

Checking out checking in: Observations on Foursquare usage patterns

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*International Workshop on Finding
Patterns of Human Behaviours in
Network Data and Mobility Data -
NEMO
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Motivation

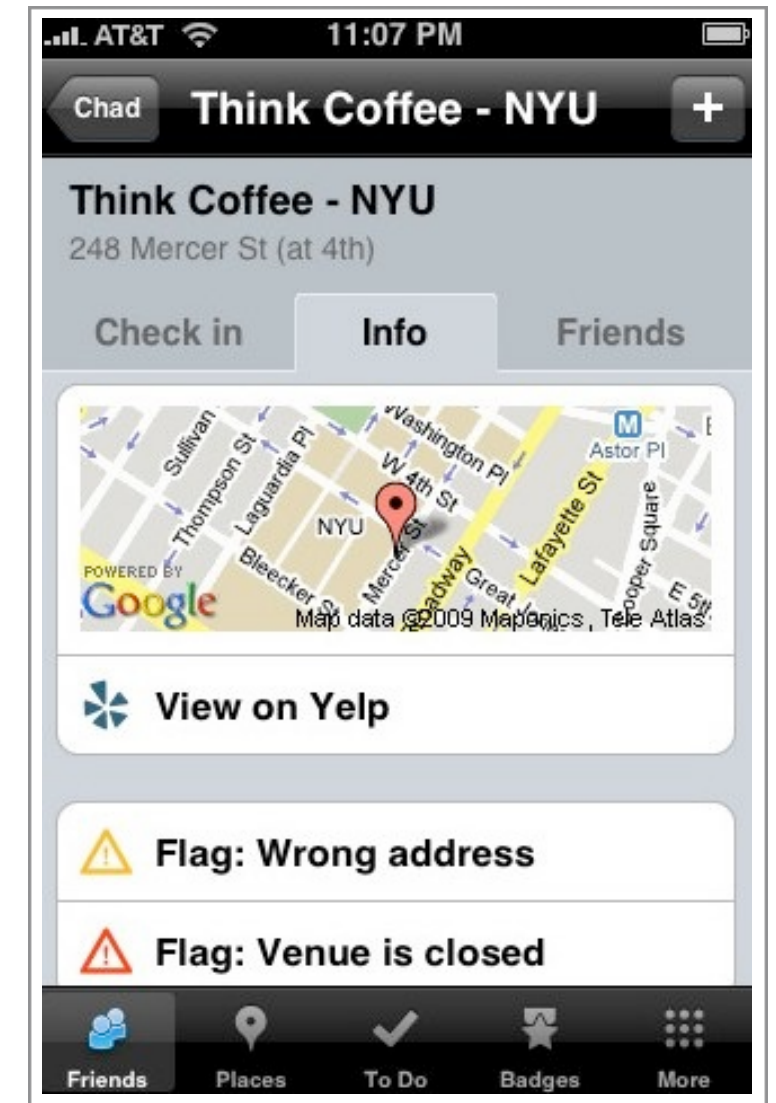
- Areas of study:
 - Presence of routine (regularity) in mobility and encounters
 - Relationship between personality traits and mobility behaviour
 - Heterogeneity in individuals' behaviours

Motivation

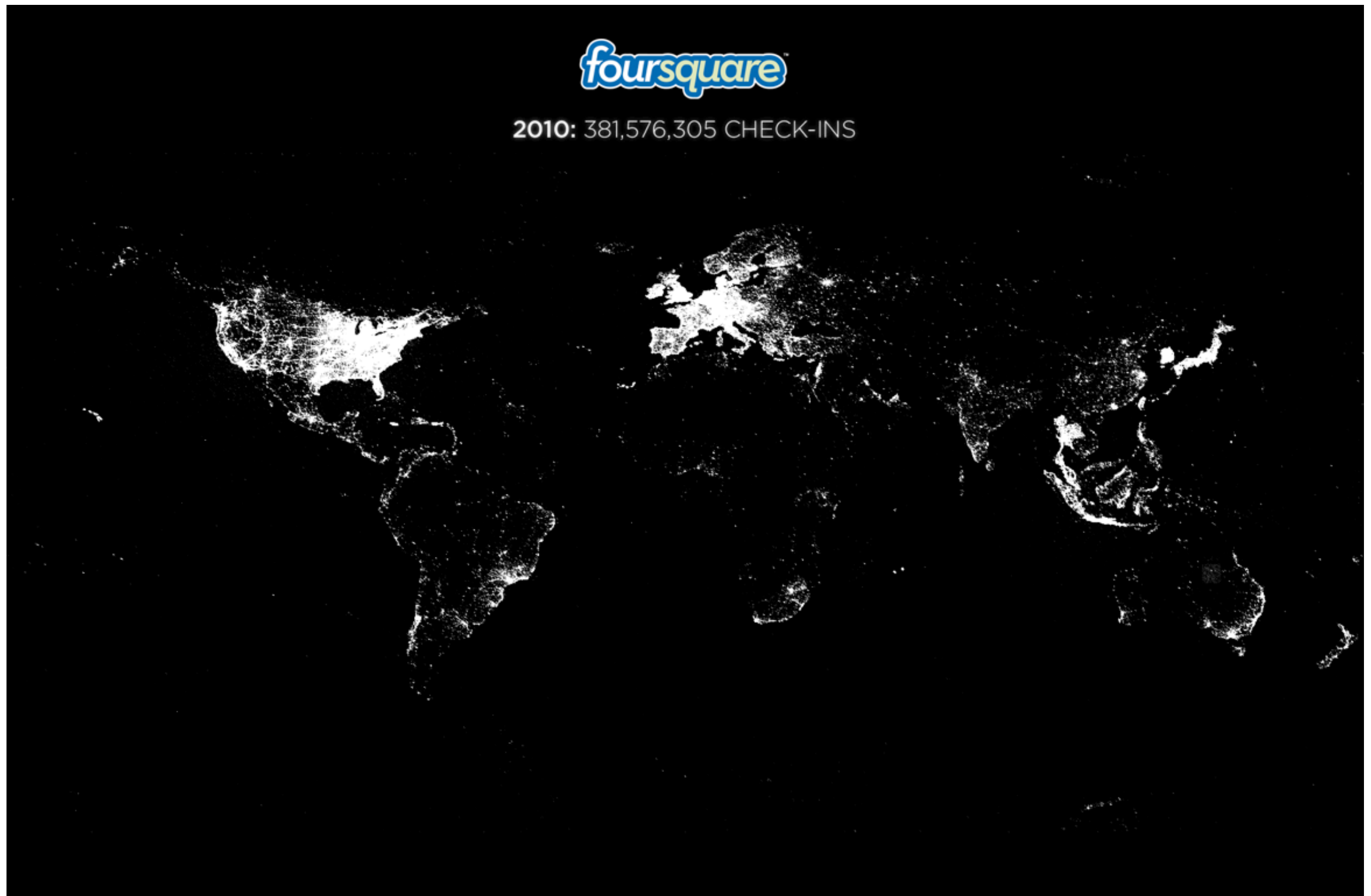
- Appropriate datasets hard to find!
- In addition to the mobility trace, we want:
 - social graph
 - profiles of individuals
 - properties of the places individuals visit
- ...and comprehensive coverage of a geographic region!

