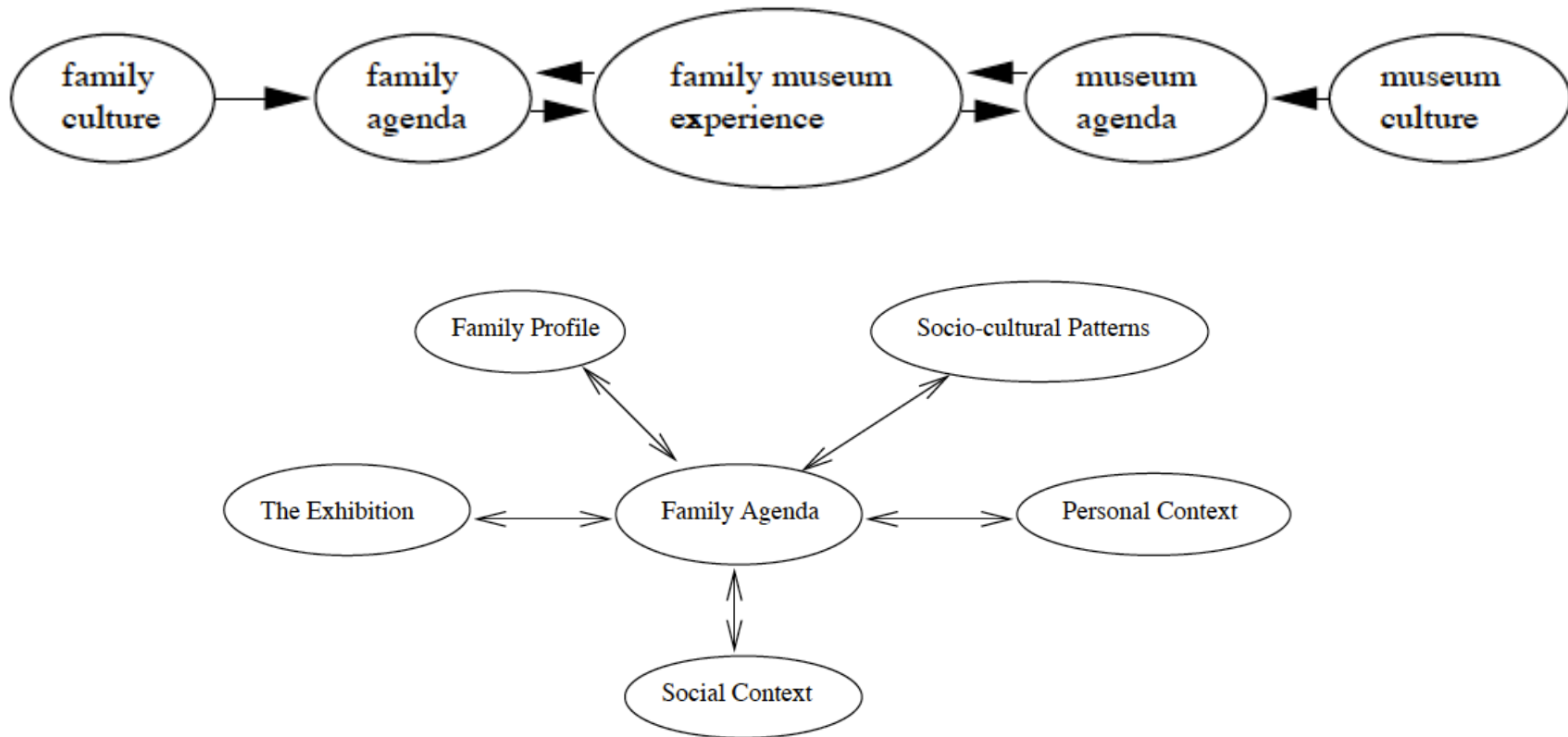
Reality-mining data set

Identify user 39 using 2 months for training and test on next month

London Zoo study

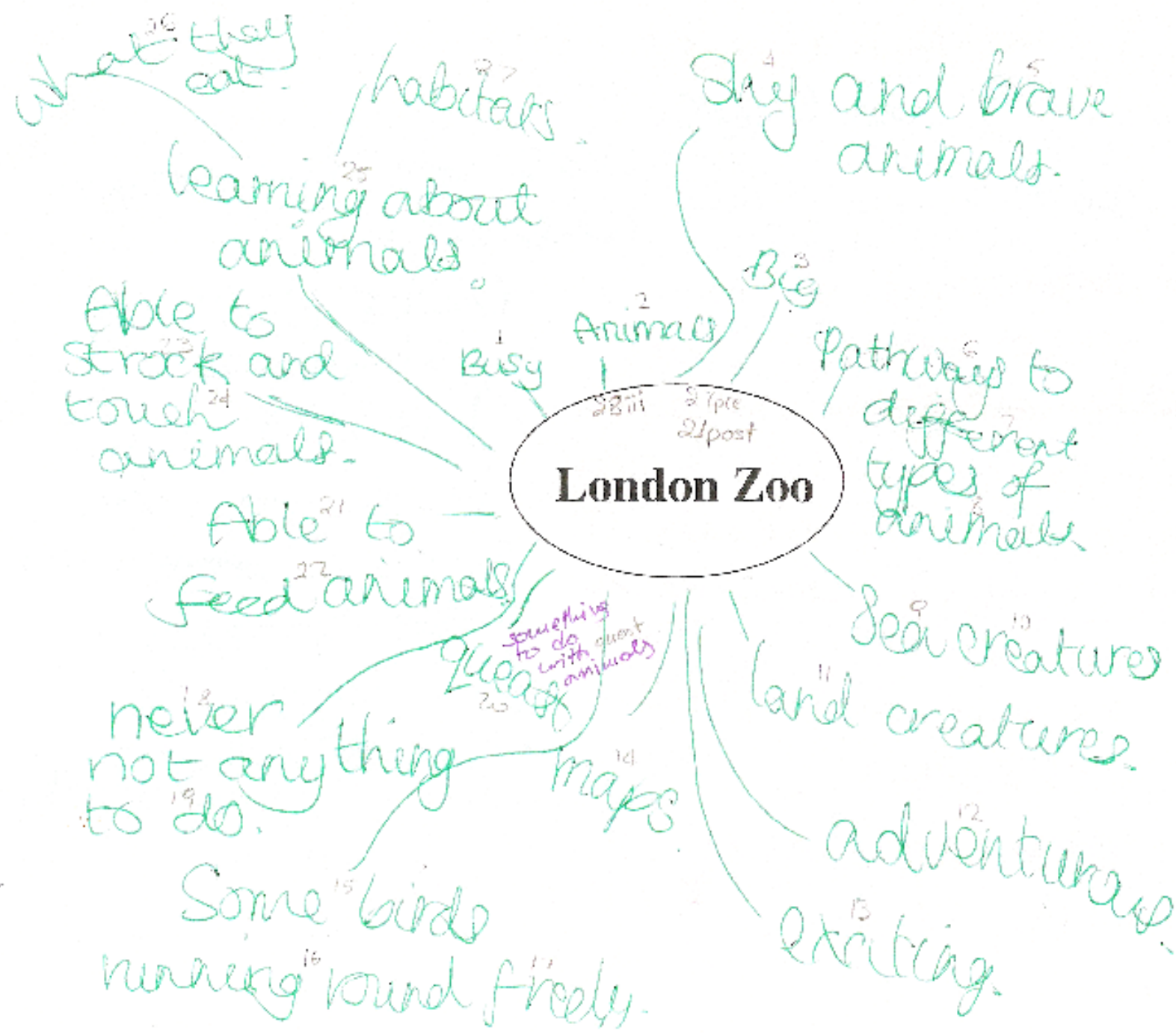
- Do motivations influence the observable visit strategy?
 - family visitors, science rich environment
- 44 families = 115 individuals
- Pre-visit imagined itineraries, expectations & motivations
- Pre-visit concept maps
 - imagined itineraries, expectations
- Smartphone Tracking
- Post-visit concept map
 - reconstructed itineraries

Family agenda



Culturally-determined Motivations

- Education / participation
- Biophilia
- Place
- Entertainment
- Flow
- Life-cycle
- Introspection
- Therapeutic
- Political / participation
- Social event



London Zoo Etc.

