

Salzburger Sommer Joker

Network Analysis Approaches



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Salzburg Sommer Joker

Traditional locally operated marketing approaches in tourism and leisure time industry face major problems when developing strategic momentum for segmenting, market selection and positioning the service worldwide. One of the remedies both on strategic and operational level is destination management. The single tourism events of a region should be seen as a leisure arena where visitors can visit a selection of attractive events and other places of personal interest and benefit.

The Salzburg Sommer Joker is an example of modern marketing management which is done by a destination marketing company. The company plans, organizes, manages and controls the configuration of the tourism arena year by year. One of the marketing tools is an all inclusive card provided for tourists.

The Salzburg Sommer-Joker Chip Card

The Salzburg Sommer-Joker is a chip card for an All inclusive vacation. It offers free admission or at a reduced rate to about 180 sights and attractions throughout the entire Province of Salzburg in Austria. It may be booked at all tourist offices, many branches of a local bank, and many hotels in the Province of Salzburg. The destination company which manages the Salzburg Sommer Joker is the Salzburg State Board of Tourism. A selection of special offers within the 180 sights covers 12 categories (see table).

Map



Categories

Event categories	Choice among
Lakes & swimming pools	41
Fortresses & castles	5
Museums & exhibitions	37
Exhibition mines	6
Natural attractions	12
Cable cars	29
Panoramic roads	2
Historical railway, busses, and boat routes	9
Sport & games facilities	13
Wildlife & adventure parks	3
Discount partners	10
Interesting historical sites in the City of Salzburg	24

... The Salzburg Sommer-Joker Chip Card

The chip card price in 1999 is ATS 495,- (approx. Euro 36,-) for adults and ATS 250,- (approx. Euro 18,-) for children. It is valid from May until October. The card may be used for entire 16 days by the holder. It also offers a family bonus with no charge for the 3rd child or more up to 14 and all children under age of 6.

When tourists use the Salzburg Sommer Joker their movement is digitally recorded for accounting reasons at the entry points of every tourism event. So each movement between the more than 180 events forms an individual trace and a network of interests. In total more than 340.000 movements are counted between the May and October in 1999 in the Province of Salzburg (see map with location of events). The tourists go there either by car or by other means of transport.

Data

...

27291417117	29.7.1999	14:43	139	Kind	Bahnen, Bussen & schiffe	126,00
27291417117	30.7.1999	10:26	108	Kind	Bergbahnen	94,00
27291417117	30.7.1999	13:02	129	Kind	Bergbahnen	170,00
27291417117	30.7.1999	14:42	46	Kind	Burgen & Schloesser	110,00
27291419126	3.8.1999	10:54	155	Freikarte	Wild & Erlebnisparcs	60,00
27291419126	4.8.1999	10:11	123	Freikarte	Bergbahnen	180,00
27291419126	5.8.1999	13:02	64	Freikarte	Museen	70,00
27291419126	6.8.1999	10:19	116	Freikarte	Bergbahnen	0,00
27291419126	9.8.1999	11:08	182	Freikarte	Stadt Salzburg	70,00
27291421104	7.8.1999	13:13	155	Erwachsen	Wild & Erlebnisparcs	60,00
27291421104	8.8.1999	11:03	101	Erwachsen	Naturerlebnisse	32,00
27291421104	8.8.1999	12:25	94	Erwachsen	Naturerlebnisse	30,00
27291421104	8.8.1999	14:20	86	Erwachsen	Schaubergwerke	70,00

...

