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What do you do or with whom? Understanding happiness with the tourism experience: an AI approach applied to Instagram

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More and more tourists are sharing their experiences on their social media through a combination of photos, texts, and hashtags. But there is a scarcity of studies in literature on analyzing tourists' visual content in relation to tourism destinations. To address this gap in literature, this study explores how and with whom users express the greatest happiness in holiday destinations, and how they share it with their community, through a mixed methods approach composed of analysis of images, text, and metadata. This approach allows us to address the objective of this research, which is the prediction of the happiness felt by tourists during their experience, using innovative techniques that allow the independent variables to be obtained. To predict tourist satisfaction, two sources of data, photos and texts, are analyzed: a novel approach and little explored in the literature, but necessary due to the interaction of both variables. This study applies various artificial intelligence analyses on visual content (deep learning), and textual and metadata content (machine learning) to 39,235 Instagram posts shared by tourists since the emergence of Instagram thirteen years ago, at a cultural and gastronomic tourist destination. The findings of the visual content analysis showed that socialization and company, that is, traveling and interacting with people, was a key aspect of a positive tourism experience. In addition, the gender of the people with whom they traveled, and the tourist's narcissism were also key aspects in the generation and expression of positive emotions. Regarding the analysis of the textual content, the results showed that when tourists enjoyed a positive experience, they became more involved in the generation of content, that is, they showed their happiness through positive words.

Introduction

The destination image displayed on social media by users is a concept widely analyzed in recent decades, given its influence on tourists to generate a desire to visit, revisit, or recommend a destination (Araujo-Batlle et al. 2023). The destination image comprises of the characteristics that make a place attractive and distinctive. One of the most accepted models is Gartner's model (1994) in which cognitive and affective factors are included (Garay 2019).

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The cognitive attributes of the destination image are those representing rationality, such as tourist resources, while the affective attributes are those based on emotional aspects, such as happiness (Garay 2019; Araujo-Batlle et al. 2023). Nowadays, the destination image and its two cognitive and affective components are created not only from the content generated by destination managers (DMOs), but, thanks to social media, users also contribute to creating this image by publishing content that narrates their experiences with rational and emotional elements added in (Filieri et al. 2021; Chuang 2023).

Tourists travel to increase their well-being, that is, to maximize the reward related to the search for pleasure and new sensations (Fodness 1994). In addition, there are more and more new types of customer experiences and behaviors (Cuesta-Valiño et al. 2023b), and these customers are used to expressing these feelings online through platforms such as social media; therefore this tourist-generated content is not only an outlet for tourists to express their satisfaction, but is also an important source of information for research on tourist emotions (Jin et al. 2020; Zhang et al. 2023). This type of content is consumed by other users, such as potential visitors, who are affected by its characteristics, perceiving to a greater or lesser extent the emotions expressed by tourists during their experiences.

Contributing to the image of the destination, more and more tourists demonstrate their feelings through photos, texts, and hashtags shared on social media, but there is still a scarcity in the literature on how travelers externalize these feelings—mostly positive—through this type of platform (Mak 2017; Filieri et al. 2021). Although the digital era presents many opportunities for companies and destinations aiming to communicate and sell their products (Cuesta-Valiño et al. 2022), this is somewhat unexplored in hedonic social media such as Instagram, where positive emotions have proven to be useful variables that allow researchers to understand user experiences through technology (Casaló et al. 2017; Casaló et al. 2021).

In addition to the emotional element generated during a positive tourist experience, other central elements are socialization, and context or environment (Coelho et al. 2018). Socialization denotes the interpersonal interaction between traveling companions, other tourists, and even locals, giving rise to intimacy between people and directly affecting the tourists' intentions of revisiting the destination and promoting it through word of mouth (eWOM) (Triantafillidou and Petala 2016). Intrapersonal activities, such as talking or building relationships with other people, lead to the activation of positive emotions (Gao and Kerstetter 2018). Due to this, it is widely considered that tourists enjoy socializing with other people, because this generates a sense of satisfaction and improves their experience (Sarkar and George 2018), but it remains unclear in literature how each person's individualism or sociability can affect their emotions during their tourist trip, depending on their companions.