What comes to mind?

- things
- ideas
- questions
- words
- what you picture/imagine
- past experiences
- feelings
- interests
- related themes
- places
- comments
- opinions
- Etc...

GPS tracking

- Used openmoko mobile phone
www.openmoko.org
- One phone per family
- Captured detailed tracking info
 - Logged one location per sec
- GPS works only outdoors but also indoors when the roof is thin (many Zoo building have thin roofs!)

Type of data Latitude Longitude Number of sats used

```
$GPGGA,115000.00,5132.11382,N,00009.27636,W,1,05,1.45,31.9,M,47.0,M,,*75
```

Time We have fix



Integrated ATMEL single-chip A-GPS
16-channel GPS correlator
Time to First Fix: 34s
Acquisition Sensitivity: -142 dBm

More on the NMEA spec for GPS data at http://en.wikipedia.org/wiki/NMEA_0183

Google maps



[Get directions](#) [My places](#)

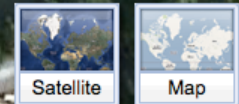
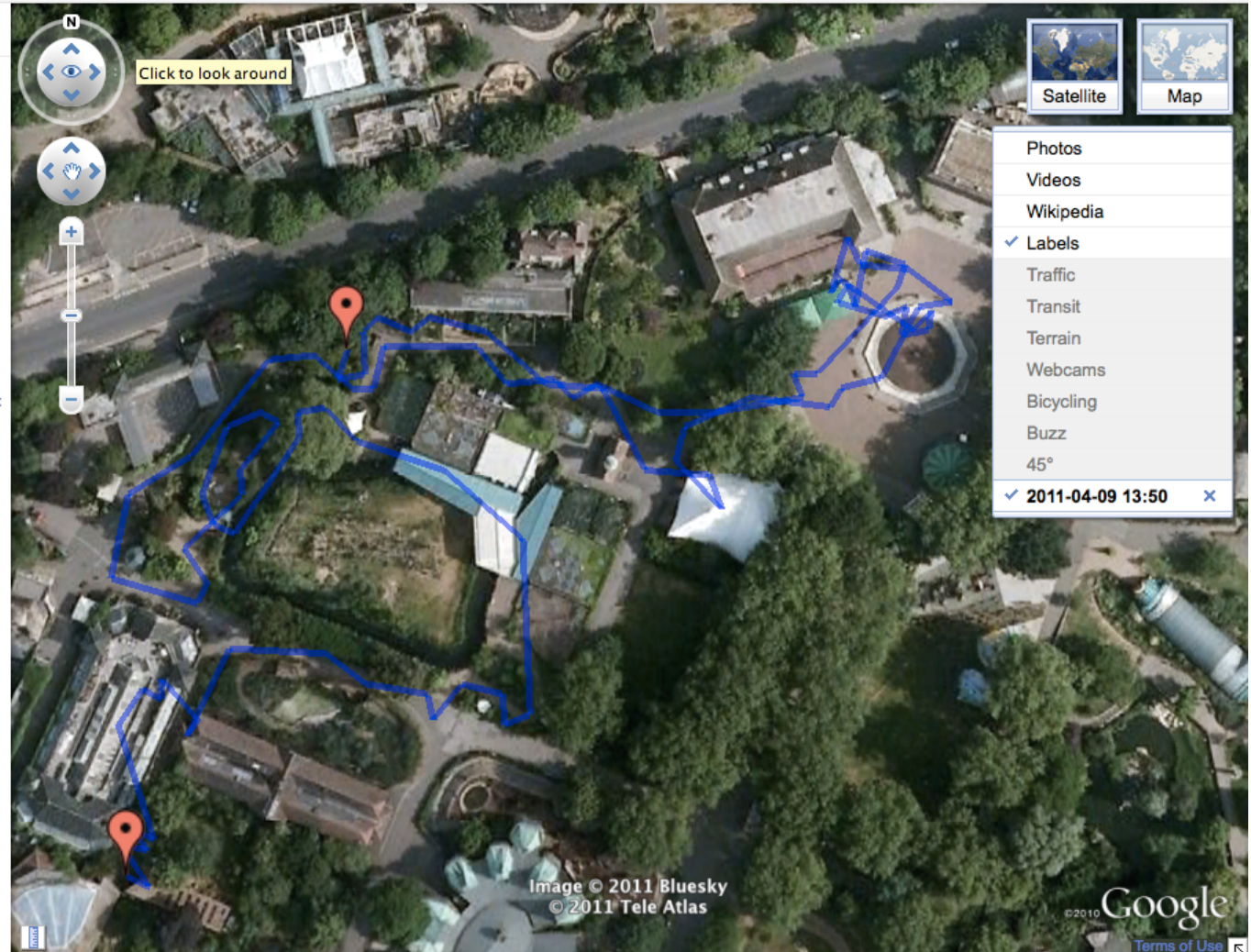
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Total Time: 1:51:32 Moving Time: 23:17 Average Speed: 0.75 km/h
(0.5 mi/h) Average Moving Speed: 3.60 km/h (2.2 mi/h) Max Speed: 12....



