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Geospatial analytics for federally managed tourism destinations and their demand markets

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ABSTRACT

Understanding geospatial demand for destinations can improve management decisions affecting destination planning, marketing, natural preservation, and resident as well as visitor experiences. Visualization and analysis of demand markets are significantly enhanced by the capabilities of Geographic Information System (GIS) technology and help to support management objectives. This study implements traditional desktop GIS as well as a free, web-delivered decision-support tool for tourism planning and marketing to assess ~7.5 million overnight accommodation reservations made for federal recreational facilities between 1999 and 2007. Visitor origin frequency and median travel distance for overnight accommodations are summarized by visitor zip code and by facility. National results indicate: (1) facilities in the west, the Great Lakes and the southern Appalachians regions draw overnight visitors from the greatest median distances; (2) residents in the Northeast have the lowest per-capita utilization; (3) residents within the south-central Midwest and central-west Southern States have the highest percapita utilization and tend strongly toward local overnight reservations. Three selected national park regions are used to illustrate destinations characterized by highly localized utilization (Hot Springs National Park, AR), both local and regional utilization (Yosemite National Park, CA) and regionally to nationally dispersed utilization with few local residents reserving overnight accommodations (Canyonlands National Park, UT). Market profiling derived from local, regional and national customer origin markets can help any tourism destination, including national parks and their gateway communities, make smarter management and marketing decisions.

1. Introduction

Tourism is unique among business enterprises in that individual businesses in aggregate create experiences for visitors to enjoy at a given geographic locale or destination. Many successful destinations facilitate coordination among various enterprises (activities, accommodation, shopping, etc.) so that the collection of experiences exceeds visitor expectations. Destinations both compete for new visitors and try to maintain flows of repeat visitation all while balancing the needs of residents with the desires of tourists. From a business perspective, often the metrics for success are enterprise growth and increases in the number of customers. Enterprise growth and increased visitation are not, however, always in line with creating desirable experiences for visitors and/or maintaining desirable conditions for residents of those destination communities.

Balancing the needs of residents against the desires of tourists, while providing high-quality visitor experiences, requires that the visiting population of any destination be well characterized and managed. Many efforts to characterize visitors or customers have included sophisticated market segmentation modeling techniques including clustering methods, mixture models, mixture regression models, mixture unfolding models, profiling segments, and dynamic segmentation (Wedel & Kamakura, 2000). However, less sophisticated approaches for characterizing tourists of a particular destination are often preferred by destination managers who desire data-driven market and management decisions. One such approach is to geographically define existing market areas and to create customer profiles based on the demographics of the residents living within those market areas (Supak, Devine, Brothers, Rozier Rich, & Shen, 2014). Unfortunately, market area definition and subsequent customer profiling cannot be accomplished for tourism destinations by simply defining distance rings or drive-time polygons with respect to an attraction (typical in other forms of retail), but rather they should include more precise

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techniques that account for the geographic dispersion of tourists to a destination (Miller, 2008).

National parks worldwide are an exemplary set of tourism destinations for examining distributed geospatial demand because they represent the most unique environmental endowments on the planet and therefore, they are likely to attract geographically diverse visitors. For the combined 56 national parks in the United States (U.S.), more than 60 million recreational visits were recorded and more than $4 billion was spent by nonlocal tourists visiting these parks in 2008 alone (Stynes, 2009). Further, these parks are part of a larger National Park System with over 300 federally managed destinations that include National Battlefields, National Historic Sites, National Monuments, National Recreation Areas, and other designated areas. This larger system received over 275 million visits in 2008 (Stynes, 2009).

National park systems have been the focus of many studies which aim to model the number of park visits using visitation data along with various other park characteristics, such as services provided inside the park, the natural characteristics of a park or the attractions and services in the regions where the parks are located (e.g. Hanink & White, 1999; Loomis, 2004; Neuvonen, Pouta, Puustinen, & Sievanen, 2010). National park characteristics and the quality of parks themselves have been linked to visitation frequency, with higher-quality parks attracting visitors from a wider area and parks with poorer qualities having a narrower geospatial range of demand (Hanink & White, 1999; Hanink & Stutts, 2002). Hanink and Stutts (2002)'s geospatial demand model posits that the level of recreational use of a site is related to its location relative to the population of potential users. The location and distance of a population in relation to a park is critical because the cost of travel to a park can limit the potential visitors (Neuvonen et al., 2010). This leads to the inherent trade-off between the investment of time, money or effort to achieve the travel and the time one can spend at the end destination, which must be balanced by tourists (Mckercher & Lew, 2003).

