

Analyzing Call Detail Records To Support Tourism Statistics

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Introduction

In our research, we will show how call detail records can be used to

- Extract mobility patterns of anonymous users
- Collect tourism statistics from an alternative source
- Capture additional details that are missed by traditional methods

Context: Saudi Arabia

The Kingdom of Saudi Arabia is

- Primarily a desert climate
- Dominated by religious tourism (especially Makkah and Madinah)

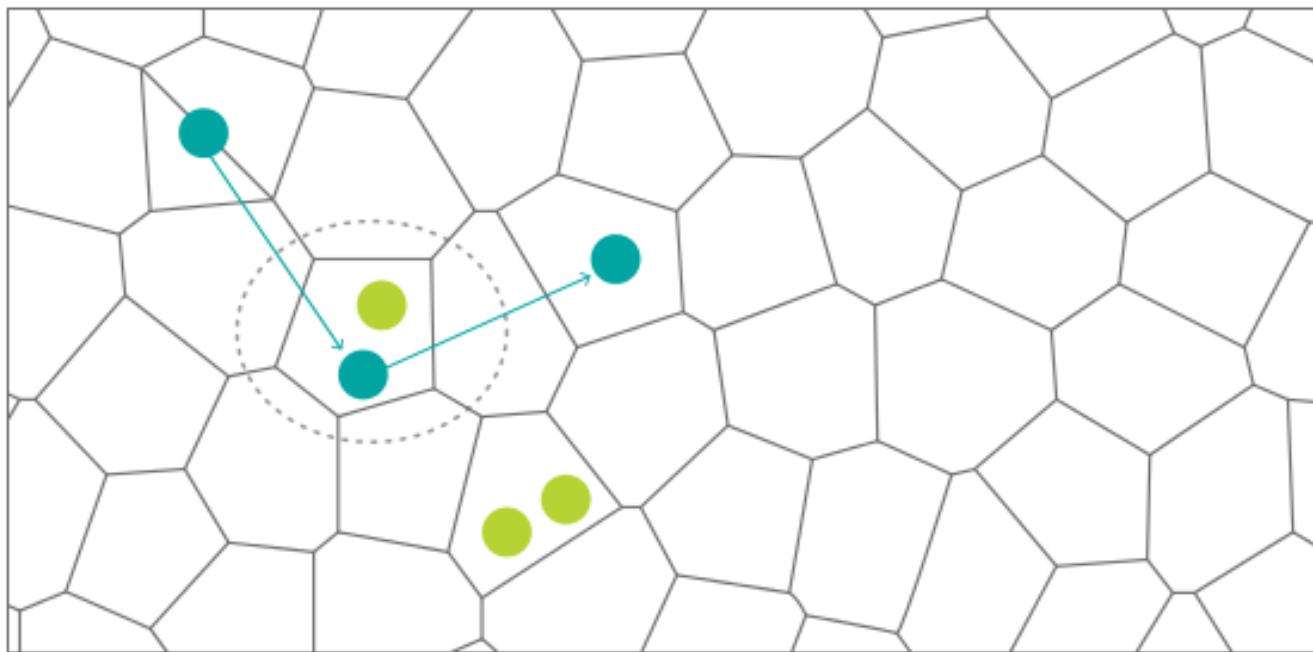
Context: Call Detail Records

Call detail records provide the time of mobile phone activity along with the connecting phone tower.

In our case, the service provider offers

- A large sample size (nearly half the population)
- Anonymized data for all registered users