About Foursquare

- “Location-based online social network”
- Users ‘check-in’ to their current venue
- Venues are user-contributed
- Points, “mayorships”, and discounts to incentivise participation



World Foursquare usage

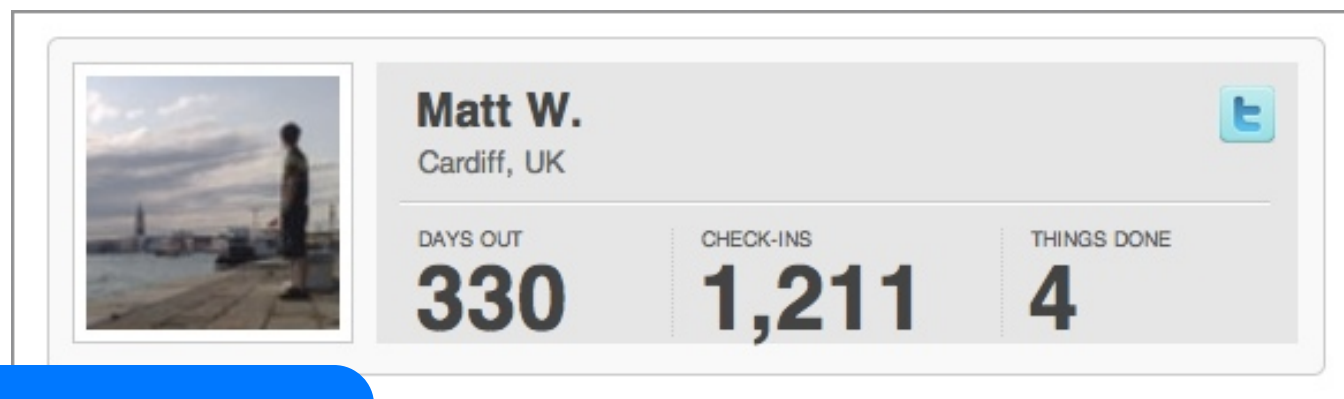
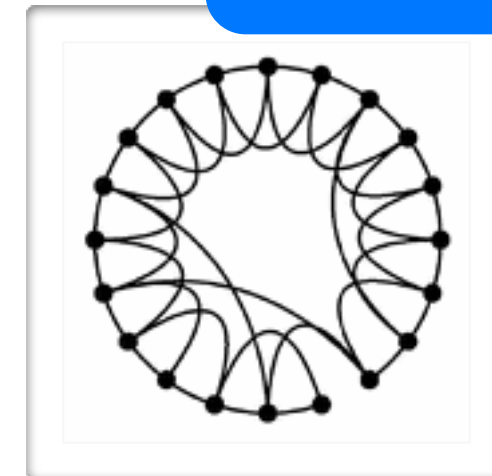
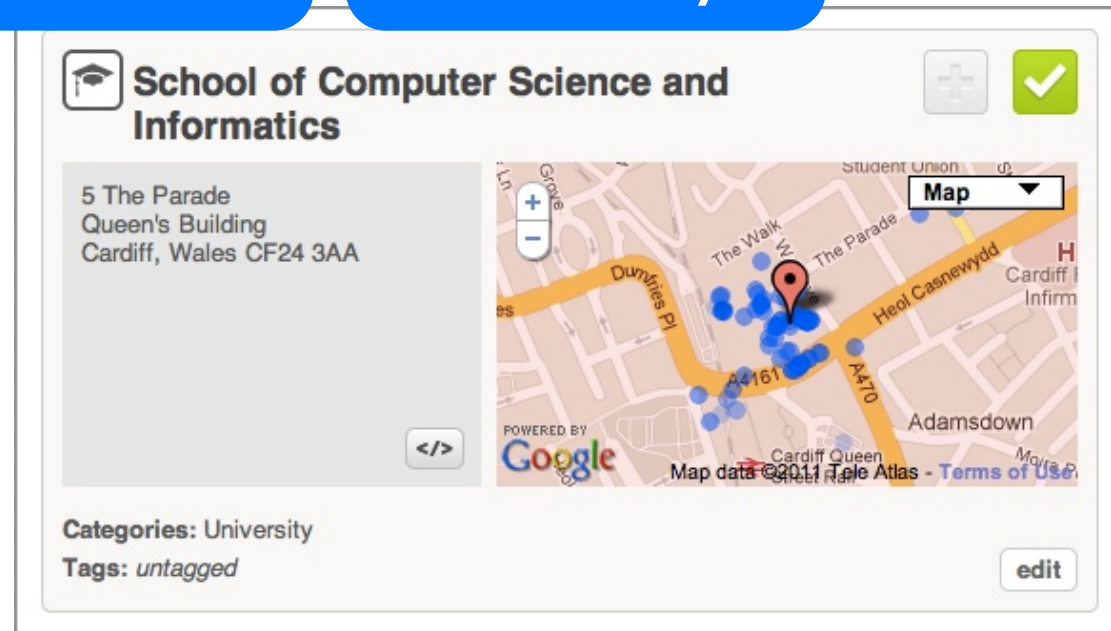