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Collaborate

Edit

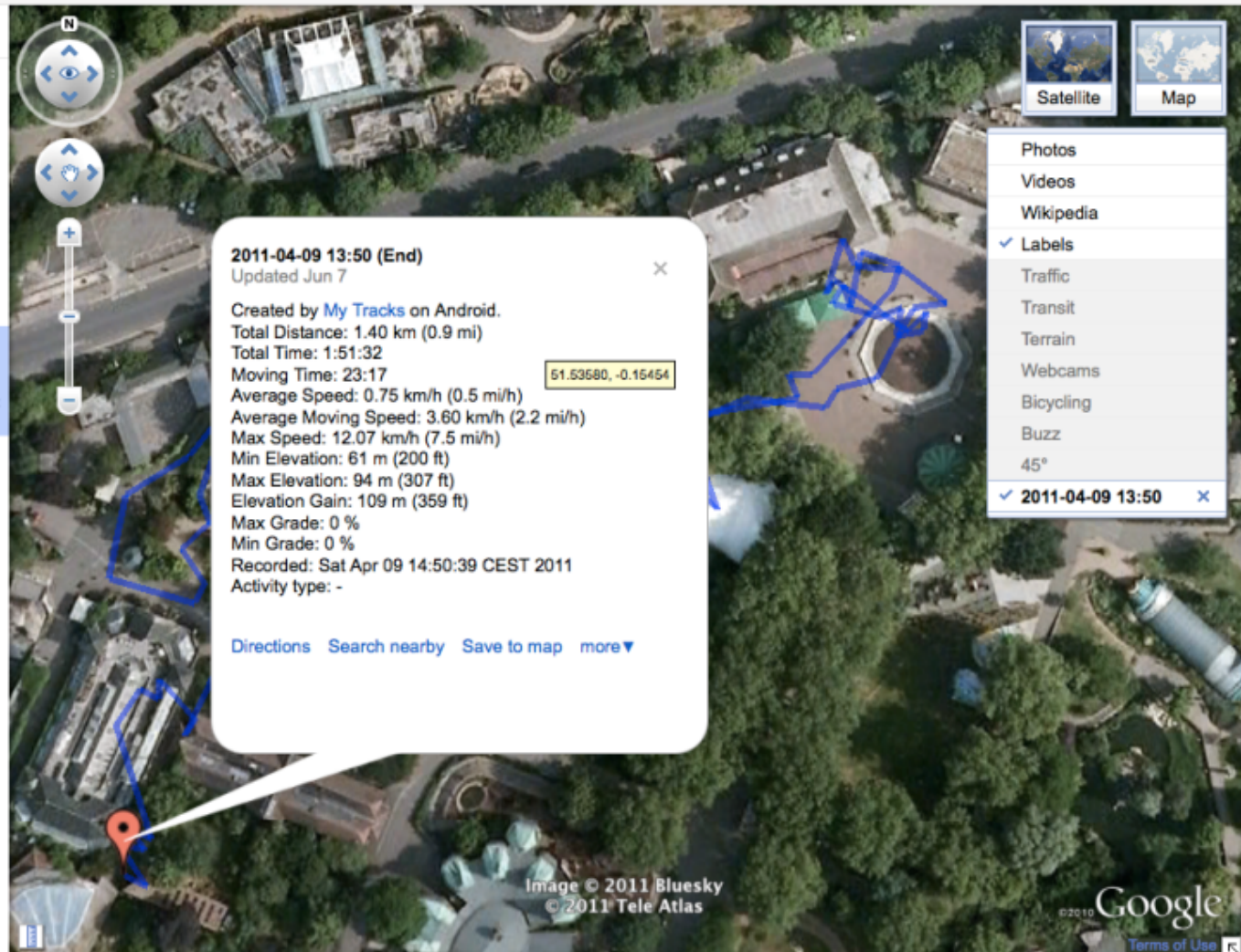
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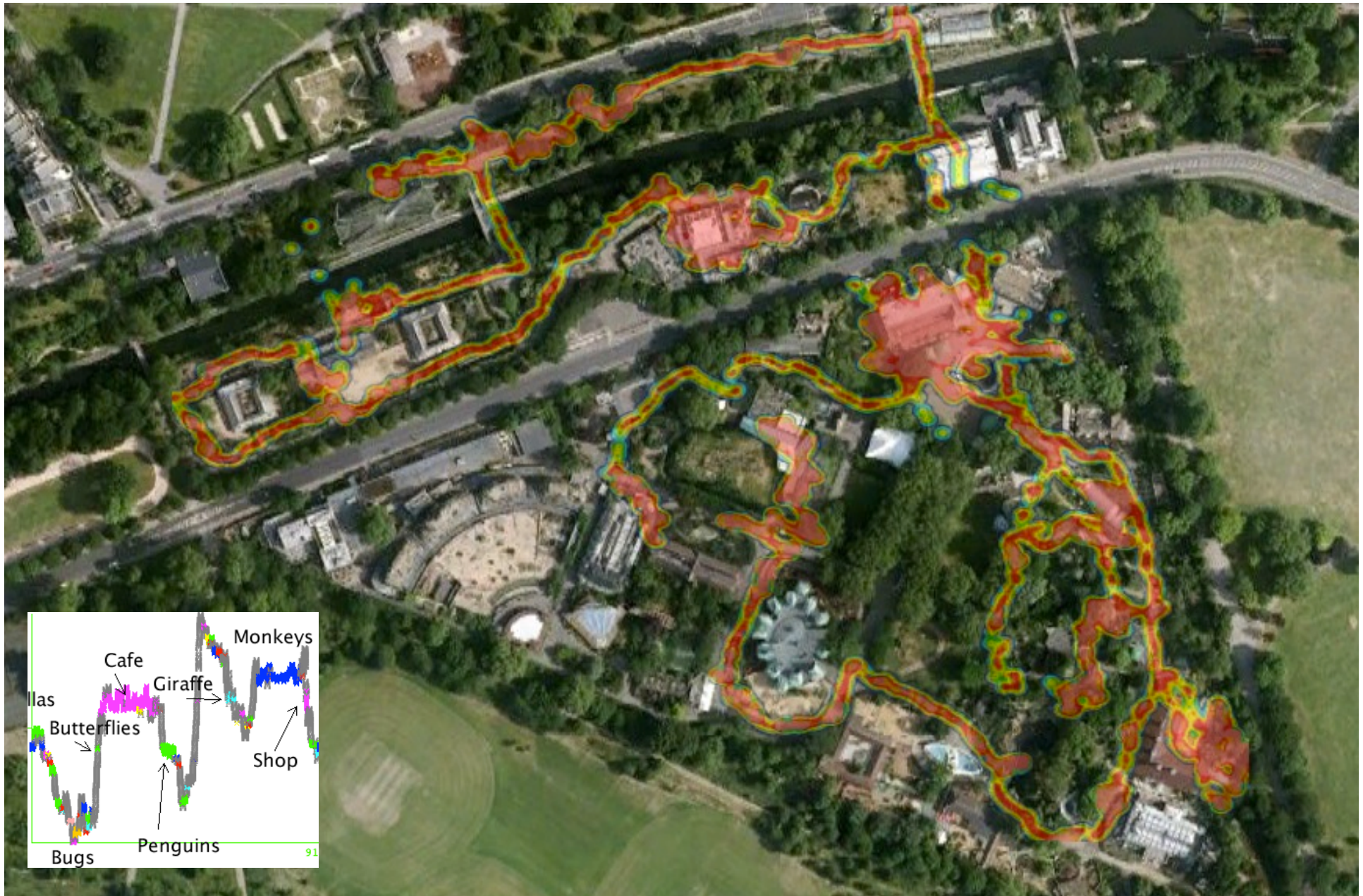
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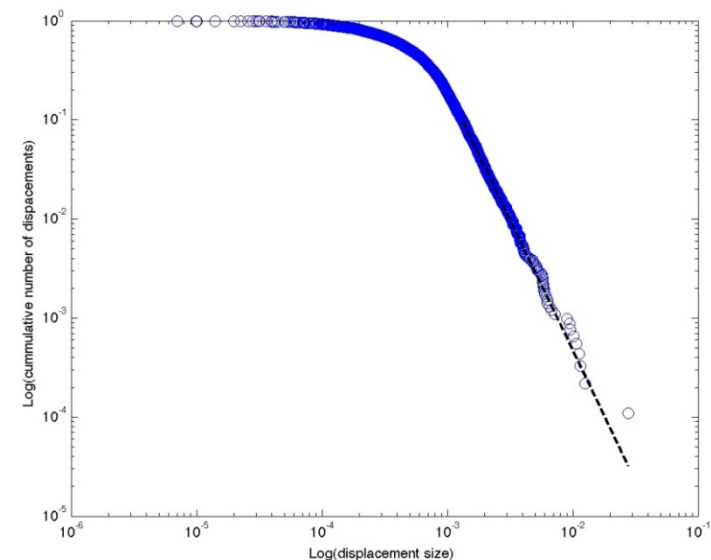
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Total Time: 1:51:32 Moving Time: 23:17 Average Speed: 0.75 km/h
(0.5 mi/h) Average Moving Speed: 3.60 km/h (2.2 mi/h) Max Speed:
12.....





Statistical representation

- Statistical representation of observable strategy: power law distribution of displacements indicates Levy flight-type behaviour
- Such behaviour associated with optimal information seeking behaviour
- What is the generating mechanism in this case?
 - Verbal descriptions of itineraries
 - Visual information?
- Does not correlate to motivation, itineraries or learning outcomes



Cumulative probability density function of (time-weighted) movement displacements for family F4

Functional Semantics of Space

- Association studies
- Discovered relationship between principle motivation and the functional semantics representation of visit strategy
 - Families with social event or entertainment motivation always visited at least one place of the non-exhibit function, spending an average of 25-30 percent of the total visit in places such as café, shop, and playgrounds.
 - Families with education/participation motivation visited only places with exhibit functions