Stay Points



Person in move



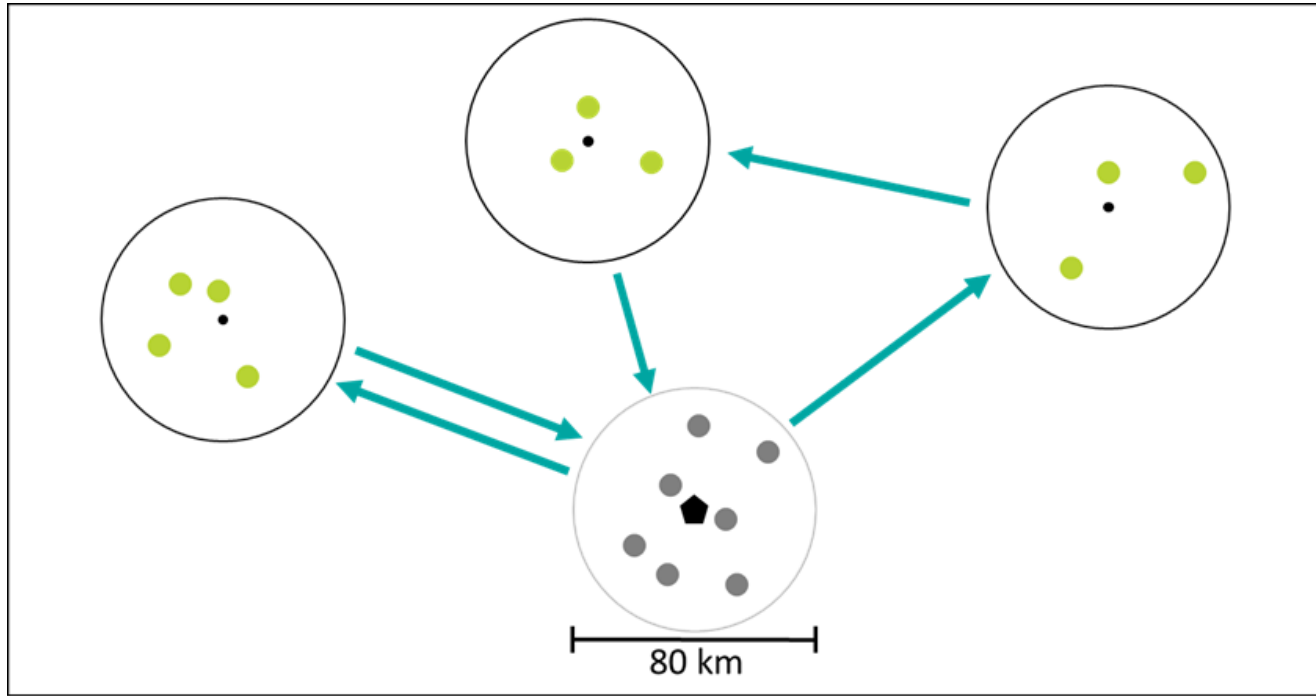
Person in stay

Identifying Tourist Trips

The Saudi Commission for Tourism and Cultural Heritage established the following conditions for tourist trips

- a) The destination must be at least 80 km from home
- b) The traveller must have spent at least one night outside of their usual environment
- c) The trip cannot occur more frequently than one week

Stay Point Clustering



◆ Home Location ● Destination (Tourist) ● Destination (Non-Tourist) • Trip Centroid

Additional Details

In addition to reinforcing current statistics, mobile phone data can provide additional information such as

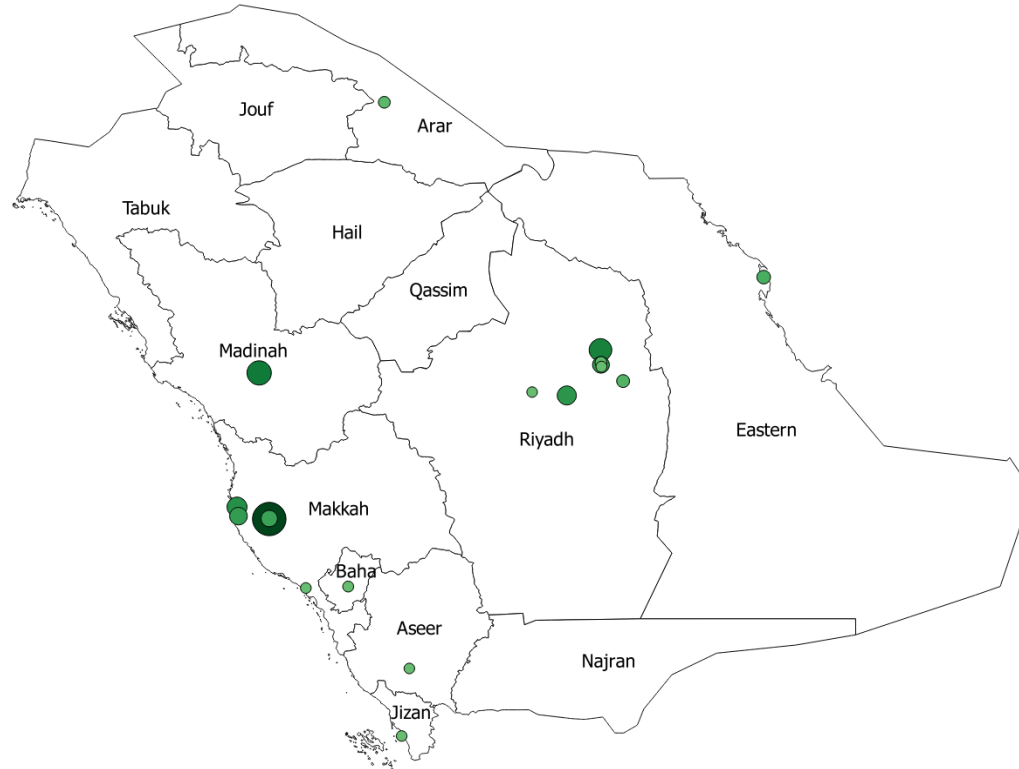
- The number of nights spent by tourists
- Identifying popular destinations
- Most common tourist attractions

