

Tourism in older population: an analysis of TripAdvisor reviews

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1. Introduction

Population aging is a widely recognized phenomenon in developed countries, where the proportion of older individuals has steadily increased over the past century [Horneman, L., Carter, R. W., Wei, S., Ruys, 2002]. The global population's age distribution is undergoing rapid change, with the median age rising and a consequent decline in the younger population [Harper, 2014]: Italy has emerged as the oldest country in Europe as of 2022, with a median age of 48 years.

Population aging is predicted to be a significant social transformation in the 21st century, affecting various sectors, including labour and financial markets, housing, transportation, social protection, and tourism [United Nations, 2015]. Tourism, in particular, stands to benefit from targeting the elderly as a potential market segment with substantial economic significance for the hospitality and tourism industry [Patterson, I., Balderas, A., 2020]. Within the tourism industry, seniors are emerging as a prominent market segment, both in terms of the frequency of their trips and the significant amount they spend [3], becoming a recognized phenomenon worldwide [Jang, S., Wu, C. M., 2006]. Senior travellers have attracted in-

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creasing attention from tourism researchers, service providers and governments because of their remarkable growth in numbers and spending patterns [Glover, P., Prideaux, B., 2009]. This population segment represents a large untapped market, making it a significant driving force for the tourism industry [Meiners, N., Seeberger, B., 2012], because senior travellers are wealthier, healthier, more active, and have more leisure time than previous generations [Horneman, L., Carter, R. W., Wei, S., Ruys, H., 2002].

Recognizing the potential of the senior travel market, professionals in the tourism and hospitality industry have actively developed competitive business and marketing strategies specifically tailored for older tourists [Sedgley, D., Pritchard, A., Morgan, N., 2011]. To gain a comprehensive understanding of the needs and preferences of the elderly population, we conducted an analysis on reviews from TripAdvisor, focusing on hotels and accommodation facilities. These reviews provide valuable and spontaneous feedback from tourists, offering a rich blend of opinions and impressions. So, we employed Non-Negative Matrix Factorization to extract meaningful insights from reviews for the identification of the main discussion topics and to inform researchers and industry practitioners on the topics of interest. This analysis enables tourism and destination management operators to gain a deeper understanding of the feedback and leverage this technique to enhance their offerings and attractions, ensuring a more enjoyable experience for senior travellers.

2. Theoretical background

To identify the main themes related to the needs of older people during vacations, a data extraction process was conducted using TripAdvisor Italy reviews. The aim of this preliminary work is to comprehend the distinct requirements of senior tourists by analysing reviews, which shed light on the factors influencing their choice of accommodation. Additionally, the research aims to examine the geographical distribution of these needs across various regions of Italy. By identifying and understanding these specific needs, we can assess their impact on the tourism industry, offering valuable insights for better catering to elderly tourists' preferences and enhancing their overall travel experiences. In pursuit of our objectives, we formulated the following research questions:

RQ1: How is the user rating distributed across different regions in Italy? Addi-

tionally, how does it compare to ratings in other countries worldwide?

RQ2: What are the specific needs of elderly travellers concerning accommodations, and how do these needs influence their decision-making process when choosing a place to book?

For doing this, we devised code in Python that extract reviews from TripAdvisor containing the query "anziano" and its various declinations in the text. The goal is to gather valuable insights from these reviews. The following variables were extracted: username of the review writer, date of the review, rating expressed by the user, address, and region/state where the facility is located, and the text of the review. The extraction process successfully collected a total of 3.536 reviews from 2008 to 2023 that were relevant to the needs of older people during vacations. Text analysis involves several important steps to extract meaningful information from a given collection of documents. The initial step is tokenization and parsing, which involves identifying sequences of characters in the text and breaking down into distinct tokens. These tokens are strings of characters separated by spaces, punctuation marks, or other characters. This process helps in reducing the text to basic graphic forms.

After that, we performed some phases of normalization to reduce language variability. One common normalization technique is converting all the characters to lowercase to ensure consistency and to standardize all the terms. So, the text is subjected to grammatical tagging, that marks each word in the corpus to indicate its corresponding part of speech (POS) based on its definition and context. Common parts of speech like nouns, verbs, and adjectives are typically selected during this phase.