In addition to being a social activity by nature, tourism is also directly associated with narcissism, an aspect that, together with social media, has been analyzed by different authors (Casale and Banchi 2020; Araujo-Batlle et al. 2023). There is a growing trend to capture oneself in photos while traveling, excluding other elements of the destination, such as monuments, museums and other places of culture (Christou et al. 2020). In the last decade, selfies have taken a central role in the context of travel and tourism, increasingly linking the tourist trip with a narcissistic experience accentuated through self-representation on social media (Canavan 2017). A selfie is a photo of oneself, usually taken from a smartphone and usually uploaded to a social media platform (Barry et al. 2019). Tourists who take selfies do so when they feel good, that is, when they are experiencing positive emotions such as joy and happiness, and they share this happiness on social media in order to communicate their personal experience with others (Ghouse et al. 2022), regardless of gender and age (Christou et al. 2020).

Lastly, tourists involved with the destination make use of social media and photos to express their attitude toward the destination (Cuesta-Valiño et al. 2023c), which in the specific case of Instagram involves photos, texts, and hashtags, linking the number of hashtags, amount of text, and greater polarity of the text expressed in the posts with greater involvement with the destination (Filieri et al. 2021; Wang et al. 2022).

The Instagram social media platform and an inland cultural and gastronomic destination have been chosen as the research scenario. Instagram is the main social media platform for tourism photos in which users share their experiences, and other potential tourists turn to this content for inspiration prior to their own trips, making it the most influential platform (Weiler et al. 2021; Arival 2023).

The chosen destination belongs to one of the routes of the *Camino de Santiago de Compostela*, a cultural asset added to the UNESCO World Heritage List in 1993 (UNESCO 2023). Cultural tourism destinations should be analyzed more deeply, given that according to the Tourism Organization (UNWTO), it is the most important type of international tourism and represents more than 39% of tourist arrivals (Richards 2018), which is equivalent to 273 million visits between January and July 2023 (UNWTO 2023). Furthermore, according to the *UNWTO Report on Tourism and Culture Synergies* (2018), 89% of UNWTO Member States stated that cultural tourism was part of their tourism policy and that they expected further growth in cultural tourism.

In addition, a particular cultural destination has been selected because it has a distinct typology, with specific and homogeneous characteristics that allow analysis to be carried out that is unaffected by other attributes related to the behavior of tourists, as can exist in sun and beach destinations, or mass urban tourism. This destination is not affected by a wide variety of differentiated destination attributes, nor by significant diversification of tourist behavior.

Since this research is focused on exploring positive emotions that users share on Instagram, it began analyzing all the posts shared at the destination from the year 2010 to the year 2022 (inclusive), with 150,000 posts from Instagram at the destination, by tourists, companies, and residents. In order to understand the behavior of tourists in this social media platform, a previous filtering of the posts is necessary to obtain content shared by only tourists. This filtering finally allowed us to analyze 39,235 posts made up of photos, texts, and metadata. A mixed methods approach was adopted that combines three analyses prior to the statistical analysis through artificial intelligence techniques: analysis of the visual content, that is, the photos, through the deep learning technique, obtaining different visual characteristics such as the number of people in each photo, their gender, and the emotion felt by each; an analysis of the textual content, that is, the texts that accompany the photos, using the machine learning technique that has enabled extracting different variables from the text, such as the polarity of the text and the user's involvement with the destination through the number of hashtags and length of their text; and finally an analysis of the metadata, such as the date of publication or the anonymous users linked to an imaginary identification, which allows deciphering tourists' behavior. This type of approach allowed obtaining a comprehensive understanding of the research topic (Filieri et al. 2021). This study expands the depth and magnitude of the investigations by applying artificial intelligence techniques together with the triangulation of different types of data, as in this case the use of images, texts, and metadata of Instagram posts simultaneously (Filieri et al. 2021).