user ID, date, time, **place**, card type, **category**, saving

category is determined by place, and card type by user ID

size of SoJo data = 301249 records

SoJo Statistics

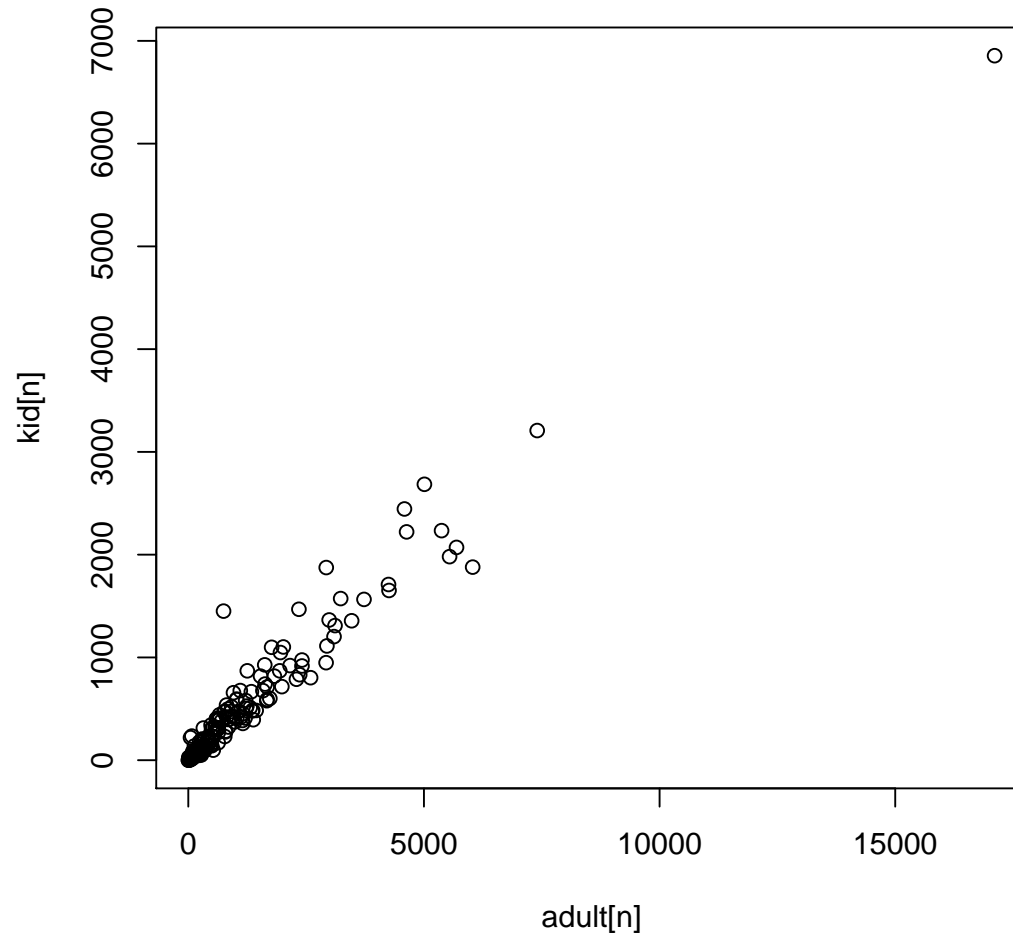
Events tables

Visits

Adult	Kid	Free	Total
203438	90268	7543	301249

Mon	Tue	Wed	Thu	Fri	Sat	Sun
45925	49647	49501	47730	40599	32458	35389

... SoJo Statistics / Adults:Kids



...SoJo Statistics / Most frequently visited places

1	172	Festung Hohensalzburg	24491	15	403
2	46	Erlebnisburg Hohenwerfen	10890	1	1606
3	127	Grafenbg.Wagrain/Fl.Mozart Tal PC-Leser	8042	3	1151
4	141	Karkogel Sommerrodel Abtenau (ohne BB)	7948	6	948
5	126	Weisssee Gletscherbahnen	7925	5	1010
6	97	Liechtensteinklamm	7781	4	1137
7	121	Rauriser Hochalmbahn	7750	2	1200
8	40	Wasserwelt Amade	7246	10	775
9	155	Wildpark u. Ki.Erl.Land Fusch-Ferleiten	7023	8	904
10	186	Wasserspiele/Schloss Hellbrunn	6133		
11	139	Schiffahrt Koenigssee	6073		
12	93	Krimmler Wasserfaelle	5412	9	825
13	5	Thermentempel Bad Hofgastein	4938		
14	173	Welt der Marionetten	4916		
15	143	Minigolf Flachau	4834		

...SoJo Statistics / Most frequent starting places

1	46	Erlebnisburg Hohenwerfen	1606
2	121	Rauriser Hochalmbahn	1200
3	127	Grafenbg.Wagrain/Fl.Mozart Tal PC-Leser	1151
4	97	Liechtensteinklamm	1137
5	126	Weisssee Gletscherbahnen	1010
6	141	Karkogel Sommerrodel Abtenau (ohne BB)	948
7	109	DSB Griessenkar + Sixback Flachau PC-L	906
8	155	Wildpark u. Ki.Erl.Land Fusch-Ferleiten	904
9	93	Krimmler Wasserfaelle	825
10	40	Wasserwelt Amade	775
11	123	Saalb.BB/ Hinterglemmer BB	556
12	125	Kabinenbahn Alpendorf	452
13	129	Bergbahnen Werfenweng	435
14	99	Kitzlochklamm	412
15	172	Festung Hohensalzburg	403

Analysis of histories

The Salzburg Sommer-Joker data are a special example of histories.

A *history* \mathcal{H} is a set of *records* of the form

$$r_i = (a_i, v_i, t_i, \dots)$$

where $a_i \in U$ is an *actor*, $v_i \in V$ is an *event*, $t_i \in T$ *time-stamp*. A record r_i can contain additional elements – for example, saving in SoJo data.

Other examples of histories: visits of pages of web server; reading of newspaper; web forum; on-line learning; TV channels, ...

A sequence of records r_i about the same actor a ordered on time-stamps,

$$t_1 < t_2 < \dots < t_k$$

$$r_1 = (a, v_1, t_1), r_2 = (a, v_2, t_2), \dots, r_k = (a, v_k, t_k)$$

determines a *trajectory* in \mathcal{H} $\tau = (v_1, v_2, v_3, \dots, v_k)$.

