

Hotel TULIP Web Server Data Analysis

Assignment 2 - SIT742 Modern Data Science

Alex Cummaudo <ca@deakin.edu.au>

Jake Renzella <jake.renzella@deakin.edu.au>

Deakin Software and Technology Innovation Laboratory

School of Information Technology

Deakin University, Australia

May 4, 2017

Executive Summary

This report summarises findings from a data exploration on the Hotel TULIP web server logs, recorded between the periods of August 2014 and August 2015. Each log contains one *request*, or *hit*, that lists fourteen attributes as described in the attached Data Dictionary spreadsheet. Publicly known client IP addresses were extracted from the MaxMind GeoIP2¹ dataset to analyse the location of requests (narrowed down to city). Additionally, user agent strings were parsed to analyse device and browser statistics using the Python user-agents library², thereby extrapolating demographics, usage trends, platform information, server performance, and security statistics from the raw logs provided in the dataset. Further details on the extraction of the data is provided in the source code attached in Appendix C, and an interactive version of this file is published on Databricks.

¹See <http://dev.maxmind.com/geoip/geoip2/>.

²See <https://pypi.python.org/pypi/user-agents>.

Contents

1	Key Findings	4
2	Introduction	5
3	Dataset	5
4	Method	5
4.1	Assumptions Made	5
4.2	Extraction Process	5
4.2.1	IP Address Source Regular Expression	5
4.3	Data Mining	6
5	Results	6
5.1	Reading Directional Network Graph	6
5.2	IP Request Sources	6
5.2.1	Internal Site Visitors	6
5.2.2	External Site Visitors	8
5.3	Top Three Countries	10
5.3.1	Hong Kong Visitors	10
5.3.2	USA Visitors	12
5.3.3	Australian Visitors	14
5.4	Platform Categories	16
5.4.1	PC Visitors	16
5.4.2	Smartphone Visitors	18
5.4.3	Tablet Visitors	20
5.4.4	Bots Visitors	22
A	Additional Tables	24
B	Web Log Data Format	55
C	Extrapolation Results	55

List of Figures

1	Directional network graph visualising frequency patterns of internal visitors made on an internal IP range. Refer to Table 1 for frequency pattern interactions.	7
2	Directional network graph visualising frequency patterns of external visitors made on a non-internal IP range. Refer to Table 2 for frequency pattern interactions. . . .	9
3	Directional network graph visualising frequency patterns of visitors from Hong Kong. Refer to Table 3 for frequency pattern interactions.	11
4	Directional network graph visualising frequency patterns of visitors from the United States. Refer to Table 4 for frequency pattern interactions.	13
5	Directional network graph visualising frequency patterns of visitors from Australia. Refer to Table 5 for frequency pattern interactions.	15
6	Directional network graph visualising frequency patterns of requests made by PCs. Refer to Table 6 for frequency pattern interactions.	17
7	Directional network graph visualising frequency patterns of requests made on smart-phones. Refer to Table 8 for frequency pattern interactions.	19
8	Directional network graph visualising frequency patterns of requests made on tablets. Refer to Table 7 for frequency pattern interactions.	21
9	Directional network graph visualising frequency patterns of requests made by bots. Refer to Table 9 for frequency pattern interactions.	23

1 Key Findings

A list of key findings in the analysis are as thus:

- Foo

2 Introduction

Browsing patterns on the Hotel TULIP Weblogs were assessed in order to gain insight on how customers navigate through the website within a typical *session*. A user session is defined as a typical visit to the website, and a collation of all the different *informational resources* that were accessed. Information resources refer to web pages that contain primary content about the hotel and its facilities, rather than multimedia and technical-related resources.

In order to assess how *different* customers do so, we extract different information based on the web log data format as prescribed in Appendix B. We contrast those users who make requests:

- Internally, such as guests using the internet within the hotel's network,
- Externally, such as prospective guests browsing the website for a potential stay in the hotel,
- From users within the top three countries that visit the website (refer to Assignment 1), and
- Between users on PCs, Smartphones, Tablets and Bots.

Each of these criteria were analysed against matching sessions that satisfy such criteria. Data mined using the Frequency Pattern was done so using the FPGrowth Algorithm in Apache Spark.

3 Dataset

4 Method

4.1 Assumptions Made

4.2 Extraction Process

4.2.1 IP Address Source Regular Expression

To differentiate between private site visitors and external visitors, a regular expression was used to filter the private and public IP address ranges. The regular expression is shown below:

```
WHERE l.c_ip REGEXP  
'(^127\.|(^10\.|
```

```

^172\.1[6-9]\.|
^172\.2[0-9]\.|
^172\.3[0-1]\.|
^192\.168\.

```

Negating this WHERE clause of the regular expression will select only public IP addresses.

4.3 Data Mining

5 Results

5.1 Reading Directional Network Graph

In our results, we have visualised the frequency patterns of users via the use of directional network graphs. In these graphs, we are able to visualise the frequency patterns of how people made requests to the website given the assumptions and extraction methods made in Section 4.

Below in Figure ?? is a sample directional network graph, a snippet made of the top

