A network analysis of Sibiu County, Romania

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Introduction

Modern network analysis methods are increasingly used in tourism studies and have shown to be able to provide scholars and practitioners with interesting outcomes. Nonetheless, the availability of investigations conducted at a broad scale on tourism destinations is still limited thus restraining our ability to understand the mechanisms that underlie the formation and the evolution of these complex adaptive systems. With this research note we aim at contributing to the field by augmenting the catalogue of tourism destination network studies and present the preliminary results of an investigation conducted in the county of Sibiu, a renowned Romanian destination.

The data

Sibiu county lies in the heart of Romania (270 km from Bucharest) in the historical region of Transylvania. In 2007, Sibiu has been the European Capital of Culture (together with Luxembourg). The destination accounts for roughly 250 000 arrivals and 460 000 overnight stays. Sibiu has a management organisation (AJTS) which is a public-private partnership in charge of promoting and marketing the county as a destination, and working in close collaboration with the local government. The tourism infrastructure is well developed and counts about 500 establishments providing more than 6000 rooms (all data and a thorough description in Richards & Rotariu, 2011).

The data for the network analysis were collected by using a number of publicly available documents (see Baggio, Scott, & Cooper, 2010 for details) complemented by a survey conducted on 551 operators (179 questionnaires were returned) aimed at validating the data collected and evaluating type and intensity of the relationships. The nodes of the network are the core tourism operators of the destination (i.e. accommodation, intermediaries, restaurants, travel agencies etc., as defined by UNWTO, 2000). Table 1 reports the distribution of the companies used for the study.

We estimate a 85%–90% completeness for the data collected (see Baggio et al., 2010 for details), thus the metrics calculated can be reasonably considered as referring to the full network of Sibiu county. Here we present only a pure topological analysis, disregarding any attribute for the links and consider the network symmetric and unweighted. This, as known in the literature (Newman, 2010), is the basic and most important step for highlighting the structural characteristics of a complex network.

The network analysis

The network (Fig. 1) comprises 551 nodes, with 14.5% disconnected elements. The isolated nodes were ignored for the quantitative analysis (i.e. the analysis was conducted on the strong connected component of the network). The main metrics calculated are shown in Table 2 (given the scope and the space restrictions for this note, see Baggio et al., 2010 or da Fontoura Costa, Rodrigues, Travieso, & Villas Boas, 2007 for a full description of the quantities reported).

The network is quite sparse (low density) but relatively compact (low average path length and diameter). It has also (proximity ratio) a marked small-world characteristic, i.e. smaller average path

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Table 1
Types of businesses included in the Sibiu destination network.

Type of business	%
Associations	6.9%
Café-Bar-Pubs	5.9%
Camping	0.4%
Hotels	7.9%
Motel/Hostel	3.1%
Pensions	52.5%
Private accommodation	1.5%
Restaurants	8.4%
Travel Agencies	13.4%

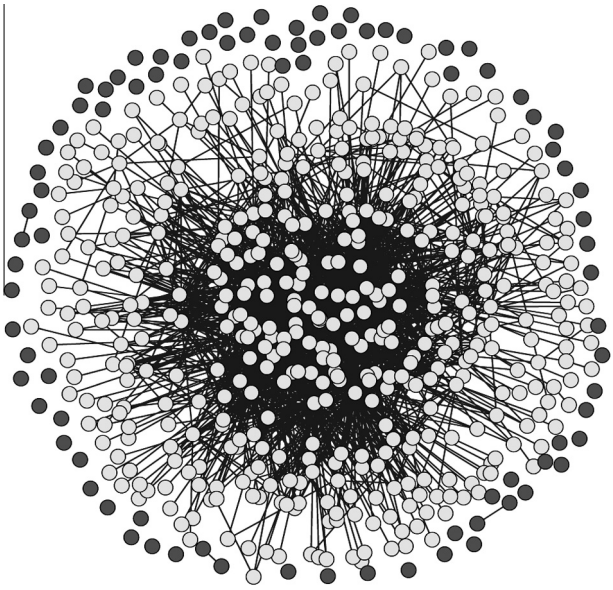

Fig. 1. The Sibiu destination network (light coloured nodes are those belonging to the strong connected component used in the analysis).

Table 2
The main metrics calculated for the Sibiu destination network.

Global metrics		Local (nodal) metrics		
Nodes	471		*Mean*	*Median*
Edges	2222	Degree	9.435	4
Density	0.020	Clustering Coefficient	0.325	0.269
Diameter (max distance)	7	Path Length	2.745	2.630
Global efficiency	0.386	Betweenness	0.004	4.57E-05
Assortativity coefficient	−0.286	Closeness	0.014	0.001
Proximity ratio	18.585	Eigenvector Centrality	0.002	0.001
Degree distribution exponent	2.51 ± 0.28	Local efficiency	0.426	0.482

length and higher clustering coefficient than expected in a purely random network (Newman, 2010). All the local (nodal) measures look skewed in their distributions (see the difference between mean and median values). In the following paragraphs we discuss with more detail the most important results.