2-mode Network Approach

One of the approaches to the analysis of histories is to transform a given history \mathcal{H} to the corresponding *2-mode network* $N(\mathcal{H}) = (U, V, L)$, where

$$(a, v) \in L \iff \exists t \in T : (a, v, t) \in \mathcal{H}$$

Different NA methods can be applied to such networks.

The *2-mode network* of the SoJo history is of dimensions 25542×223 .

We transformed it into the corresponding events \times events undirected *1-mode network* (and deleted all unvisited events/places). The weights of an edge equals the number of common visitors of the endpoint events.

Visualizations: *250-edge-cut*; *18700-vertex-cut on valued core*.

We can also use normalizations of the network weights to neutralize the (big) differences in frequencies of visits. Clustering of users – unordered trajectories.

Visit Transitions Network

Another network that can be obtained from a given history \mathcal{H} is the corresponding *visit transitions network* $N_T(\mathcal{H}) = (V, A, w)$, where

$$(u, v) \in A \iff \exists a \in U, t_1, t_2 \in T : (t_1 < t_2 \wedge (a, u, t_1), (a, v, t_2) \in \mathcal{H}) \\ \wedge \neg \exists (a, z, t_3) \in \mathcal{H} : t_1 < t_3 < t_2$$

The weight $w(u, v)$ counts the number of transitions from u to v . Another weight /– the average transition time.

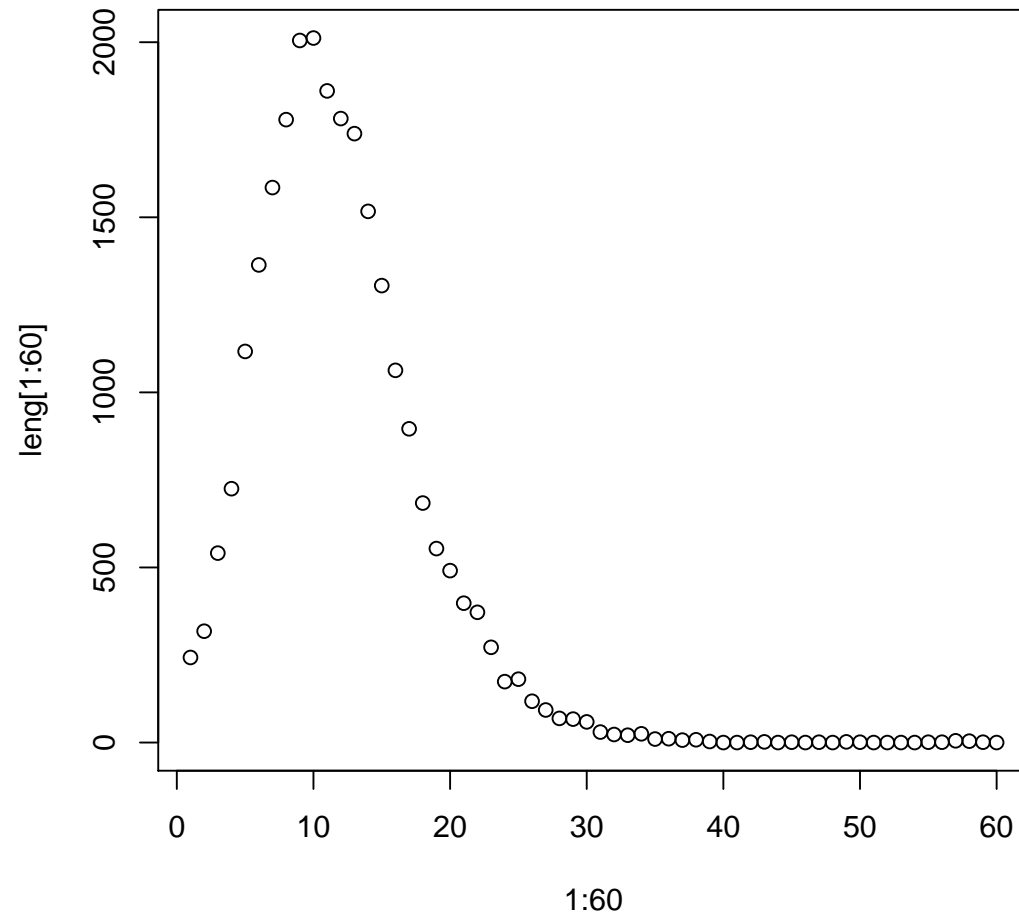
SoJo visit transitions network: 100-arc-cut;

We can put some additional conditions on transitions – for example $t_2 - t_1 < 12h$.

SoJo daily visit transitions network: 100-arc-cut;

The transition network can prove useful in identification of the most frequent subtrajectories.

Trajectory lengths



Sources

Vladimir Batagelj, Andrej Mrvar: Pajek.

<http://vlado.fmf.uni-lj.si/pub/networks/pajek/>

Christian Martin Broser: Die verwendung von touristischen all-inclusive karten in erlebnisnetzwerken am beispiel des Salzburger sommerjokers 1999. Diploma work, JohannesKepler University, Linz, 2001.