5.2 IP Request Sources

5.2.1 Internal Site Visitors

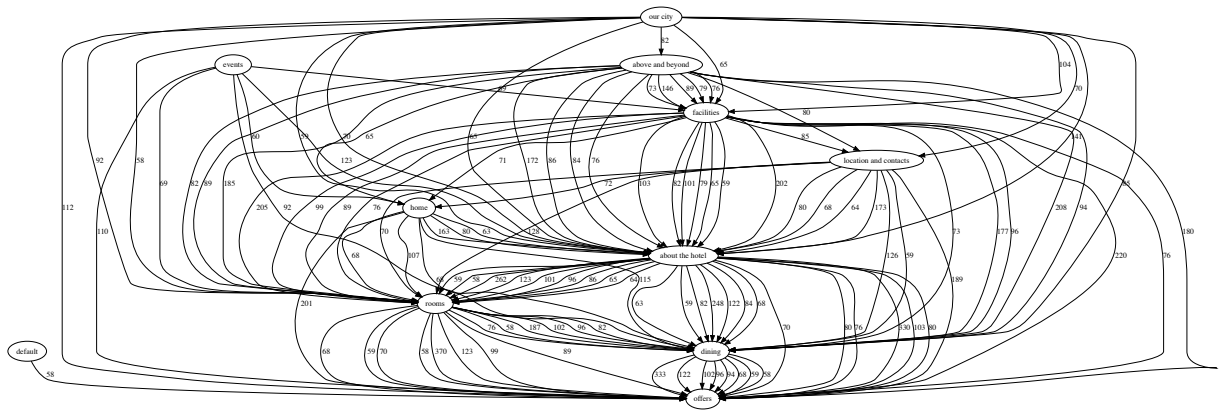


Figure 1: Directional network graph visualising frequency patterns of internal visitors made on an internal IP range. Refer to Table 1 for frequency pattern interactions.

5.2.2 External Site Visitors

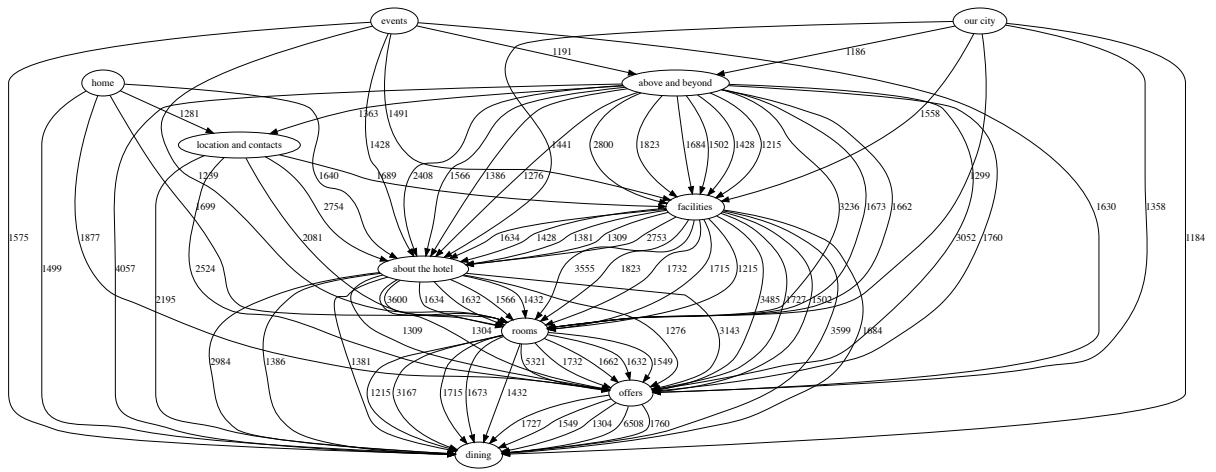


Figure 2: Directional network graph visualising frequency patterns of external visitors made on a non-internal IP range. Refer to Table 2 for frequency pattern interactions.

5.3 Top Three Countries

5.3.1 Hong Kong Visitors

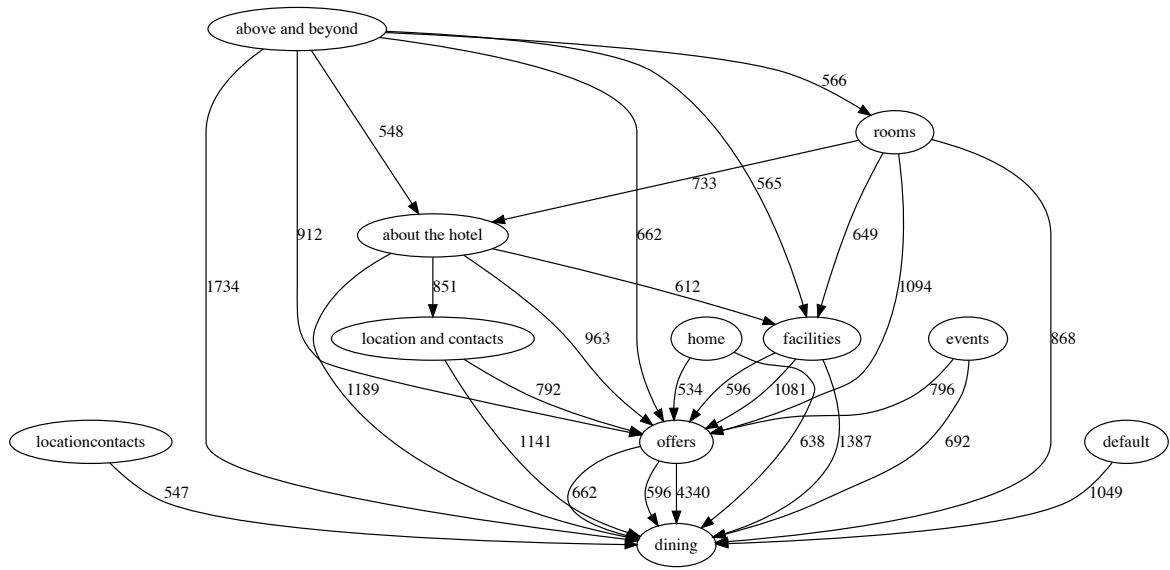


Figure 3: Directional network graph visualising frequency patterns of visitors from Hong Kong. Refer to Table 3 for frequency pattern interactions.