About Foursquare

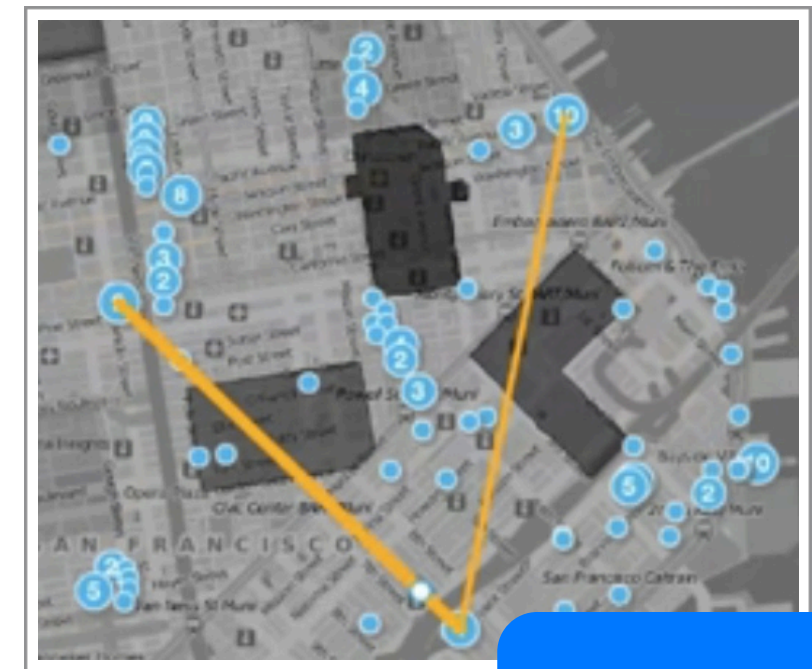
venue
database

+ category
hierarchy

social graph

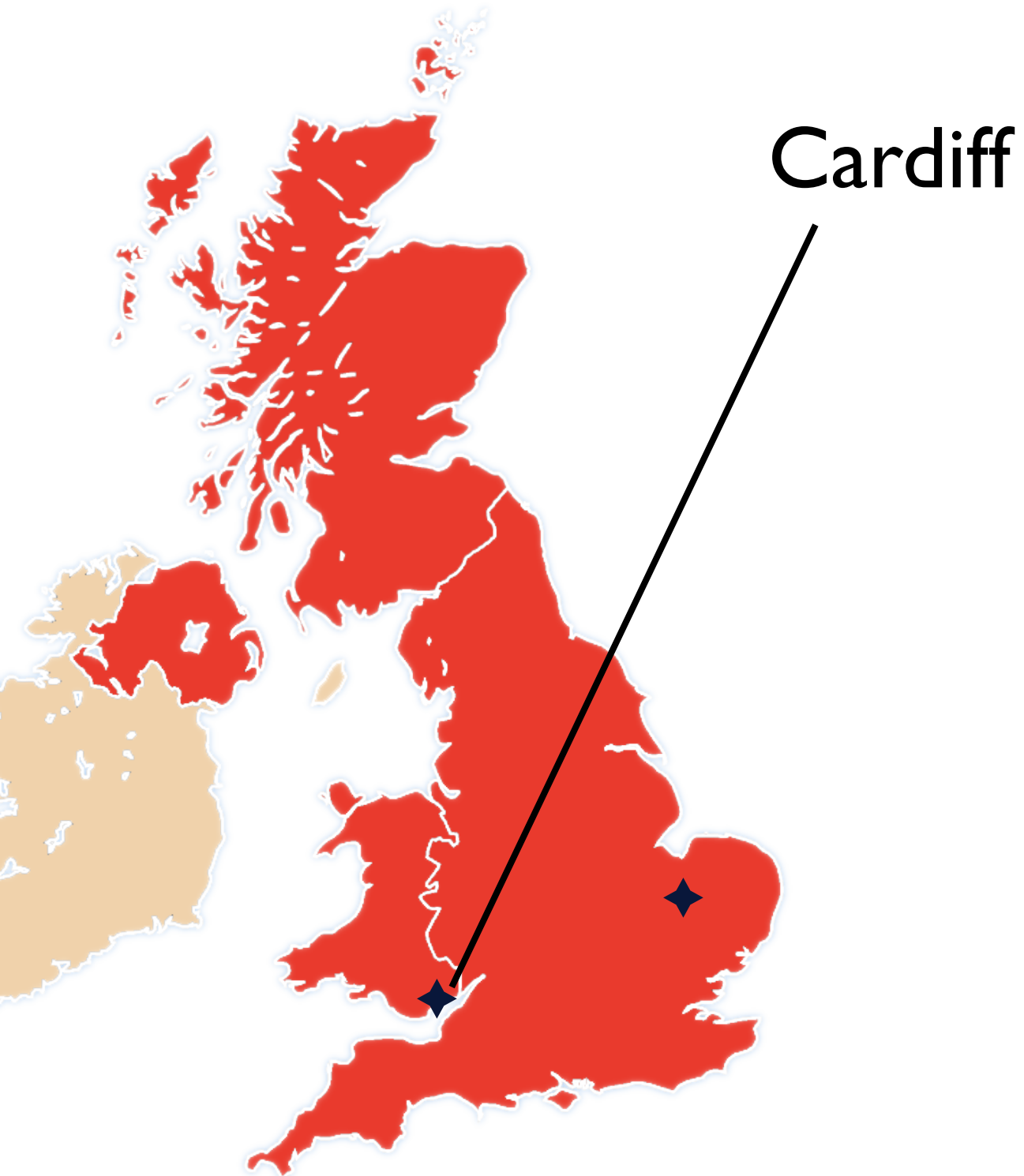


user
database



visit history

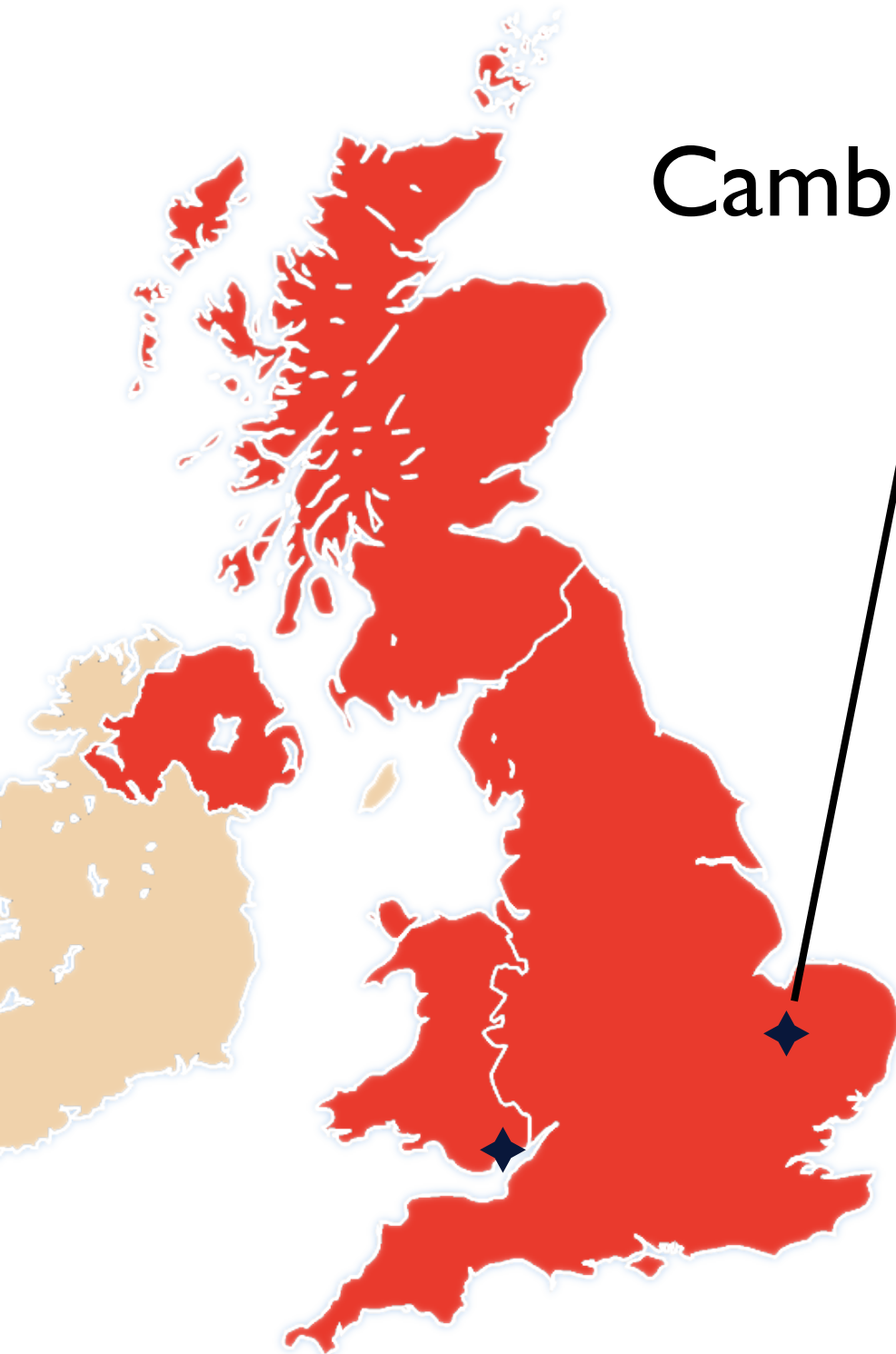
Data collection



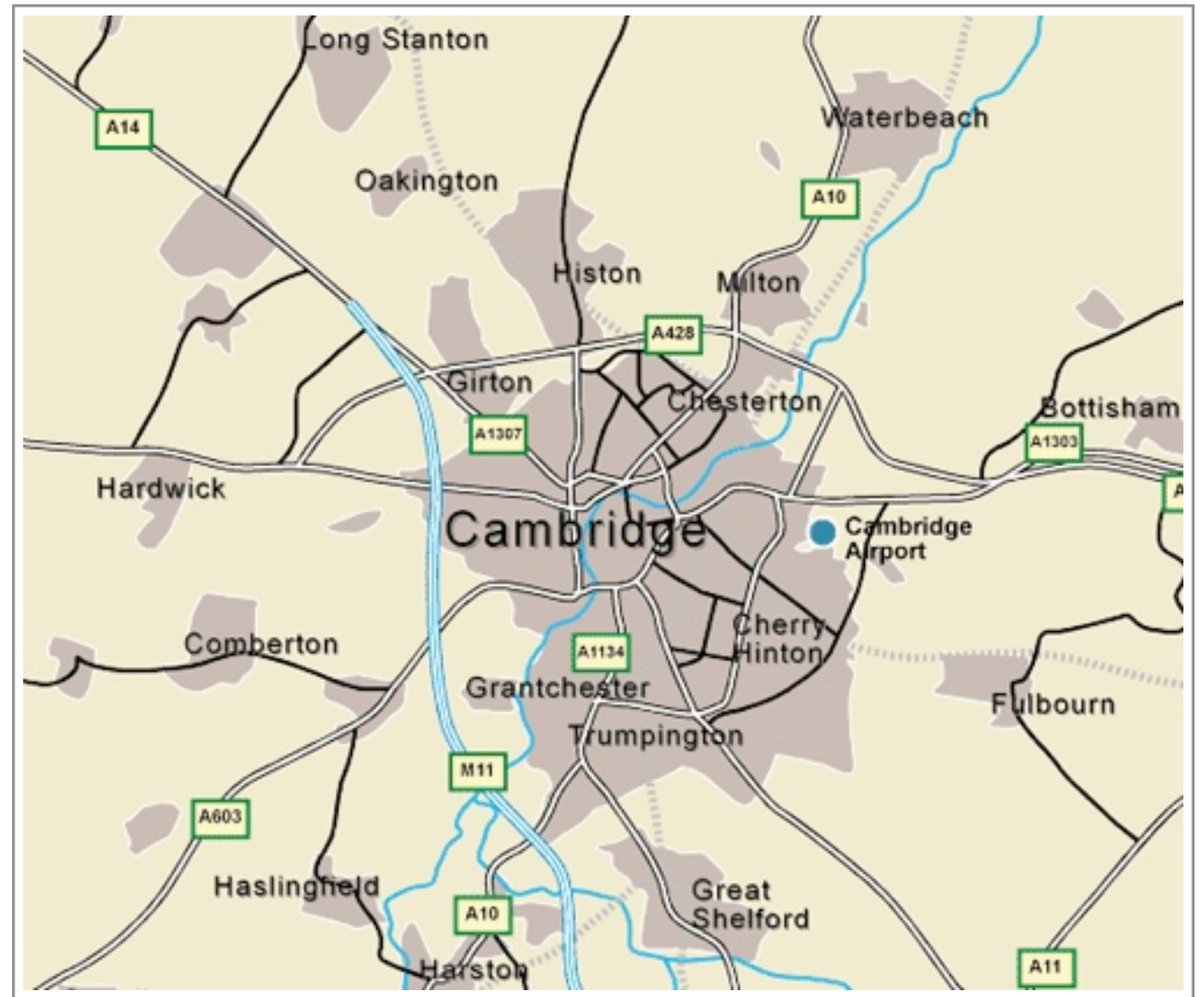
city area: 140 km²

city population: 341,000

Data collection



Cambridge



city area: 116 km²

city population: 130,000

Collected data

		Foursquare dataset			
	City population	Collection area	# users (≥ 1 visit)	# venues (≥ 1 visit)	# checkins
Cardiff	341,000	7.0 x 9.0 km	1,701	1,234	13,299
Cambridge	130,000	5.0 x 3.5 km	1,196	852	6,464