The objective of this research is to provide clarity on what generates enjoyment in tourists when they visit a destination, and how they share it with their community through social media, to help DMOs better define their goals, marketing strategies, and destinations. Therefore, this research aims to resolve three main questions:

1. How do Instagram users express their happiness through visual and textual content in their posts?
2. More specifically, is this happiness affected by their level of socialization and narcissism during the trip? Is this happiness reflected in their level of involvement with the destination?
3. Finally, do individualist tourists behave the same as more sociable tourists?

By answering these questions, we contribute to the consumer research field in several ways. First, the findings of this research provide DMOs with valuable information, allowing them to identify the most representative attributes in Instagram posts that generate more positive emotions in the destination. Knowing if tourists feel pleasure will allow managers to plan ahead, since this feeling implies an intention to return, and generation of positive eWOM about the destination can engage more tourists (Reitsamer and Brunner-Sperdin 2017). Second, there is evidence on how tourists' well-being acts as a driving force in their intentions and involvement with the destination, which leads to a greater generation of positive content in social media, which will influence the behavior of future tourists (Filieri et al. 2021). Third, this paper broadens the understanding of positive emotions in tourism experiences, specifically illustrating how these emotions are accompanied by different visual attributes, such as socialization or tourist narcissism expressed by tourists in their social media posts, that build up the target image. Fourth, we also present a scalable method for analyzing large datasets through mixed methods and artificial intelligence techniques which helps us apply content analysis that allows us to extract the content type of each post (Thongmak 2022). Lastly, this research offers a robust methodology for better understanding how DMOs can measure satisfaction and tourist behavior, and determine what factors influence tourist happiness.

The next section provides the theoretical background of this paper, followed by the application of mixed methods and artificial intelligence techniques, prior to the statistical analysis proposed to demonstrate the causal relationship between the happiness of tourists, and the independent variables. Finally, this paper provides a discussion, followed by various academic and practical implications of the findings and future research directions.

Literature review

Positive emotions, tourism experience, and Instagram. Through its campaigns, the tourism industry promotes positive experiences full of joyful and happy scenes. Happiness is a central issue for any person, since it is the main state to which any individual aspires (Cuesta-Valiño et al. 2023a). In addition, happiness is expressed when tourists have a favorable attitude towards the destination, and this transforms into word of mouth or recommendations marketing strategies (Cuesta-Valiño et al. 2022a). In turn, these feelings are idealized, reinforced, and reproduced by the tourists themselves in their holiday photographic scenes (Heimtun and Jordan, 2011), that these days they share them with their community on social media (Chen et al. 2023), rather than saving them in a personal photo album.

Two universal emotions in the field of tourism experiences are pleasure and happiness; certain holiday activities create fun and entertainment, engendering joy and satisfaction (Cuesta-Valiño et al. 2020). Pleasure, understood as a temporary emotional event, is not the same as happiness, but the two are closely related. The first is motivated by external circumstances in a specific place or time, while happiness is constant and is related to a state of inner fulfillment (Filieri et al. 2021). Both reveal the positive emotional state that tourists feel during a moment in their trip, for example, smiles that travelers display in the photos they share on Instagram. This positive feeling is also expressed in words in the texts accompanying these publications, through the polarity of the descriptions, hashtags, and emojis linked to positive feelings such as happiness, enthusiasm, joy, enjoyment, and pleasure (Filieri et al. 2021; Wang et al. 2022; Chen et al. 2023).