5.3.2 USA Visitors

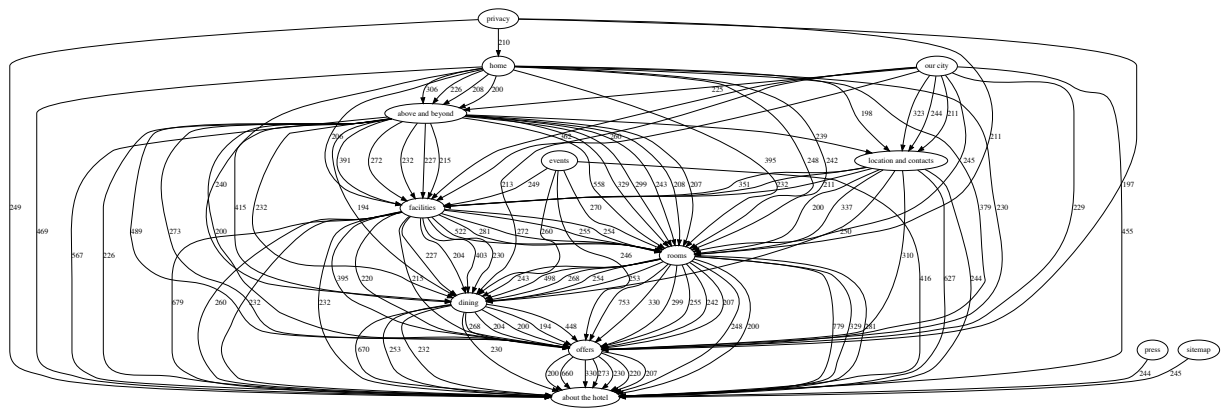


Figure 4: Directional network graph visualising frequency patterns of visitors from the United States. Refer to Table 4 for frequency pattern interactions.

5.3.3 Australian Visitors

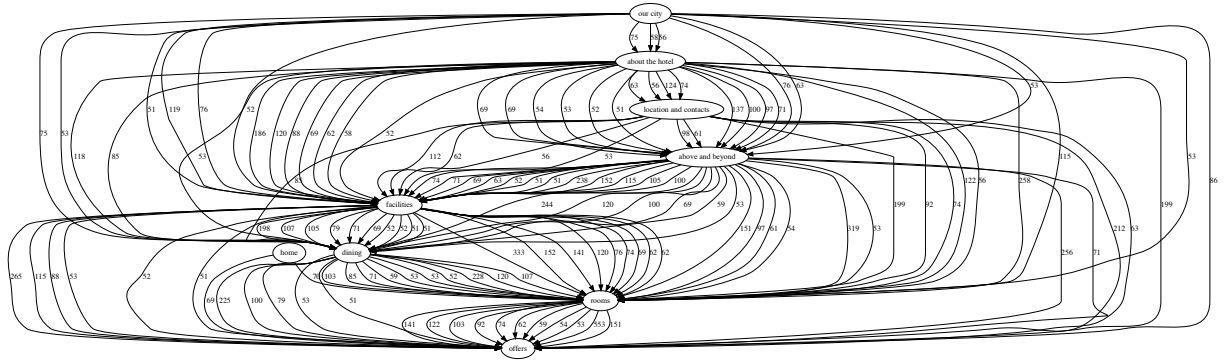


Figure 5: Directional network graph visualising frequency patterns of visitors from Australia. Refer to Table 5 for frequency pattern interactions.

5.4 Platform Categories

5.4.1 PC Visitors

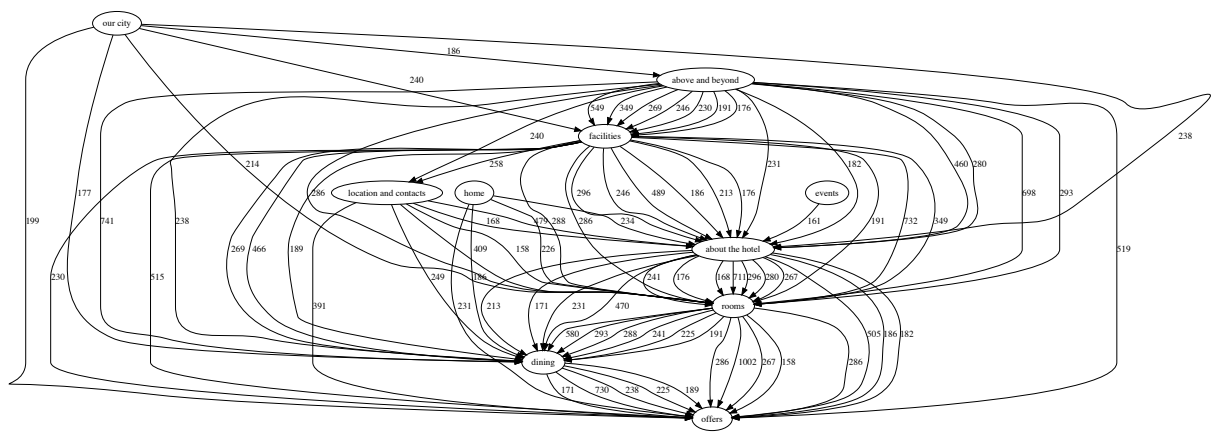


Figure 6: Directional network graph visualising frequency patterns of requests made by PCs. Refer to Table 6 for frequency pattern interactions.