Next, lemmatization is performed, which involves reducing each inflected word to its base form or lemma. For verbs, this means considering their infinitive form, for nouns, their singular form, and for adjectives, their masculine singular form. Lemmatization ensures that different inflections of a word are treated as a single, unified term, simplifying the overall text analysis process.

After removing the stop-words (such as prepositions, articles, or other words as meaningless as they are isolated from context), we have streamlined the text analysis process to focus on more meaningful terms. As a result, we constructed a vocabulary that reports a list of unique terms (types) along with their respective occurrences. We had 2.450 types, 13.488 tokens and 3.356 documents. Next, we constructed the term-document matrix, where the rows represent the terms, and the columns represent the documents. On this matrix, it is possible to apply different topic modeling techniques to frame which topics of interest guests find important

[Rossetti, M., Stella, F., Zanker, M., 2016; Sutherland, I., Kiatkawsin, K., 2020; Sutherland, I., Sim, Y., Lee, S. K., Byun, J., Kiatkawsin, K., 2020]

In our work, we applied the Non-Negative Matrix Factorization (NMF) to define the major topics of discussion. NMF is an unsupervised technique already established in the literature used to reduce the size of high-density data by discovering the underlying low-density structures [Kuang, D., Choo, J., Park, H., 2015]. It has been used in many applications, such as audio source separation, image classification, and visual tracking because it imposes nonnegativity constraints on the factor matrices makes the results easily interpretable. This is particularly useful for textual data analysis, where clusters of terms that are created can be interpreted as arguments. In fact, NMF has gained significant attention in machine learning and text data mining research due to its effectiveness in identifying topics within text corpora. Compared to Latent Dirichlet Allocation (LDA) method, NMF has the advantage of involving fewer parameters in the modeling process and excels in identifying niche topics often overlooked by LDA approaches [14]. Selecting the optimal value of k (the number of topics) in NMF can be achieved using various methods, one of which suggests determining the value where the cophenetic coefficient starts to decrease (Brunet et al., 2004). By applying NMF to the term-document matrix, primary themes can be extracted from the collection of documents [Alshalan, R., Al-Khalifa, H., Alsaeed, D., Al-Baity, H., Alshalan, S., 2020; Grassia, M. G., Marina, M., Rocco, M., Misuraca, M., Agostino, S., 2023].

Main results

Reviews express different perspectives or aspects of the experience a user has had with an object. Therefore, extracting and interpreting these dimensions can be leveraged to enhance the accuracy of systems that automatically process these reviews, aiming to improve user experiences on such platforms or extract some form of commercial value from this review data. Before proceeding to define the main themes extracted from the reviews, we conducted an in-depth analysis of the distribution of user ratings across various Italian regions (Fig.1) and other countries (Fig.2). This examination provided us with valuable insights into the overall satisfaction levels and preferences of customers in different geographic locations. Ratings play a fundamental role in the tourism review ecosystem, providing users with essential information to make well-informed decisions, enhancing their travel experiences, and contributing to the growth and improvement of the tourism industry. For the Italian facilities (Fig. 1), it is evident that the overall distribution of ratings tends to be positive, with most scores falling above three. This indicates that most users had satisfactory experiences and expressed their contentment through higher

ratings. Among the Italian regions analysed, Basilicata and Sardinia stand out as top-performers, both receiving a rating value of 4. These regions have managed to create memorable and enjoyable experiences for older travellers, garnering high levels of satisfaction from visitors. On the other hand, Molise appears to have received a negative score, indicating that some older users may have had subpar experiences or encountered issues during their travels in this area.

On a global scale (Fig.2), the analysis of user ratings for elderly care facilities reveals interesting patterns in user preferences and satisfaction levels across different countries. According to the data, Italian tourists who chose outdoor vacations provided positive feedback and expressed appreciation for facilities mainly located in Kenya, Japan, the Czech Republic, and Cuba. These countries have managed to create environments that are highly valued by the elderly residents, providing exceptional care and services that have garnered positive reviews from users. In contrast, the user ratings indicate a less favourable perception of elderly care facilities in San Marino, Morocco, and Croatia. This suggests that users in these countries may have encountered challenges or perceived shortcomings in the quality of care, amenities, or services provided by the facilities.