Collection period: Mon 21st March – Fri 13th May
53 continuous days

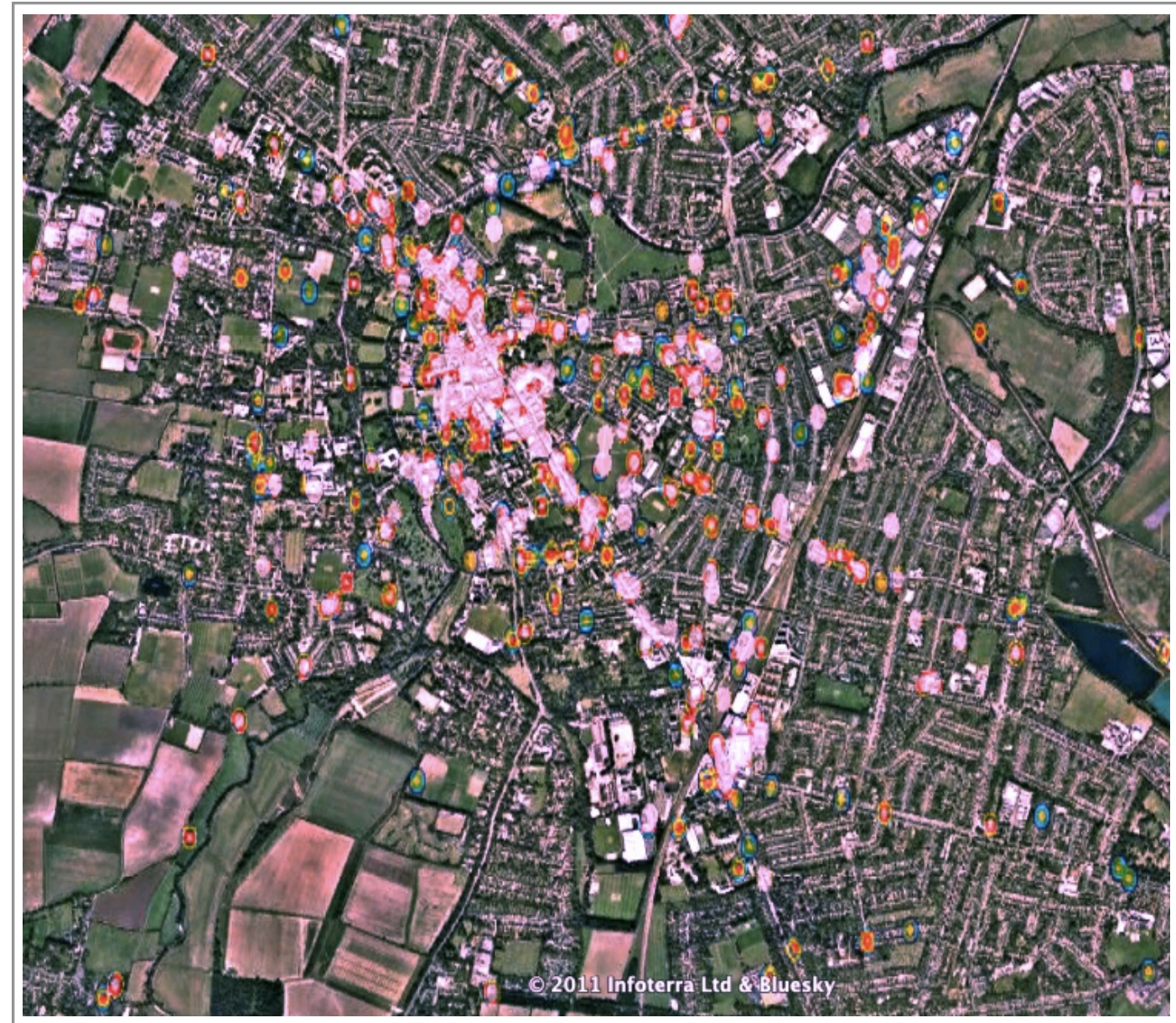
Checkins heatmap

Cardiff



2km

Cambridge



2km

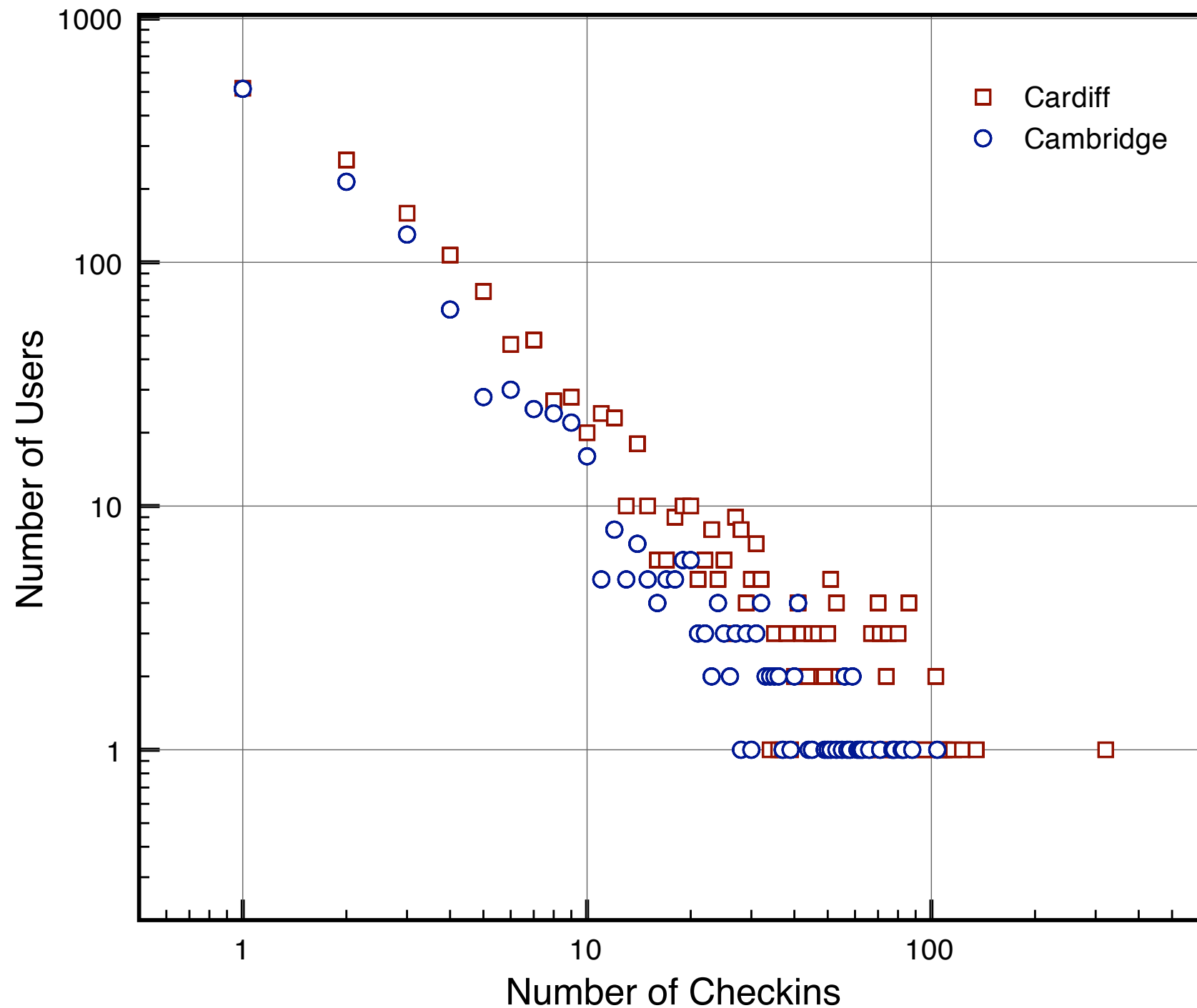
most  fewest

Overview of analysis topics

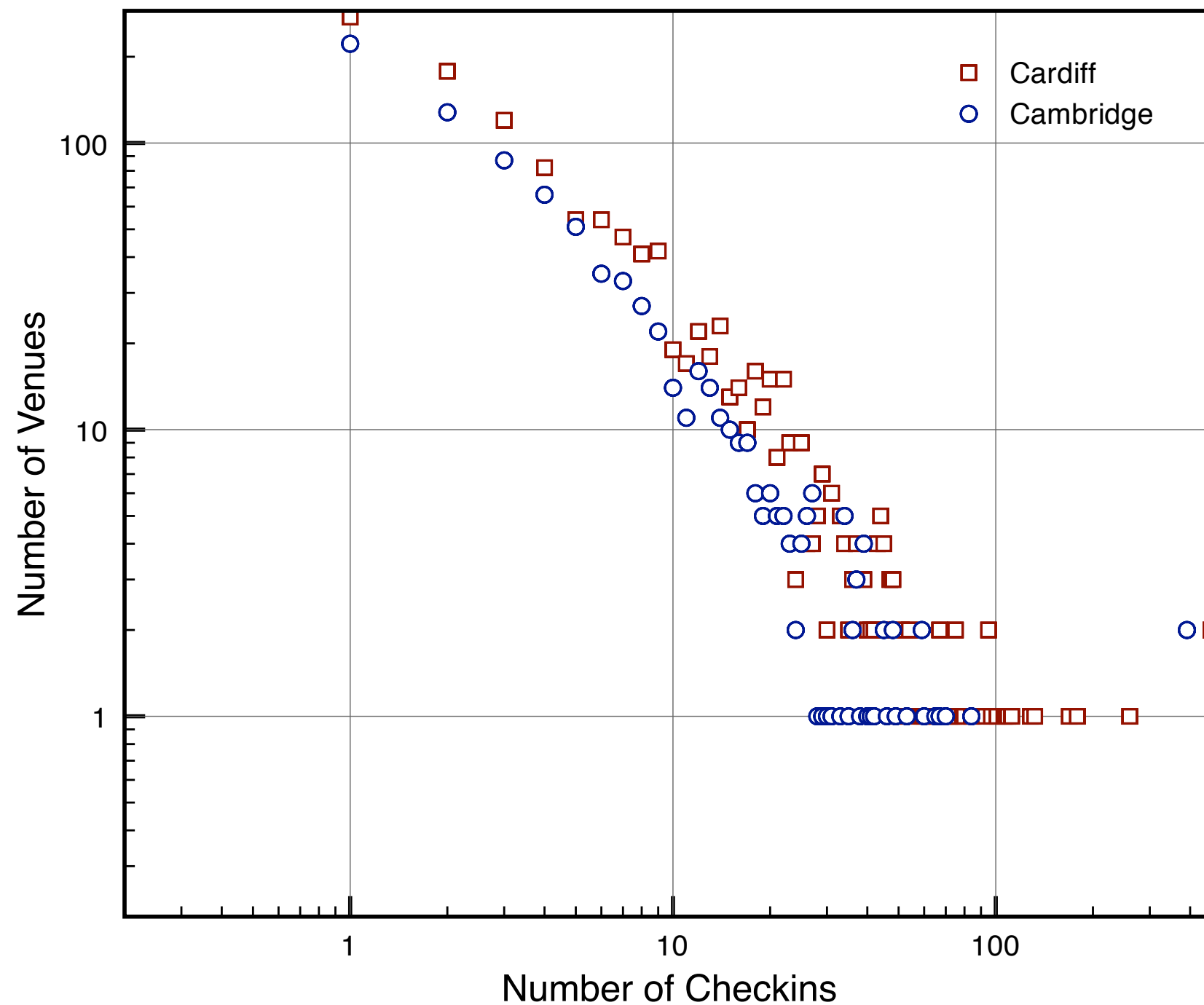
- User activity and venue popularity
- Checkins in time
- User similarity