5.4.2 Smartphone Visitors

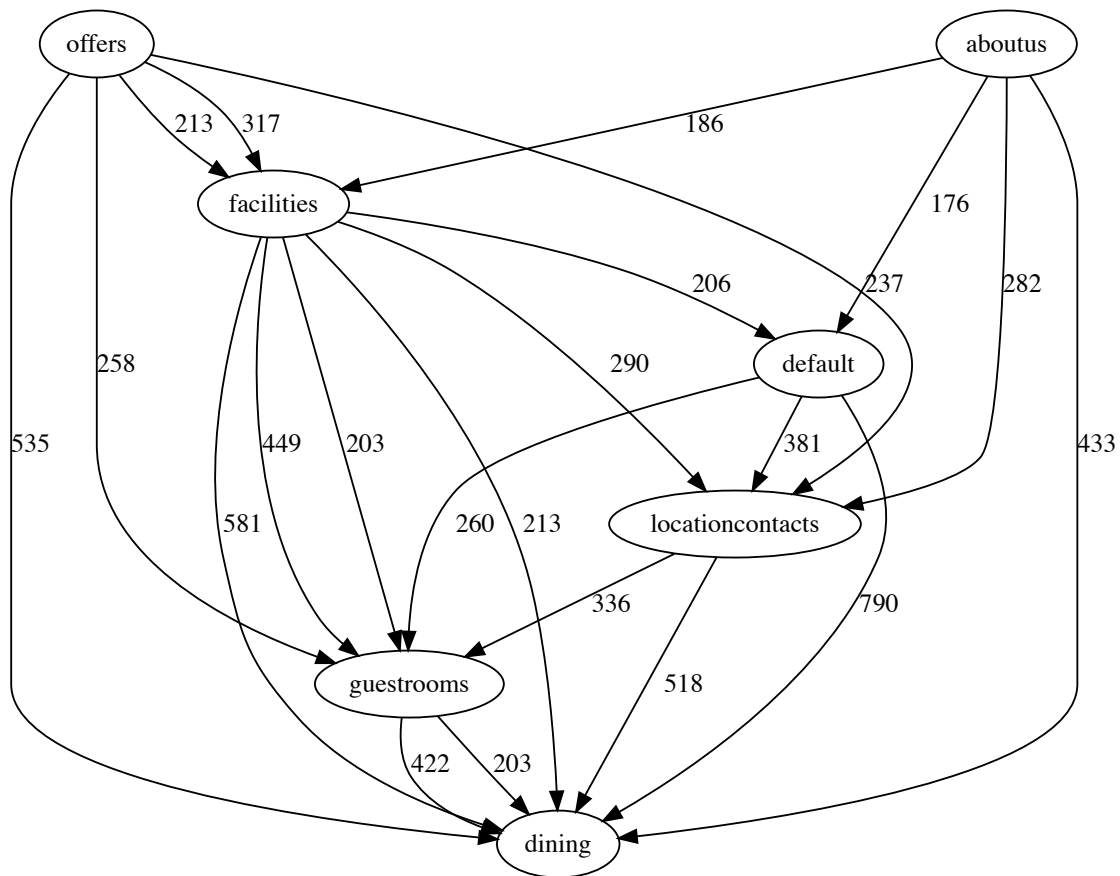


Figure 7: Directional network graph visualising frequency patterns of requests made on smartphones. Refer to Table 8 for frequency pattern interactions.

5.4.3 Tablet Visitors

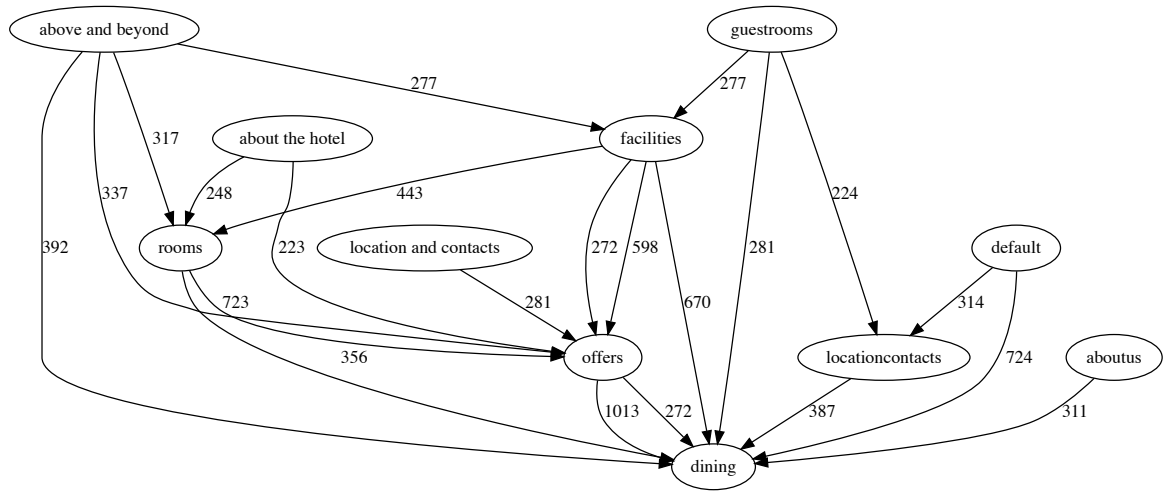


Figure 8: Directional network graph visualising frequency patterns of requests made on tablets. Refer to Table 7 for frequency pattern interactions.

5.4.4 Bots Visitors

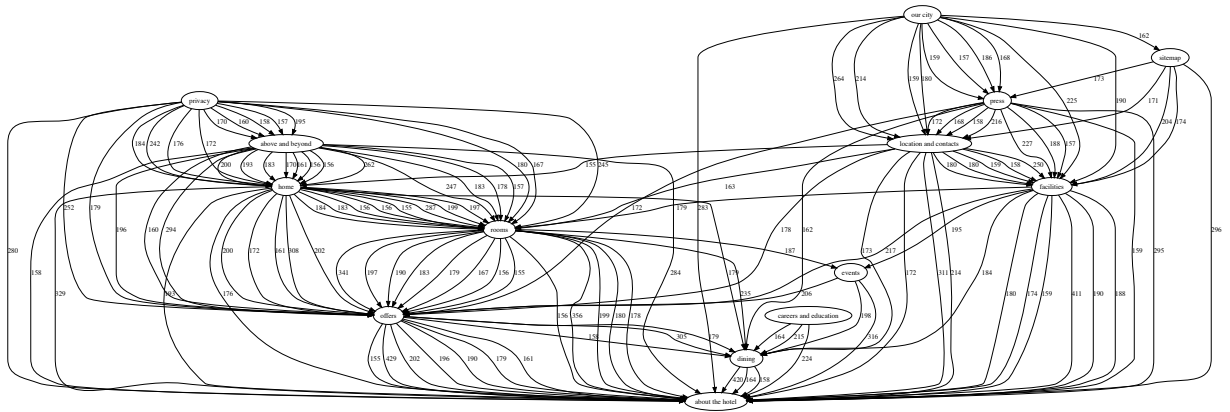


Figure 9: Directional network graph visualising frequency patterns of requests made by bots. Refer to Table 9 for frequency pattern interactions.