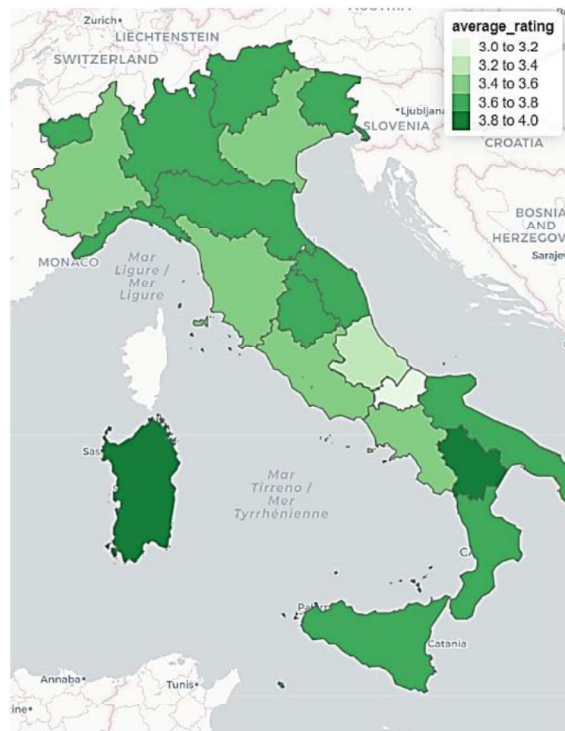


Figure 1 – Average rating for Italian regions

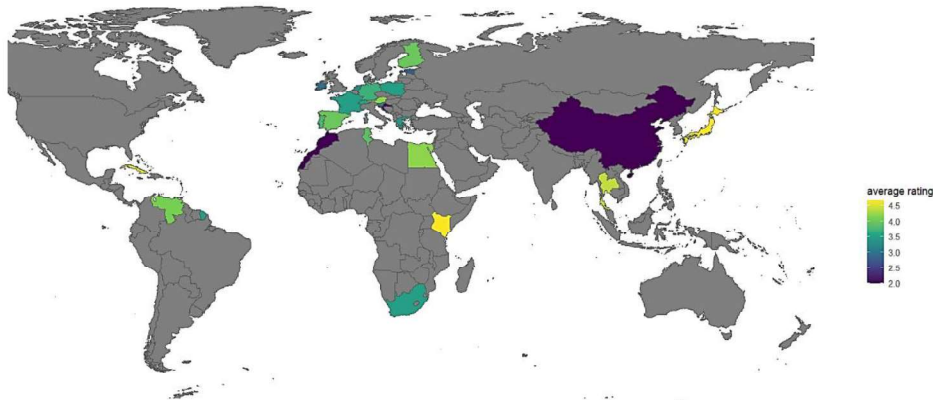


Figure 2 – World map with average rating for country

Once the rating trends provided by users were visually analysed, we embarked on identifying the main themes extracted from the reviews on TripAdvisor, focusing on the elderly vacation experience. According to the measure of cophenetic coefficient, we extracted 4 topics which shed light on the specific services and preferences that elderly customers look for when booking facilities for their vacations. One prominent theme that emerged from the reviews is the significance of tailored services catering to the unique needs of customers. This includes amenities and features designed to enhance their comfort and mobility during their stay. From accessible facilities and accommodation options to personalized care services, these considerations play a pivotal role in ensuring a delightful vacation experience for senior guests. Moreover, it was evident that senior tourists show a preference for vacation facilities located in serene villages, ideally with proximity to the sea and pool areas. Then, some elderly couples may require assistance or care services during the vacation, such as medical staff or caregivers, depending on their individual needs. So, an important aspect related to this topic is mobility, which plays a crucial role in ensuring a comfortable overnight stay for elderly clients. It is essential for facilities to offer transportation services to facilitate their movement and make it easier for them to get around during the stay.