User activity and venue
popularity

User activity



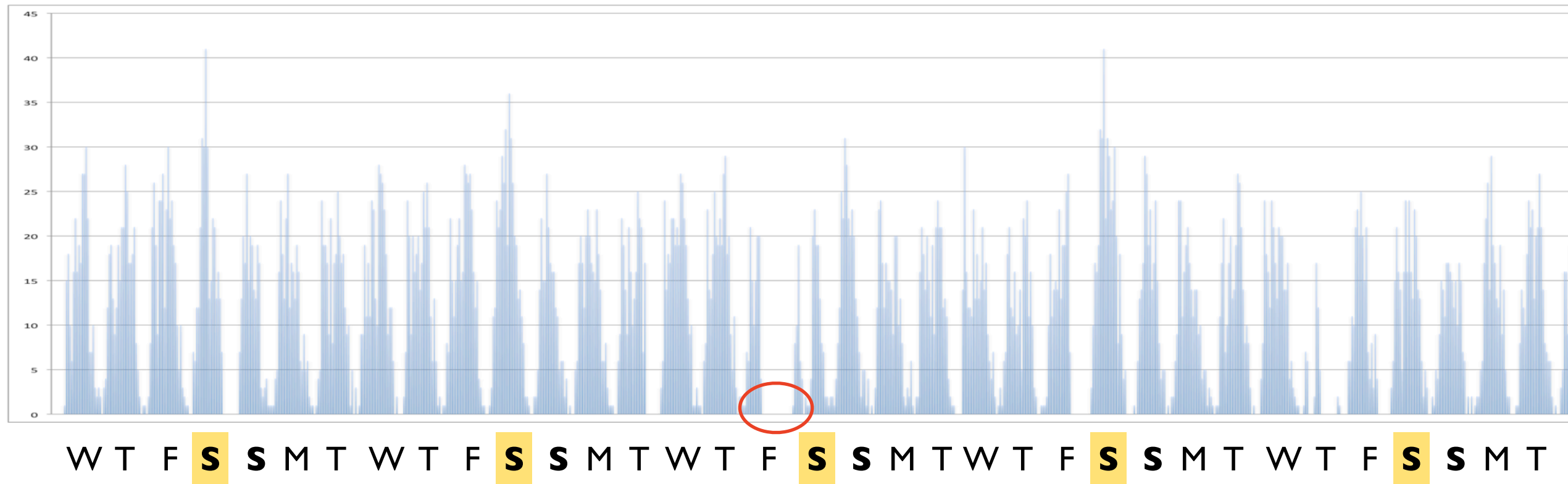
Venue popularity



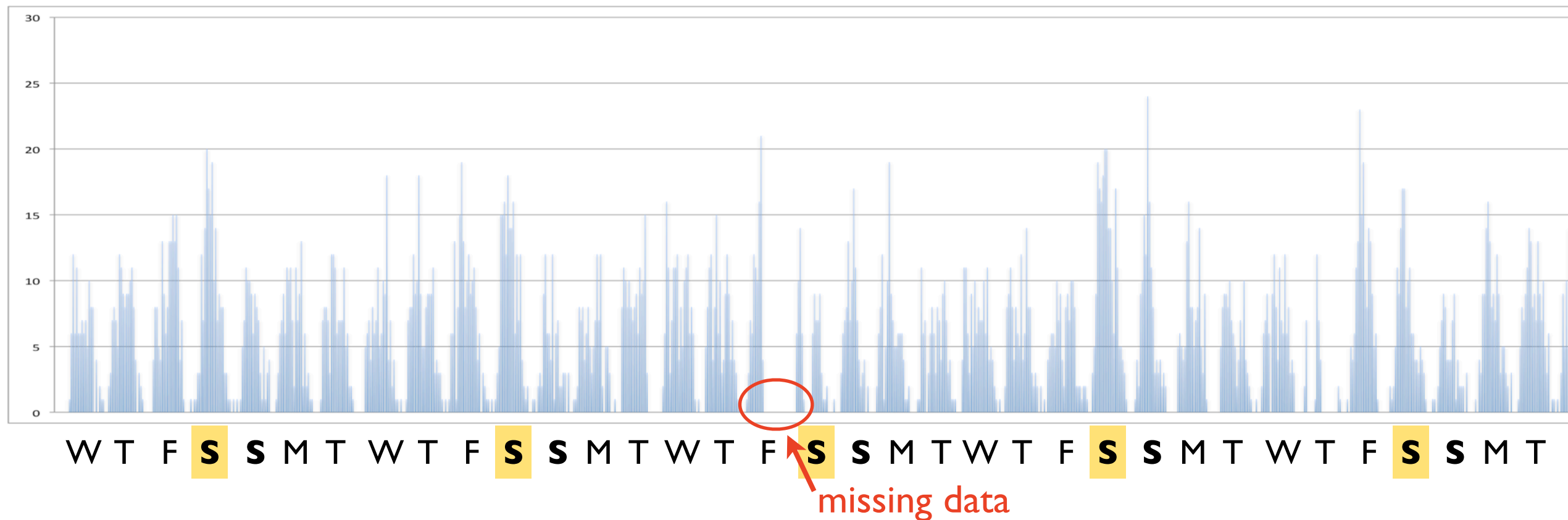
Checkins in time

Checkins over time

Cardiff



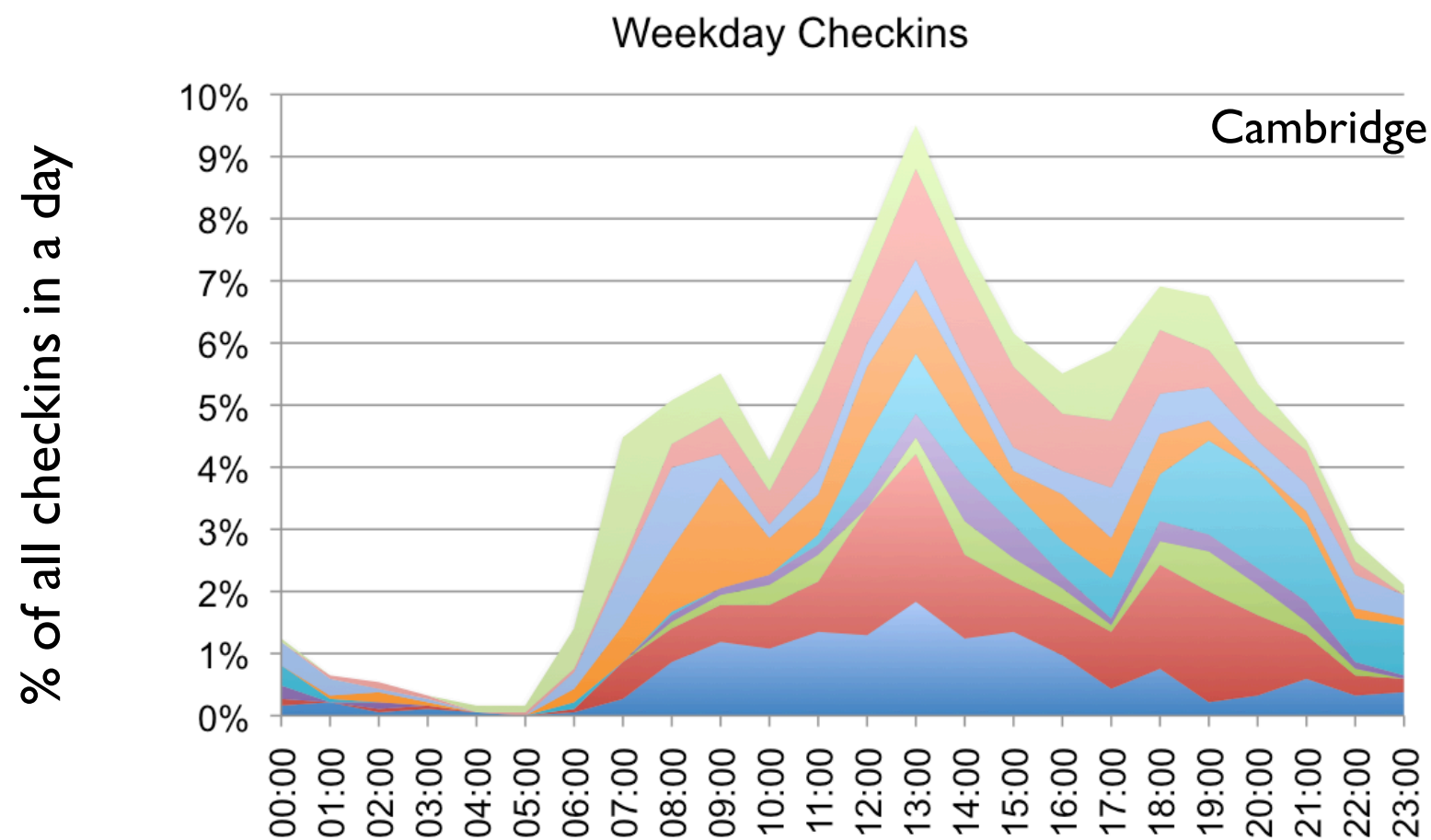
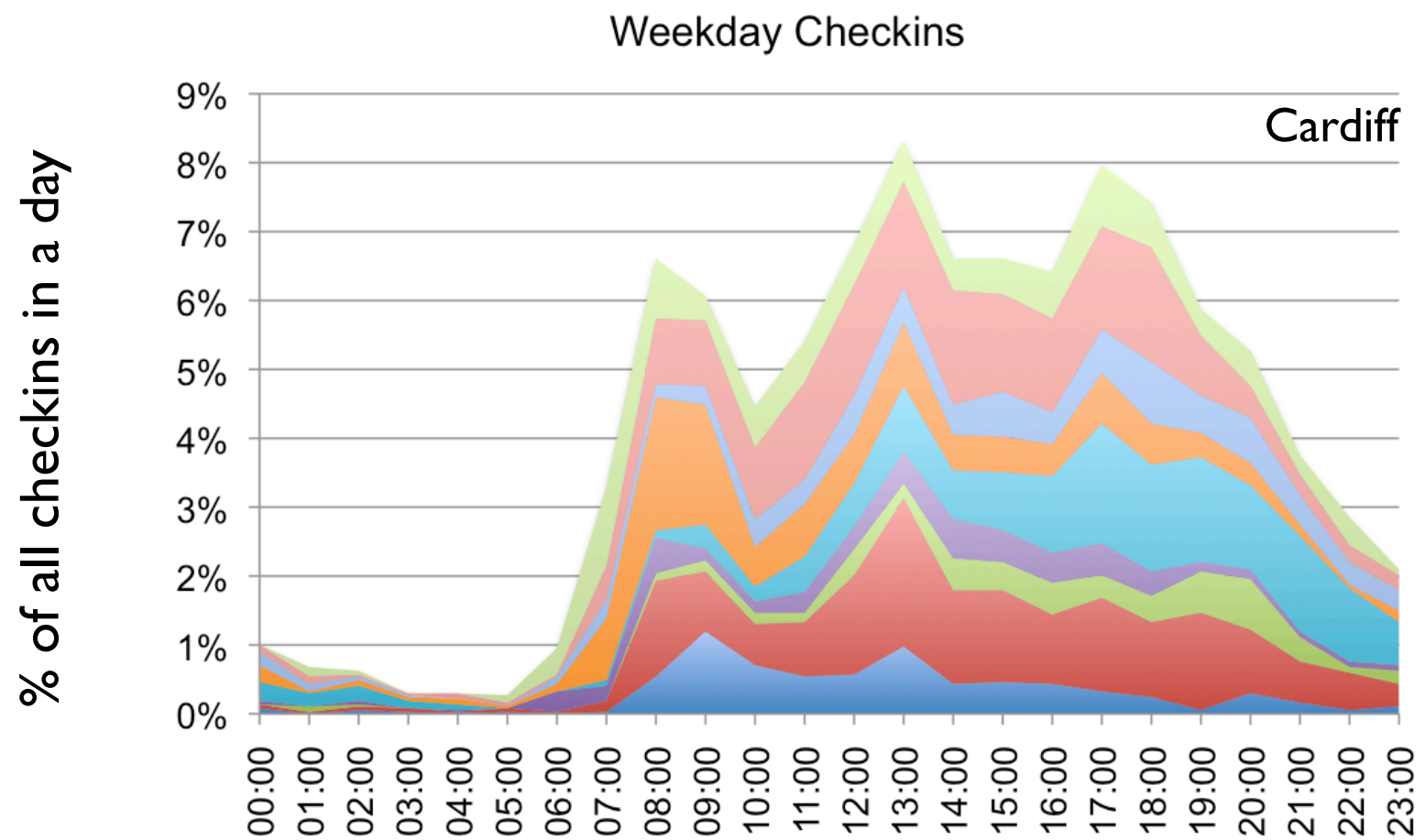
Cambridge