For unique destinations, such as U.S. national parks, understanding demand can be important for the stakeholders managing and marketing these destinations, both at the federal level and within the gateway communities that support these national parks. These gateway communities are often seen not only as the portals to cherished landscapes, but as the purveyors of food, lodging, transportation and other business support for visitors to the national parks (McMahon,1999). Studies examining geospatial demand and tourism flow have found that the beneficial effects from tourist flows are not confined to the tourism-specialized regions, but are also transmitted to the neighboring regions by means of geospatial spillovers (Marrocu & Paci, 2011, 2013). From a geographic perspective, the spillover effect in tourism can be regarded as a particular geospatial interaction among destinations (Yang & Wong, 2012). National parks in the U.S. can experience spillover into gateway communities simply due to limited resources within the parks.

For federally managed destinations within the national park system, specifically for the 56 national parks, the time spent within the park may be externally controlled by the availability of overnight accommodations within the park itself. While the sites in the National Park System attract millions of visitors because of their scenic beauty and outdoor recreation opportunities, only a small percentage of these visitors can be accommodated within the most popular parks each night. For example, of the 4 million visitors to Yosemite National Park in 2010, there were only 142,864 overnight stays (Yosemite National Park Statistics, 2014). The remaining visitors, those who do not stay within the park boundaries, either were passing through on the way to a different destination, live locally or stayed on public or private land within or adjacent to neighboring gateway communities.

When planning a visit to a federally managed destination, in which an overnight stay is desired, prospective visitors can search a single web-presence (www.recreation.gov) to browse, query and make reservations at one of 60,000 facilities (campsites, cabins and group facilities) at over 2500 locations. The recommended facilities are selected based on proximity and customer interest, rather than by the managing agency (Recreation.gov About Us, 2014). If an overnight stay is not available for a prospective visitor's desired date and location, alternative federally managed facilities within the region are recommended, so that a prospective visitor may choose another suitable location. Reservations made on this website are on the order of one million per year and they represent a big data opportunity for characterizing the demand markets for federally managed tourism destinations themselves as well as the gateway communities who provide services to specific national parks. Understanding geospatial demand for a destination from temporal and spatial data such as these can improve management decisions affecting destination planning, marketing, and natural preservation, which are all necessary for balancing the experiences of residents and visitors.

The main purposes of this study are to examine the general geospatial demand for overnight recreation on federal lands prior to the 2008 recession and to examine the specific geospatial demand for selected national park regions. The national geospatial demand for overnight recreation on federal lands provides a snapshot from which specific national park regions were selected for further investigation. The geospatial demand for the selected national park regions were then used to characterize the destination as having some combination of local, regional or national visitors. By investigating the geospatial distribution of visitors to national parks regions, destination managers for both the federally managed facilities within the region and their corresponding gateway communities can improve marketing and management decisions. Specifically, understanding existing customers more fully and targeting new prospective markets more precisely are direct benefits. These benefits can be particularly powerful for gateway communities that desire enterprise growth but also need to maintain a balance between marketing efforts and desired visitor experiences. As demand market data for national park gateway community destinations is often hard to assemble, we see this study as presenting an approach for characterizing the visiting populations to any gateway community. Although we present analysis and interpretations for only three selected national park regions, managers of other national parks and their respective gateway communities can utilize this approach to become smarter destinations.

2. Geospatial data analytics for tourism destinations

For reservation data systems, such as the one described for overnight federal facility reservations, the volume of data presents big data challenges related to data curation, querying, sharing, transferring, and analysis. Visualization of such large datasets and the insights that can be gained from exploring geospatial relationships among the data can be significantly enhanced by the capabilities of a Geographic Information System (GIS). The geospatial analytic and visualization capabilities of a GIS allow for analysis and display of past or current trends, providing geospatial context to strategic tourism planning and management in destination communities (McAdam, 1999).

The ability of a GIS to employ a variety of internal and external datasets for analysis of geospatial and temporal relationships for market and customer profiling makes these systems invaluable for destination management (Bell & Zabriskie, 1978; Elliott-White & Finn, 1998; Grimshaw, 1999; Miller, 2008). Not only is the travel and tourism industry in need of GIS tools that can help account for the geographic dispersion of customers, but it is well suited for geospatial analysis, primarily because most transactions produce a record of