Ensuring the availability of these services can provide them with peace of mind and support the well-being during the holiday. Personalized activity plans are also crucial for older adults couples. Offering a diverse range of activities that cater to

their interests and travel pace allows them to fully enjoy their vacation experience. Whether they prefer leisurely sightseeing, cultural excursions, or engaging in recreational activities, providing customizable options ensures that they can engage in activities that resonate with their preferences. The importance of spacious and well-appointed rooms was another recurrent theme in the reviews. Senior guests often prioritize rooms that offer ample space to move around comfortably and are equipped with amenities that promote comfort, such as air conditioning. Such features contribute significantly to the overall enjoyment and well-being of guests. Additionally, the proximity of vacation facilities to places of attraction emerged as a vital consideration for senior guests. The ability to explore nearby tourist spots or cultural landmarks without extensive travel to immerse themselves in local experiences and make the most of their time during the vacation.

Topic 1	Topic 2	Topic 3	Topic 4
Colazione	Mare	Personale	Camera
Pulizia	Spiaggia	Cordialità	Letto
Posizione	Animazione	Servizio	Bagno
Prezzo	Villaggio	Assistenza	Spazioso
Last minute	Piscina	Attività	Scale
Buffet	Ristorante	Centro_Termale	Doccia
Parcheggio	Attrezzatura	Famiglia	Ascensore
Pranzo	Spazio_Verde	Cucina	Accesso
TV	Relax	Sala	Mobilità
Aria_condizionata	Ombrellone	Ristorante	Navetta

Table 1 – Terms associated with topics.

After identifying the underlying topics, we associated each review with its relevant topic of discussion. This allowed us to group the documents by region, enabling us to determine the prevailing topic for each area. By adopting this approach, we could visualize the distribution of extracted topics across different Italian regions and gain valuable insights into the geographical dispersion of senior tourists' needs.

As depicted in Figure 3, the theme concerning services and infrastructure appears to be widely discussed in the north-central part of Italy. This finding suggests that

travellers in this region show a significant interest in the quality of services offered by hospitality establishments and the overall infrastructure supporting their travel experiences. The second topic, centred around facilities with a diverse range of marine equipment, is prominently discussed in southern Italian regions. So, who visit these areas are particularly interested in amenities and services related to marine landscape and relax. This finding could be of great value to hospitality businesses operating in the southern regions, as they can tailor their offerings to cater to the specific interests of their target audience, thereby enhancing guest satisfaction and loyalty.

On the other hand, Friuli Venezia Giulia and Trentino Alto Adige emerge as the regions where activities and experiences offered by the facilities are the primary focus of discussions. This indicates that travellers in these regions place a strong emphasis on engaging in various recreational and cultural experiences, such as hiking, sightseeing, and exploring local attractions. Interestingly, Topic 4 appears to be less discussed in Italy compared to the other topics, with its prevalence being relatively low across other nations.



Figure 3 – Distribution of topics across Italian regions

3. Preliminary conclusions and future developments

In conclusion, this work sets out to conduct a preliminary analysis of the needs and perceptions of senior tourists. Understanding user preferences and satisfaction levels is crucial for enhancing the tourism experience for older adult guests. For Italian facilities, most ratings were positive, indicating satisfactory experiences and high levels of contentment among users. Basilicata and Sardinia stood out as top-performing regions. San Marino, Morocco, and Croatia received less favourable ratings, suggesting potential challenges in the quality of care and services. Countries with lower ratings should address concerns to improve the overall travel experience (RQ1).

By recognizing the preferences and needs faced by senior travellers, it is possible to devise a set of strategies to improve tourism offerings by accommodations. This approach enables to understand the distinctive attributes that attract visitors to specific areas. By exploring the regional prevalence of different topics, stakeholders in the tourism industry can make informed decisions and tailor their offerings to cater to the diverse needs of travellers, ultimately enhancing the overall tourism experience in Italy. We have identified the major topics that contribute to the satisfaction of senior tourists. Accessibility and safety emerged as fundamental considerations, with the provision of accessible facilities and accommodations equipped with safety features ensuring ease of mobility and a worry-free environment, but also a range of accommodations that are attentive to senior services and consider age-related needs (RQ2).