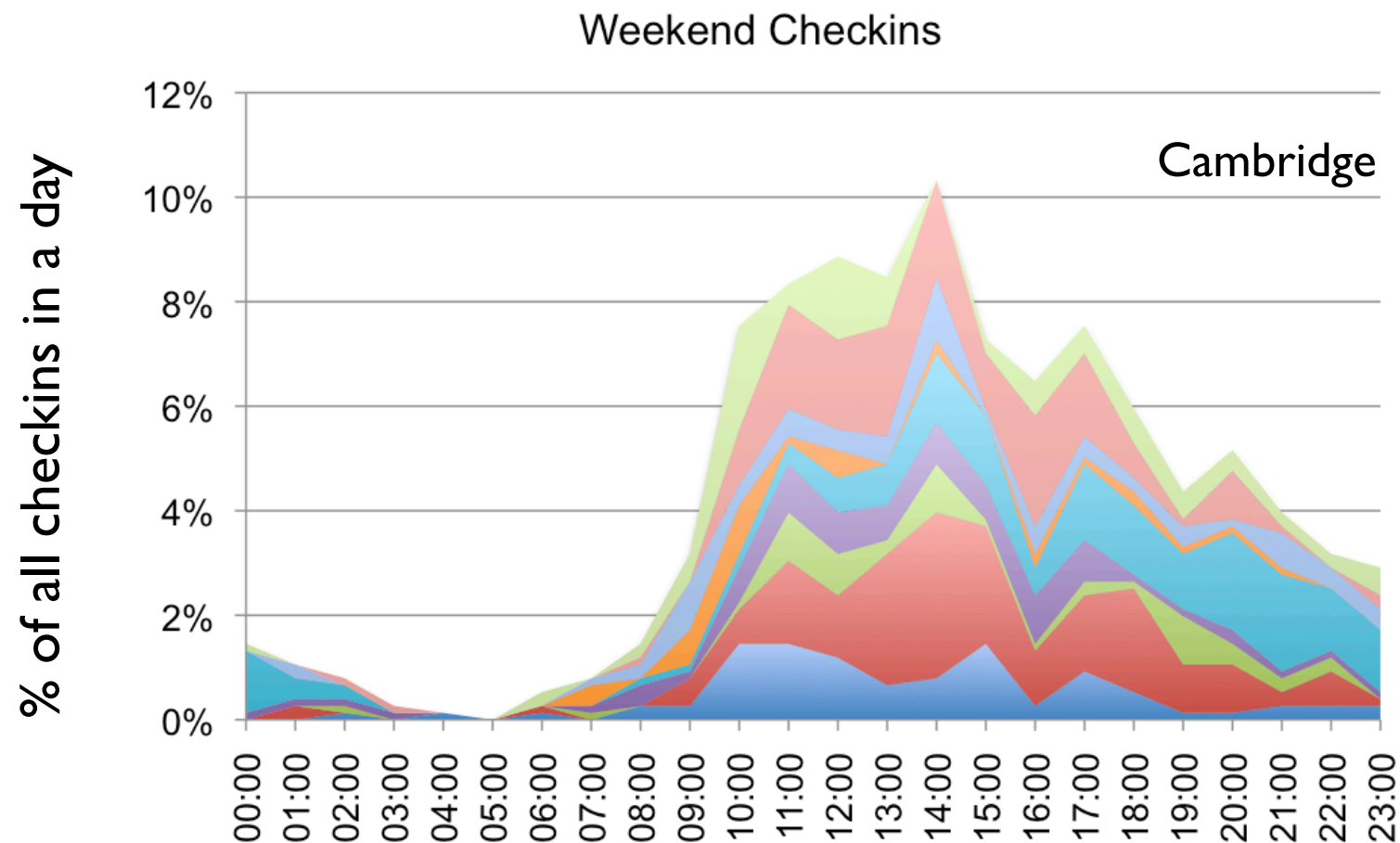
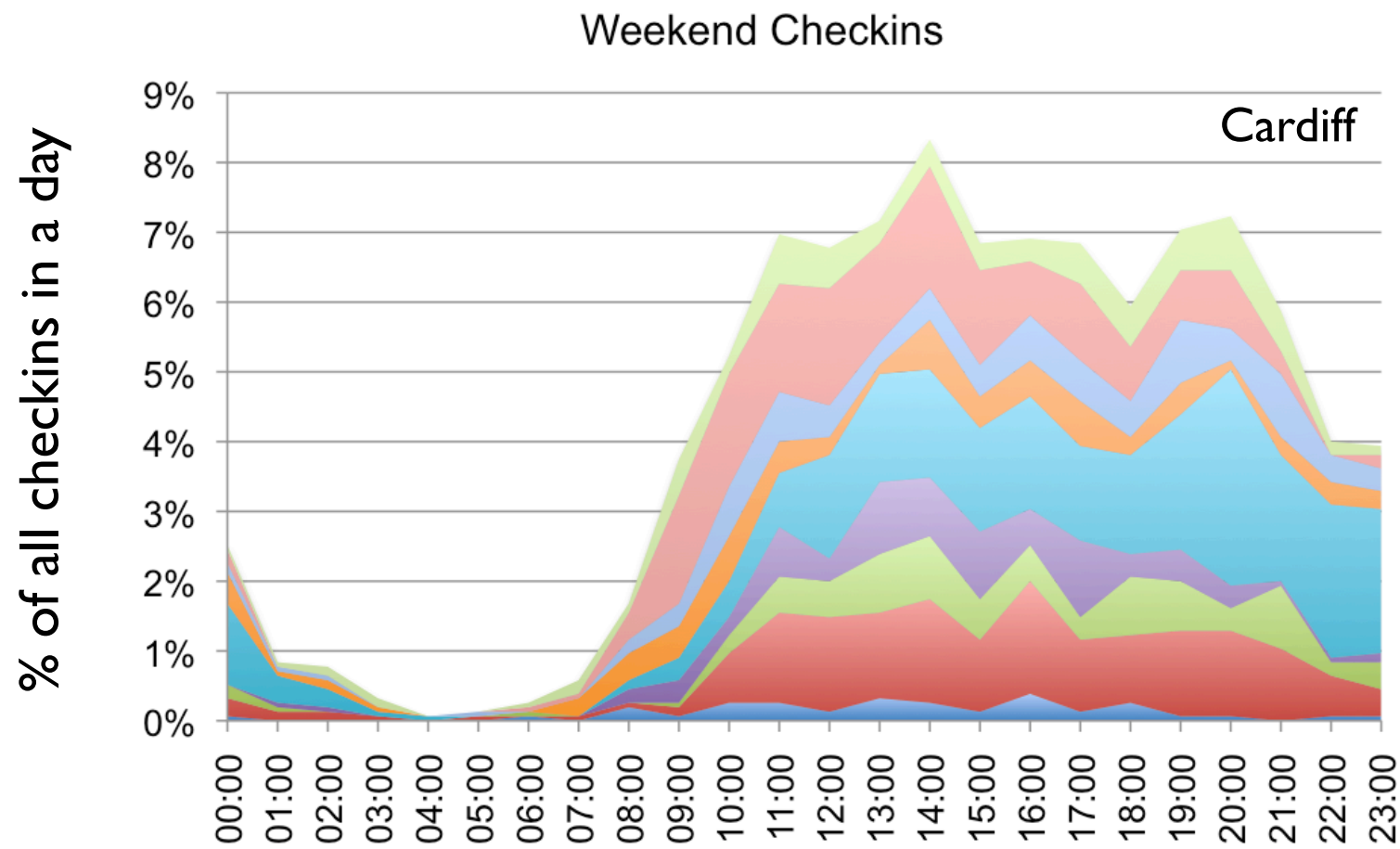
Checkins per day