A Additional Tables

Below are tables of frequency pattern results for each section identified in Section 5.

Table 1: Internal Request Frequency Patterns

From	To	Frequency
rooms	offers	370
dining	offers	333
about the hotel	offers	330
about the hotel	rooms	262
about the hotel	dining	248
facilities	offers	220
above and beyond	dining	208
facilities	rooms	205
facilities	about the hotel	202
home	offers	201
location and contacts	offers	189
rooms	dining	187
above and beyond	rooms	185
above and beyond	offers	180
facilities	dining	177
location and contacts	about the hotel	173
above and beyond	about the hotel	172
home	about the hotel	163
above and beyond	facilities	146
our city	about the hotel	141
location and contacts	rooms	128
location and contacts	dining	126
events	about the hotel	123

Continued on next page...

Table 1 (*continued from Page 24*): Internal Request Frequency Patterns

From	To	Frequency
about the hotel	rooms	123
rooms	offers	123
about the hotel	dining	122
dining	offers	122
home	dining	115
our city	offers	112
events	offers	110
home	rooms	107
our city	facilities	104
facilities	about the hotel	103
about the hotel	offers	103
rooms	dining	102
dining	offers	102
facilities	about the hotel	101
about the hotel	rooms	101
facilities	rooms	99
rooms	offers	99
facilities	dining	96
dining	offers	96
about the hotel	rooms	96
rooms	dining	96
above and beyond	dining	94
dining	offers	94
events	dining	92
our city	rooms	92

Continued on next page...

Table 1 (*continued from Page 24*): Internal Request Frequency Patterns

From	To	Frequency
above and beyond	rooms	89
rooms	offers	89
above and beyond	facilities	89
facilities	rooms	89
above and beyond	about the hotel	86
about the hotel	rooms	86
facilities	location and contacts	85
our city	dining	85
above and beyond	about the hotel	84
about the hotel	dining	84
facilities	about the hotel	82
about the hotel	dining	82
above and beyond	rooms	82
rooms	dining	82
our city	above and beyond	82
above and beyond	location and contacts	80
home	about the hotel	80
about the hotel	offers	80
location and contacts	about the hotel	80
about the hotel	offers	80
above and beyond	facilities	79
facilities	about the hotel	79
facilities	rooms	76
rooms	dining	76
above and beyond	about the hotel	76

Continued on next page...

Table 1 (*continued from Page 24*): Internal Request Frequency Patterns

From	To	Frequency
about the hotel	offers	76
above and beyond	facilities	76
facilities	offers	76
above and beyond	facilities	73
facilities	dining	73
location and contacts	home	72
facilities	home	71
our city	location and contacts	70
our city	about the hotel	70
about the hotel	offers	70
location and contacts	rooms	70
rooms	offers	70
events	rooms	69
events	facilities	69
home	rooms	68
rooms	offers	68
home	dining	68
dining	offers	68
location and contacts	about the hotel	68
about the hotel	dining	68
above and beyond	home	65
our city	about the hotel	65
about the hotel	rooms	65
our city	facilities	65
facilities	about the hotel	65

Continued on next page...

Table 1 (*continued from Page 24*): Internal Request Frequency Patterns

From	To	Frequency
location and contacts	about the hotel	64
about the hotel	rooms	64
home	about the hotel	63
about the hotel	dining	63
events	home	60
facilities	about the hotel	59
about the hotel	rooms	59
rooms	offers	59
our city	about the hotel	59
about the hotel	dining	59
location and contacts	dining	59
dining	offers	59
default	offers	58
our city	rooms	58
rooms	offers	58
about the hotel	rooms	58
rooms	dining	58
dining	offers	58

Table 2: External Request Frequency Patterns

From	To	Frequency
offers	dining	6508
rooms	offers	5321
above and beyond	dining	4057

Continued on next page...

Table 2 (continued from Page 28): External Request Frequency Patterns

From	To	Frequency
about the hotel	rooms	3600
facilities	dining	3599
facilities	rooms	3555
facilities	offers	3485
above and beyond	rooms	3236
rooms	dining	3167
about the hotel	offers	3143
above and beyond	offers	3052
about the hotel	dining	2984
above and beyond	facilities	2800
location and contacts	about the hotel	2754
facilities	about the hotel	2753
location and contacts	offers	2524
above and beyond	about the hotel	2408
location and contacts	dining	2195
location and contacts	rooms	2081
home	offers	1877
above and beyond	facilities	1823
facilities	rooms	1823
above and beyond	offers	1760
offers	dining	1760
facilities	rooms	1732
rooms	offers	1732
facilities	offers	1727
offers	dining	1727

Continued on next page...

Table 2 (continued from Page 28): External Request Frequency Patterns

From	To	Frequency
facilities	rooms	1715
rooms	dining	1715
home	rooms	1699
location and contacts	facilities	1689
above and beyond	facilities	1684
facilities	dining	1684
above and beyond	rooms	1673
rooms	dining	1673
above and beyond	rooms	1662
rooms	offers	1662
home	about the hotel	1640
facilities	about the hotel	1634
about the hotel	rooms	1634
about the hotel	rooms	1632
rooms	offers	1632
events	offers	1630
events	dining	1575
above and beyond	about the hotel	1566
about the hotel	rooms	1566
our city	facilities	1558
rooms	offers	1549
offers	dining	1549
above and beyond	facilities	1502
facilities	offers	1502
home	dining	1499

Continued on next page...