Specifically, the polarity is extracted through sentiment analysis, an analysis that allows us to know the thoughts, feelings, and desires of users through their comments on social media. The analysis of polarity (usually measured between −1 and 1, the latter being the maximum positivity) has been widely addressed in literature to determine user satisfaction (Hemmatian and Sohrabi 2019; Karayiğit et al. 2021; Chen et al. 2023). However, in a highly visual social media environment, such as Instagram, and in a tourism context, satisfaction may not merely be expressed in the text created by the user, but this happiness may be revealed in the photos that tourists take at the destination. These two variables are closely related, but they do not measure the same thing. While the text allows knowing the tourist's written and reflected opinion after the experience, the emotion transmitted in the photograph allows knowing the happiness felt at the moment the photo is taken, that is, while the tourist experience is being lived. The photo reflects reality, which might be expressed and elaborated on in a text.

The impulse to share travel content intensifies after a satisfactory and positive experience at the destination, causing an emotional attachment to the destination to become positive eWOM that might influence the attitudes of other potential and current tourists (Aro et al. 2018; Lund et al. 2018; Filieri et al. 2021). For this reason, although tourist experiences are subjective, intangible, and difficult to capture in their essence, the tourism sector tries to understand tourists' experiences and use them as a differentiation tool in comparison with other destinations (Coelho et al. 2018), because when an emotional connection occurs, other tourists are more likely to remember the destination brand (Cuesta-Valiño et al. 2021; Cuesta-Valiño et al. 2022b). Furthermore, when the consumer responds favorably to stimuli, such as points of touristic interests, the destination brand is positively impacted (Gutiérrez-Rodríguez et al. 2017). However, analysis of the positive feelings generated during the tourist experience has received little attention in research, and therefore it is vital to address this topic (Kladou and Mavragani, 2015; Oliveira and Panyik 2015; Aro et al. 2018; Filieri et al. 2021). Instead, existing research has focused on other aspects such as analysis of the happiness acquired after the trip (Huang et al. 2019) or the emotions generated during advertisements using technologies such as neuromarketing (Costa-Feito et al. 2023), but has not tracked the tourists' enjoyment throughout their holiday experience, since existing research has focused more on the analysis of happiness once the trip is over, but not while experiencing it.

Some studies have analyzed the emotional ties between people and tourism resources (Pan et al. 2014; Cheng and Kuo 2015) or how Instagram users express their love for a destination brand in their posts (Filieri et al. 2021), but little attention has been paid to how tourists articulate and express their emotions on social media platforms, specifically Instagram, through images and texts that they immortalize and share while having a positive experience.

Tourists are familiar with expressing their happiness and well-being on digital platforms, therefore not only is this type of

content important for tourists to express their emotions, but these data are also a vital source of information for academic research. This source has until now not been sufficiently exploited (Zhang et al. 2023), since it allows us to understand tourists' behavior and what implications this has for tourism managers and their decision-making. For this reason, this study considers positive emotions as a central variable surrounding the entire tourist experience and investigates the factors that can affect the generation of this positive feeling, detailed below. Thus, the following is hypothesized:

H1: The polarity expressed in the text of a tourist post has a direct and positive relationship with the positive emotions expressed by the people appearing in the accompanying image.

Involvement during a positive tourism experience. Tourists use the content of social media to express their involvement with the destination, which on Instagram means photos, texts, and hashtags (Filieri et al. 2021). Specifically, hashtags are especially relevant on Instagram, since their focus is on connecting people with the same interests (Mele et al. 2023). One way in which users share their content with other users is by selecting hashtags that best connect with the content they want to share, since these hashtags then become a direct link to other similar public content that other users are able to view (Palazzo et al. 2021). For this reason, the use of one or more specific hashtags is considered to indicate the degree of involvement that tourist has with the destination, with hashtags revealing this even more than likes or comments (Filieri et al. 2021).

In the same way, the length of the texts linked to the hashtags depends on the level of the individual's involvement with the photographed scene, where the longer the text, the higher the level of involvement with the destination (or with the point of interest) (Wang et al. 2022). Other authors consider that the depth and breadth of the content reveal the tourists' involvement with the destination and reinforce their point, which in the case of Instagram is to reinforce the self-image transmitted through the text (Qazi et al. 2016; Leung 2021). However, not enough research has been done on the type of tourism content, since the importance attributed varies, depending on what is being experienced.