Nights Spent

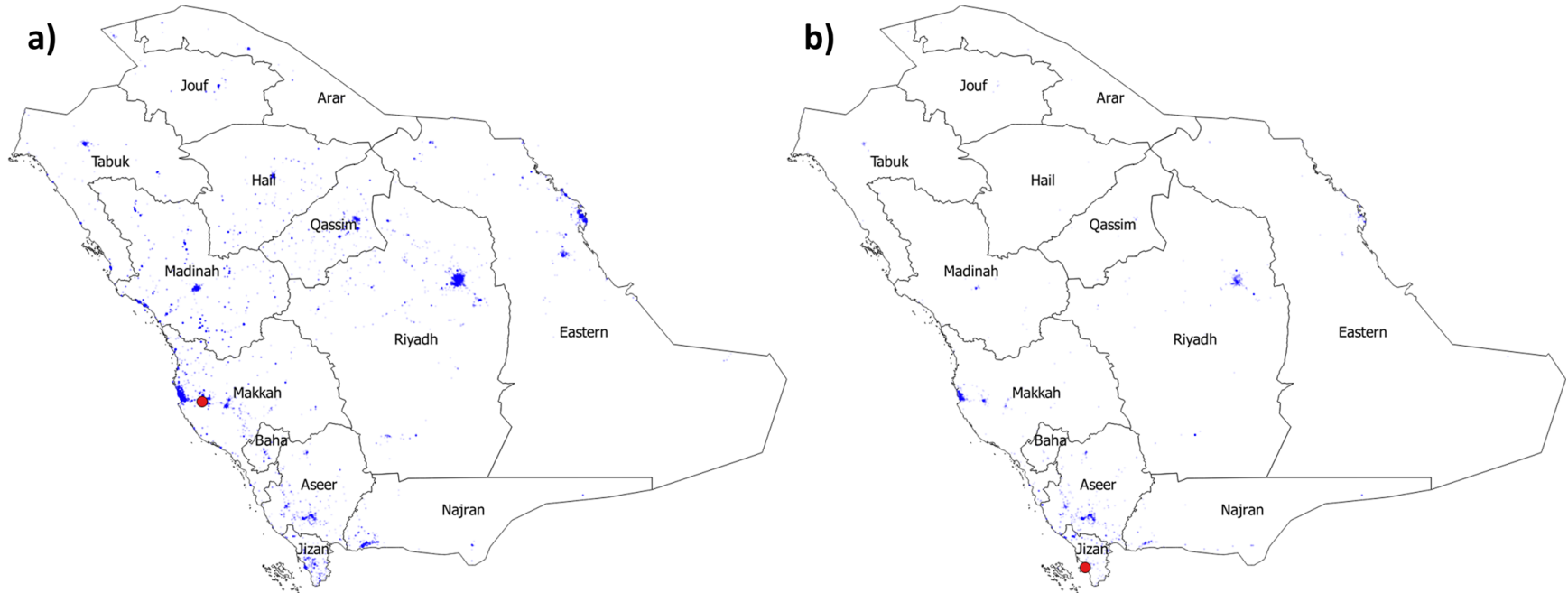
The nights spent by travellers in each region is an effective indicator of tourist expenditure

		Tourist Home Location												
		Riyadh	Qassim	Makkah	Madinah	Eastern	Aseer	Jizan	Najran	Baha	Tabuk	Hail	Jouf	Arar
Tourist Destination	Riyadh	580832	130289	292438	51700	305474	98700	47871	42493	12871	23634	46952	19524	14825
	Qassim	119087	29149	26904	13949	34811	2241	1022	884	295	3191	15381	2843	2817
	Makkah	424751	57680	435413	208000	144882	142780	72564	35051	65965	44429	22264	7941	5143
	Madinah	78640	19688	216396	93493	34995	10524	4342	4242	1727	32272	11767	2817	1596
	Eastern	282477	28258	102803	27814	469447	28608	15063	14204	4386	7331	14025	6480	14647
	Aseer	109807	2368	121430	6990	35467	106519	66074	34866	8560	10843	969	556	490
	Jizan	61730	1519	81466	4830	22467	87667	12947	16789	2277	11110	563	421	602
	Najran	43513	1318	33885	4687	18377	35673	12634	25534	1172	1373	381	342	251
	Baha	8600	310	39349	929	3225	6303	1194	873	124	551	137	39	26
	Tabuk	19473	2700	29174	23711	7617	7586	5208	758	809	42684	4207	4796	1733
	Hail	48402	18424	16421	11681	19411	836	402	588	189	7727	41406	5028	2569
	Jouf	15706	2669	5176	2301	6462	853	314	229	54	5533	3215	9960	7430
Arar	18032	2957	3904	1170	16716	523	356	158	52	1640	2358	7325	11487	

Top Tourist Destinations



Sources of Tourists



The home locations of tourists (blue) who visited
a) Al-Masjid Al-Haram (red)
b) The city of Jizan (red)

Popular Tourist Attractions



Further Areas of Research

There are several areas that can be expanded upon

- Categorizing trips by purpose
- Automatic detection of tourist attractions
- Identifying patterns in tourist itineraries