Table 2 (continued from Page 28): External Request Frequency Patterns

From	To	Frequency
events	facilities	1491
our city	about the hotel	1441
about the hotel	rooms	1432
rooms	dining	1432
above and beyond	facilities	1428
facilities	about the hotel	1428
events	about the hotel	1428
above and beyond	about the hotel	1386
about the hotel	dining	1386
facilities	about the hotel	1381
about the hotel	dining	1381
above and beyond	location and contacts	1363
our city	offers	1358
facilities	about the hotel	1309
about the hotel	offers	1309
about the hotel	offers	1304
offers	dining	1304
our city	rooms	1299
home	location and contacts	1281
above and beyond	about the hotel	1276
about the hotel	offers	1276
events	rooms	1239
above and beyond	facilities	1215
facilities	rooms	1215
rooms	dining	1215

Continued on next page...

Table 2 (continued from Page 28): External Request Frequency Patterns

From	To	Frequency
events	above and beyond	1191
our city	above and beyond	1186
our city	dining	1184

Table 3: Hong Kong Frequency Patterns

From	To	Frequency
offers	dining	4340
above and beyond	dining	1734
facilities	dining	1387
about the hotel	dining	1189
location and contacts	dining	1141
rooms	offers	1094
facilities	offers	1081
default	dining	1049
about the hotel	offers	963
above and beyond	offers	912
rooms	dining	868
about the hotel	location and contacts	851
events	offers	796
location and contacts	offers	792
rooms	about the hotel	733
events	dining	692
above and beyond	offers	662
offers	dining	662

Continued on next page...

Table 3 (continued from Page 32): Hong Kong Frequency Patterns

From	To	Frequency
rooms	facilities	649
home	dining	638
about the hotel	facilities	612
facilities	offers	596
offers	dining	596
above and beyond	rooms	566
above and beyond	facilities	565
above and beyond	about the hotel	548
locationcontacts	dining	547
home	offers	534

Table 4: USA Request Frequency Patterns

From	To	Frequency
rooms	about the hotel	779
rooms	offers	753
facilities	about the hotel	679
dining	about the hotel	670
offers	about the hotel	660
location and contacts	about the hotel	627
above and beyond	about the hotel	567
above and beyond	rooms	558
facilities	rooms	522
rooms	dining	498
above and beyond	offers	489

Continued on next page...

Table 4 (*continued from Page 33*): USA Request Frequency Patterns

From	To	Frequency
home	about the hotel	469
our city	about the hotel	455
dining	offers	448
events	about the hotel	416
above and beyond	dining	415
facilities	dining	403
home	rooms	395
facilities	offers	395
above and beyond	facilities	391
home	offers	379
our city	facilities	362
location and contacts	facilities	351
location and contacts	rooms	337
rooms	offers	330
offers	about the hotel	330
above and beyond	rooms	329
rooms	about the hotel	329
our city	location and contacts	323
location and contacts	offers	310
home	above and beyond	306
above and beyond	rooms	299
rooms	offers	299
facilities	rooms	281
rooms	about the hotel	281
above and beyond	offers	273

Continued on next page...

Table 4 (*continued from Page 33*): USA Request Frequency Patterns

From	To	Frequency
offers	about the hotel	273
above and beyond	facilities	272
facilities	rooms	272
events	rooms	270
rooms	dining	268
dining	offers	268
events	dining	260
our city	facilities	260
facilities	about the hotel	260
facilities	rooms	255
rooms	offers	255
facilities	rooms	254
rooms	dining	254
rooms	dining	253
dining	about the hotel	253
location and contacts	dining	250
events	facilities	249
privacy	about the hotel	249
home	rooms	248
rooms	about the hotel	248
events	offers	246
sitemap	about the hotel	245
our city	rooms	245
our city	location and contacts	244
location and contacts	about the hotel	244

Continued on next page...

Table 4 (*continued from Page 33*): USA Request Frequency Patterns

From	To	Frequency
press	about the hotel	244
above and beyond	rooms	243
rooms	dining	243
home	rooms	242
rooms	offers	242
home	dining	240
above and beyond	location and contacts	239
above and beyond	dining	232
dining	about the hotel	232
above and beyond	facilities	232
facilities	about the hotel	232
location and contacts	facilities	232
facilities	about the hotel	232
home	offers	230
offers	about the hotel	230
facilities	dining	230
dining	about the hotel	230
our city	offers	229
above and beyond	facilities	227
facilities	dining	227
home	above and beyond	226
above and beyond	about the hotel	226
our city	above and beyond	225
facilities	offers	220
offers	about the hotel	220

Continued on next page...

Table 4 (*continued from Page 33*): USA Request Frequency Patterns

From	To	Frequency
above and beyond	facilities	215
facilities	offers	215
our city	dining	213
our city	location and contacts	211
location and contacts	facilities	211
privacy	rooms	211
privacy	home	210
home	above and beyond	208
above and beyond	rooms	208
above and beyond	rooms	207
rooms	offers	207
offers	about the hotel	207
home	facilities	206
facilities	dining	204
dining	offers	204
home	above and beyond	200
above and beyond	offers	200
dining	offers	200
offers	about the hotel	200
location and contacts	rooms	200
rooms	about the hotel	200
home	location and contacts	198
privacy	offers	197
above and beyond	dining	194
dining	offers	194

Table 5: Australian Request Frequency Patterns

From	To	Frequency
rooms	offers	553
facilities	rooms	333
above and beyond	rooms	319
facilities	offers	265
about the hotel	rooms	258
above and beyond	offers	256
above and beyond	dining	244
above and beyond	facilities	238
dining	rooms	228
dining	offers	225
location and contacts	offers	212
about the hotel	offers	199
location and contacts	rooms	199
facilities	dining	198
about the hotel	facilities	186
above and beyond	facilities	152
facilities	rooms	152
above and beyond	rooms	151
rooms	offers	151
facilities	rooms	141
rooms	offers	141
about the hotel	above and beyond	137
about the hotel	location and contacts	124
about the hotel	rooms	122
rooms	offers	122
about the hotel	facilities	120

Continued on next page...