For future developments, we can fine-tune the search query used to gather relevant reviews from various online platforms. By optimizing the search parameters and incorporating more specific keywords related to senior-friendly amenities and services, we can ensure that the retrieved data is even more targeted and aligned with the specific needs and preferences of guests. While online booking platforms like booking.com and hotels.com ensure that reviews are only certified for bookings confirmed through their platforms, TripAdvisor, on the other hand, does not verify the status of reviewers, creating a potential invitation for fake reviews. For this reason, even rating analysis does not show highly accurate information about the rating of facilities. In this regard in future developments, a sentiment analysis will be conducted to compare the rating expressed by users with the content expressed in reviews.

References

- Alshalan, R., Al-Khalifa, H., Alsaeed, D., Al-Baity, H., Alshalan, S.: Detection of hate speech in covid-19–related tweets in the arab region: Deep learning and topic modeling approach. *Journal of Medical Internet Research*, 22(12) (2020).
- Bai, B., Jang, S. S., Cai, L. A., O'leary, J. T.: Determinants of travel mode choice of senior travelers to the United States. *Journal of Hospitality & Leisure Marketing*, 8(3-4), 147-168 (2001).
- Fleischer, A., Pizam, A.: Tourism constraints among Israeli seniors. *Annals of Tourism Research*, 29(1), 106–123 (2002).
- Glover, P., Prideaux, B.: Implications of population ageing for the development of tourism products and destinations. *Journal of Vacation Marketing*, 15, 25–37 (2009)
- Grassia, M. G., Marina, M., Rocco, M., Misuraca, M., Agostino, S.: Topic modeling for analysing the Russian propaganda in the conflict with Ukraine. In: *ASA 2022 Data-Driven Decision Making-Book of Short Papers*, Firenze University Press, 245-250 (2023).
- Harper, S., Leeson, G.: Introducing the journal of population ageing. *Journal of Population Ageing*, 1(1), 1–5 (2008).
- Harper, S.: Economic and social implications of aging societies. *Science*, 346(6209), 587–591 (2014).
- Horneman, L., Carter, R. W., Wei, S., Ruys, H.: Profiling the senior traveler: An Australian perspective. *Journal of Travel Research*, 41, 23–37 (2002).
- Isa, S. M., Ismail, H. N., Fuza, Z. I. M.: Elderly and heritage tourism: A review. In: *IOP Conference Series: Earth and Environmental Science*, 447, No. 1. IOP Publishing (2020).
- Jang, S., Wu, C. M.: Seniors' travel motivation and the influential factors: An examination of Taiwanese seniors. *Tourism Management*, 27, 306–316 (2006)
- Kuang, D., Choo, J., Park, H.: Nonnegative matrix factorization for interactive topic modeling and document clustering, in *Partitional Clustering Algorithms*, Springer, Cham, 215-243. (2015).
- Meiners, N., Seeberger, B: Marketing to senior citizens: Challenges and opportunities. *The Journal of Social, Political, and Economic Studies*, 35(3), 293–328 (2010).
- Misuraca, M., Spano, M.: Unsupervised analytic strategies to explore large document collections. In *Text Analytics: Advances and Challenges*. Springer International Publishing, 17-28. (2020).

- O'Callaghan, D., D. Greene, J. Carthy, P. Cunningham.: An analysis of the coherence of descriptors in topic modeling. *Expert Systems with Applications (ESWA)*, 42(13), 5645–5657 (2015).
- Patterson, I., Balderas, A.: Continuing and emerging trends of senior tourism: A review of the literature. *Journal of Population Ageing*, 13, 385-399 (2020).
- Rossetti, M., Stella, F., Zanker, M.: Analyzing user reviews in tourism with topic models. *Information Technology & Tourism*, 16, 5-21 (2016).
- Sedgley, D., Pritchard, A., Morgan, N.: Tourism and ageing: A transformative research agenda. *Annals of Tourism Research*, 38(2), 422-436 (2011).
- Sutherland, I., Kiatkawsin, K.: Determinants of guest experience in Airbnb: a topic modeling approach using LDA. *Sustainability*, 12(8), 3402 (2020).
- Sutherland, I., Sim, Y., Lee, S. K., Byun, J., Kiatkawsin, K.: Topic modeling of online accommodation reviews via latent dirichlet allocation. *Sustainability*, 12(5), 1821 (2020).
- United Nations, Department of Economic and Social Affairs, Population Division: *World population prospects*. New York: USA (2015).