Checkins per day		
	Weekday	Weekend
Cardiff	246.2	255.5
Cambridge	123.5	126.0

Weekday checkins: Cardiff vs Cambridge



Weekend checkins: Cardiff vs Cambridge



User similarity

User similarity

- We treat the fraction of checkins in venues of a particular category as the user's interest in that category
- **Interest profile:** vector of user's interest levels for each category

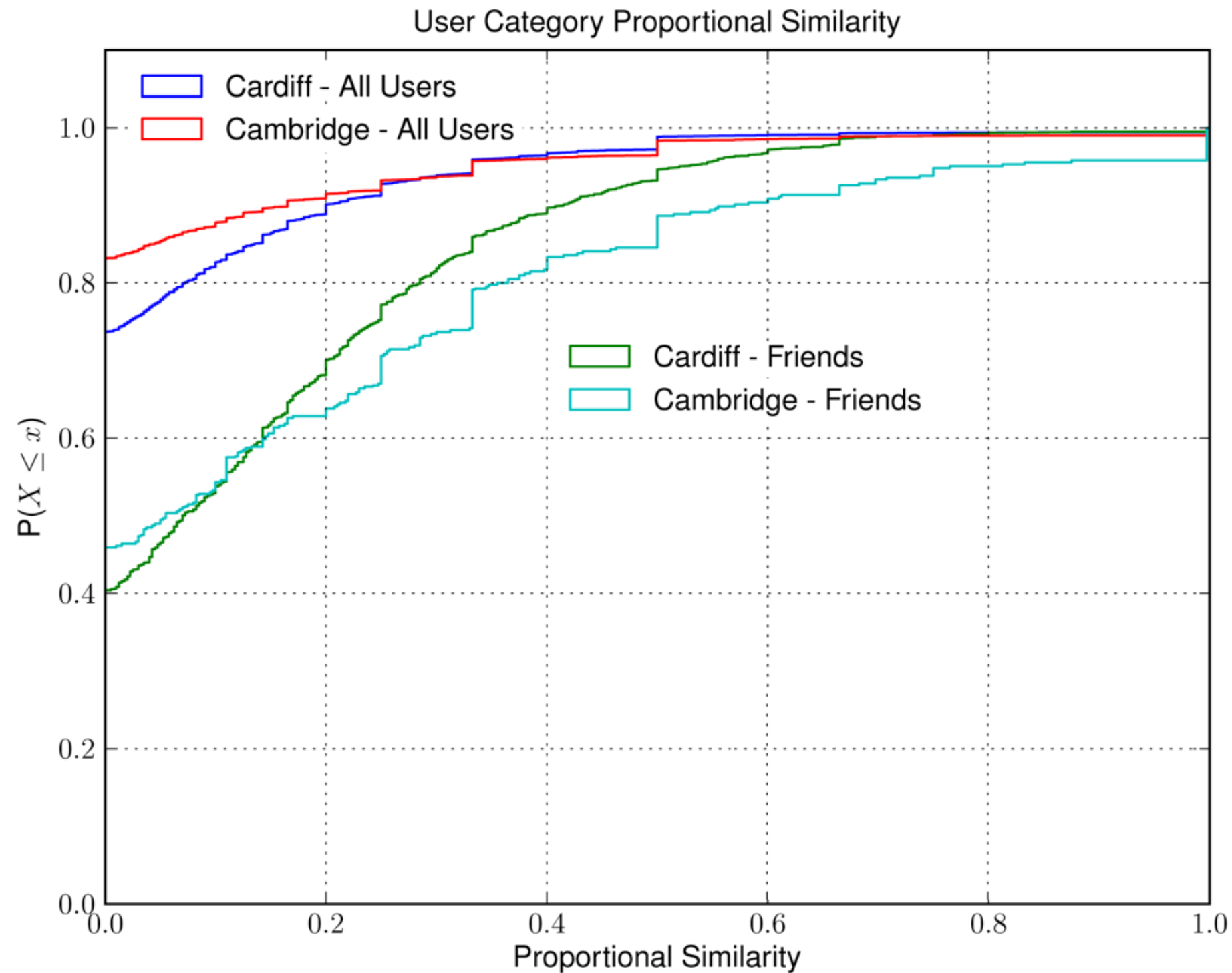
	Coll&Uni	Food	Arts&Ent	Outdoors	Nightlife	Home &Work	Shops	Travel
User A	0.51	0.13	0.00	0.00	0.34	0.00	0.02	0.00
User B	0.57	0.05	0.10	0.00	0.20	0.00	0.03	0.05
User C	0.00	0.19	0.43	0.00	0.05	0.32	0.00	0.01

...

- Use **proportional similarity** metric to compute similarity between two of users' interest profiles

$$PS(x, y) = 1 - \frac{1}{2} \sum_{m=1}^M |C_m^x - C_m^y|$$

User similarity



Average proportional
similarity:

Friends: 0.19

All pairs: 0.05

The bad news...

- Relies on self reporting
- Users very W.E.I.R.D
- Users have differing usage styles

Summary

- Foursquare offers a rich source of data – location visits, social graph, venues, users
- Stronger presence of routine on weekdays, but weekend checkins less structured
- Friends are more similar in the types of places they visit

Ongoing and future research

- Individual checkin patterns: regularity, predictability, heterogeneity
- User co-location patterns
- Relationship between personality traits and visiting behaviour

Thanks for listening!

Questions?

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