Table 5 (*continued from Page 38*): Australian Request Frequency Patterns

From	To	Frequency
facilities	rooms	120
above and beyond	dining	120
dining	rooms	120
our city	facilities	119
about the hotel	dining	118
our city	rooms	115
above and beyond	facilities	115
facilities	offers	115
location and contacts	facilities	112
facilities	dining	107
dining	rooms	107
above and beyond	facilities	105
facilities	dining	105
dining	rooms	103
rooms	offers	103
about the hotel	above and beyond	100
above and beyond	facilities	100
above and beyond	dining	100
dining	offers	100
location and contacts	above and beyond	98
about the hotel	above and beyond	97
above and beyond	rooms	97
location and contacts	rooms	92
rooms	offers	92
about the hotel	facilities	88

Continued on next page...

Table 5 (*continued from Page 38*): Australian Request Frequency Patterns

From	To	Frequency
facilities	offers	88
our city	offers	86
about the hotel	dining	85
dining	rooms	85
location and contacts	dining	85
facilities	dining	79
dining	offers	79
our city	above and beyond	76
our city	facilities	76
facilities	rooms	76
our city	dining	75
our city	about the hotel	75
about the hotel	location and contacts	74
location and contacts	rooms	74
above and beyond	facilities	74
facilities	rooms	74
rooms	offers	74
about the hotel	above and beyond	71
above and beyond	offers	71
above and beyond	facilities	71
facilities	dining	71
dining	rooms	71
home	rooms	70
about the hotel	above and beyond	69
above and beyond	dining	69

Continued on next page...

Table 5 (*continued from Page 38*): Australian Request Frequency Patterns

From	To	Frequency
about the hotel	above and beyond	69
above and beyond	facilities	69
facilities	rooms	69
about the hotel	facilities	69
facilities	dining	69
home	offers	69
about the hotel	location and contacts	63
location and contacts	offers	63
our city	above and beyond	63
above and beyond	facilities	63
about the hotel	facilities	62
facilities	rooms	62
rooms	offers	62
location and contacts	facilities	62
facilities	rooms	62
location and contacts	above and beyond	61
above and beyond	rooms	61
above and beyond	dining	59
dining	rooms	59
rooms	offers	59
our city	about the hotel	58
about the hotel	facilities	58
about the hotel	location and contacts	56
location and contacts	facilities	56
our city	about the hotel	56

Continued on next page...

Table 5 (*continued from Page 38*): Australian Request Frequency Patterns

From	To	Frequency
about the hotel	rooms	56
about the hotel	above and beyond	54
above and beyond	rooms	54
rooms	offers	54
about the hotel	dining	53
dining	offers	53
about the hotel	above and beyond	53
above and beyond	dining	53
dining	rooms	53
our city	dining	53
dining	rooms	53
our city	above and beyond	53
above and beyond	rooms	53
our city	rooms	53
rooms	offers	53
location and contacts	facilities	53
facilities	offers	53
about the hotel	above and beyond	52
above and beyond	facilities	52
facilities	offers	52
about the hotel	facilities	52
facilities	dining	52
dining	rooms	52
our city	facilities	52
facilities	dining	52

Continued on next page...

Table 5 (*continued from Page 38*): Australian Request Frequency Patterns

From	To	Frequency
about the hotel	above and beyond	51
above and beyond	facilities	51
facilities	dining	51
our city	facilities	51
facilities	offers	51
above and beyond	facilities	51
facilities	dining	51
dining	offers	51

Table 6: PC Request Frequency Patterns

From	To	Frequency
rooms	offers	1002
above and beyond	dining	741
facilities	rooms	732
dining	offers	730
about the hotel	rooms	711
above and beyond	rooms	698
rooms	dining	580
above and beyond	facilities	549
above and beyond	offers	519
facilities	offers	515
about the hotel	offers	505
facilities	about the hotel	489
location and contacts	about the hotel	479

Continued on next page...

Table 6 (continued from Page 43): PC Request Frequency Patterns

From	To	Frequency
about the hotel	dining	470
facilities	dining	466
above and beyond	about the hotel	460
location and contacts	rooms	409
location and contacts	offers	391
above and beyond	facilities	349
facilities	rooms	349
facilities	about the hotel	296
about the hotel	rooms	296
above and beyond	rooms	293
rooms	dining	293
facilities	rooms	288
rooms	dining	288
above and beyond	rooms	286
rooms	offers	286
facilities	rooms	286
rooms	offers	286
above and beyond	about the hotel	280
about the hotel	rooms	280
above and beyond	facilities	269
facilities	dining	269
about the hotel	rooms	267
rooms	offers	267
facilities	location and contacts	258
location and contacts	dining	249

Continued on next page...

Table 6 (*continued from Page 43*): PC Request Frequency
Patterns

From	To	Frequency
above and beyond	facilities	246
facilities	about the hotel	246
about the hotel	rooms	241
rooms	dining	241
above and beyond	location and contacts	240
our city	facilities	240
above and beyond	dining	238
dining	offers	238
our city	about the hotel	238
home	about the hotel	234
above and beyond	about the hotel	231
about the hotel	dining	231
home	offers	231
above and beyond	facilities	230
facilities	offers	230
home	rooms	226
rooms	dining	225
dining	offers	225
our city	rooms	214
facilities	about the hotel	213
about the hotel	dining	213
our city	offers	199
above and beyond	facilities	191
facilities	rooms	191
rooms	dining	191

Continued on next page...

Table 6 (continued from Page 43): PC Request Frequency Patterns

From	To	Frequency
facilities	dining	189
dining	offers	189
home	dining	186
our city	above and beyond	186
facilities	about the hotel	186
about the hotel	offers	186
above and beyond	about the hotel	182
about the hotel	offers	182
our city	dining	177
above and beyond	facilities	176
facilities	about the hotel	176
about the hotel	rooms	176
about the hotel	dining	171
dining	offers	171
location and contacts	about the hotel	168
about the hotel	rooms	168
events	about the hotel	161
location and contacts	rooms	158
rooms	offers	158

Table 7: Tablet Request Frequency Patterns

From	To	Frequency
offers	dining	1013
default	dining	724

Continued on next page...

Table 7 (*continued from Page 46*): Tablet Request Frequency Patterns

From	To	Frequency
rooms	offers	723
facilities	dining	670
facilities	offers	598
facilities	rooms	443
above and beyond	dining	392
locationcontacts	dining	387
rooms	dining	356
above and beyond	offers	337
above and beyond	rooms	317
default	locationcontacts	314
aboutus	dining	311
location and contacts	offers	281
guestrooms	dining	281
above and beyond	facilities	277
guestrooms	facilities	277
facilities	offers	272
offers	dining	272
about the hotel	rooms	248
guestrooms	locationcontacts	224
about the hotel	offers	223

Table 8: Smartphone Request Frequency Patterns

From	To	Frequency
default	dining	790

Continued on next page...

Table 8 (*continued from Page 47*): Smartphone Request Frequency Patterns

From	To	Frequency
facilities	dining	581
offers	dining	535
locationcontacts	dining	518
facilities	guestrooms	449
aboutus	dining	433
guestrooms	dining	422
default	locationcontacts	381
locationcontacts	guestrooms	336
offers	facilities	317
facilities	locationcontacts	290
aboutus	locationcontacts	282
default	guestrooms	260
offers	guestrooms	258
offers	locationcontacts	237
offers	facilities	213
facilities	dining	213
facilities	default	206
facilities	guestrooms	203
guestrooms	dining	203
aboutus	facilities	186
aboutus	default	176

Table 9: Bots Request Frequency Patterns

From	To	Frequency
offers	about the hotel	429
dining	about the hotel	420
facilities	about the hotel	411
rooms	about the hotel	356
rooms	offers	341
home	about the hotel	329
events	about the hotel	316
location and contacts	about the hotel	311
home	offers	308
offers	dining	305
sitemap	about the hotel	296
press	about the hotel	295
above and beyond	offers	294
home	rooms	287
above and beyond	about the hotel	284
our city	about the hotel	283
privacy	about the hotel	280
our city	location and contacts	264
above and beyond	home	262
privacy	offers	252
location and contacts	facilities	250
above and beyond	rooms	247
privacy	rooms	245
privacy	home	242
rooms	dining	235
press	facilities	227

Continued on next page...

Table 9 (continued from Page 49): Bots Request Frequency Patterns

From	To	Frequency
our city	facilities	225
careers and education	about the hotel	224
facilities	offers	217
press	location and contacts	216
careers and education	dining	215
our city	location and contacts	214
location and contacts	about the hotel	214
events	offers	206
sitemap	facilities	204
home	offers	202
offers	about the hotel	202
above and beyond	home	200
home	offers	200
home	rooms	199
rooms	about the hotel	199
events	dining	198
home	rooms	197
rooms	offers	197
above and beyond	offers	196
offers	about the hotel	196
privacy	above and beyond	195
facilities	events	195
above and beyond	home	193
home	about the hotel	193
our city	facilities	190

Continued on next page...

Table 9 (continued from Page 49): Bots Request Frequency Patterns

From	To	Frequency
facilities	about the hotel	190
rooms	offers	190
offers	about the hotel	190
press	facilities	188
facilities	about the hotel	188
rooms	events	187
our city	press	186
privacy	home	184
home	rooms	184
facilities	dining	184
above and beyond	rooms	183
rooms	offers	183
above and beyond	home	183
home	rooms	183
our city	location and contacts	180
location and contacts	facilities	180
location and contacts	facilities	180
facilities	about the hotel	180
privacy	rooms	180
rooms	about the hotel	180
home	dining	179
rooms	offers	179
offers	dining	179
privacy	offers	179
offers	about the hotel	179

Continued on next page...

Table 9 (continued from Page 49): Bots Request Frequency Patterns

From	To	Frequency
facilities	rooms	179
location and contacts	offers	178
above and beyond	rooms	178
rooms	about the hotel	178
privacy	home	176
home	about the hotel	176
sitemap	facilities	174
facilities	about the hotel	174
location and contacts	dining	173
sitemap	press	173
press	offers	172
press	location and contacts	172
location and contacts	about the hotel	172
privacy	home	172
home	offers	172
sitemap	location and contacts	171
privacy	above and beyond	170
above and beyond	home	170
our city	press	168
press	location and contacts	168
privacy	rooms	167
rooms	offers	167
careers and education	dining	164
dining	about the hotel	164
location and contacts	rooms	163

Continued on next page...

Table 9 (continued from Page 49): Bots Request Frequency Patterns

From	To	Frequency
our city	sitemap	162
press	dining	162
above and beyond	home	161
home	offers	161
offers	about the hotel	161
privacy	above and beyond	160
above and beyond	offers	160
our city	press	159
press	about the hotel	159
our city	location and contacts	159
location and contacts	facilities	159
facilities	about the hotel	159
press	location and contacts	158
location and contacts	facilities	158
offers	dining	158
dining	about the hotel	158
privacy	above and beyond	158
above and beyond	about the hotel	158
our city	press	157
press	facilities	157
privacy	above and beyond	157
above and beyond	rooms	157
above and beyond	home	156
home	rooms	156
rooms	offers	156

Continued on next page...

Table 9 (*continued from Page 49*): Bots Request Frequency
Patterns

From	To	Frequency
above and beyond	home	156
home	rooms	156
rooms	about the hotel	156
home	rooms	155
rooms	offers	155
offers	about the hotel	155
location and contacts	home	155

B Web Log Data Format

C Extrapolation Results

Attached on the following pages are the results from Databricks. You may also interact with this online on Databricks.