To illuminate on how tourists convey their experience through text, it is proposed that there is a direct relationship between the intensity of the emotion felt, and the amount of text and the number of hashtags that they post along with their photos. Thus, the following are hypothesized:

H2: The number of hashtags included in the text of a tourist post has a direct and positive relationship with the positive emotions expressed by the people appearing in the accompanying image.

H3: The length of the text of a tourist post has a direct and positive relationship with the positive emotions expressed by the people appearing in the accompanying image.

Narcissism during a positive tourism experience: selfies. Perhaps no aspect of social media and tourist-generated content has impacted the travel and tourism industry more than the selfie phenomenon (Taylor 2020). At any tourism destination, tourists have great motivation to search for the most representative selfies of their enjoyment at that moment; for this reason, tourism marketing specialists try to promote "selfie moments" at certain points of tourist interest that enhance the viral effect, and help position that destination with the aim of increasing visitor numbers (Taylor, 2020).

The tourism industry has been transformed by the drive for selfies, so it is important to understand tourists' motivations to share their travel experiences through selfies on social media platforms, since these motivations can provide a competitive advantage over other destinations (Taylor 2020). And the best place to analyze these motivations is on Instagram, the main platform used for self-presentation (Keerakiatwong et al. 2023).

Christou et al. (2020) showed that tourists generally take selfies when they feel good and experience positive emotions such as joy and happiness. Publishing these contributes to enhancing the objectives of the DMOs and goes viral more quickly, but there is still little knowledge about what drives tourists to take selfie photos.

Therefore, this research proposes that there is a relationship between the intensity of tourists' emotions in their photos, and the format of the image itself (i.e., selfie). Thus, the following is hypothesized:

H4: The narcissism of tourists expressed in their selfie-format photos in a social media post has a direct and positive relationship with the positive emotions expressed by the people in the image.

The socialization and gender diversity of tourists during a positive tourism experience

Socialization during a positive tourism experience. The tourism experience is made up of three main dimensions: the context or environment of the experience, the emotion felt during the experience, and finally with whom it is experienced (Coelho et al. 2018). Therefore, when analyzing the tourism experience, the social component cannot be ignored (Triantafillidou and Petala 2016). This normally refers to the social relationships that tourists have during their experience, that is, enjoying the company of others who belong to the group, a good group atmosphere, and group-members interacting with each other (Triantafillidou and Petala 2016). Tourists generally like to socialize because their experience is improved (Kim and Kim 2018; Sarkar and George 2018) thanks to the activation of their positive emotions (Gao and Kerstetter 2018). Thus, the following is hypothesized:

H5: The reflection of socialization in the image of a tourist post has a direct and positive relationship with the positive emotions expressed by the people appearing in it.

To generate a good atmosphere within a group of visitors, it is necessary to take into account individuals' tastes, expectations, and preferences (Contreras-Contreras et al. 2023). Junek, Binney, and Winn (2006) concluded in their research that tastes and preferences differ between men and women. Gender influences people's decision-making about what leisure activities to choose, so tourists prefer to share their experience with people with the same tastes (Li et al. 2011). These gender differences can create conflict between travelers and their companions, generating negative emotions such as fear, tension, or anger, accentuated when companions are of different genders (Heimtun and Jordan, 2011). In addition, Collins and Tisdell (2002) found that women tend to travel more for pleasure, while men travel more for work-related events, so women who want to travel without their family or partner, but not alone, often travel in all-female groups (Junek et al. 2006).

Because the tastes of men and women differ (Small 2002), it is proposed that the intensity of positive feelings will be intensified when the number of women or men forms a majority, that is, when there is a greater number of women in a photo, or a greater number of men, separately. Indeed, it is believed that gender is related to the number of people and the emotions expressed in them, it is suggested that women place more importance on the relationship with others than men do, so Instagram photos with

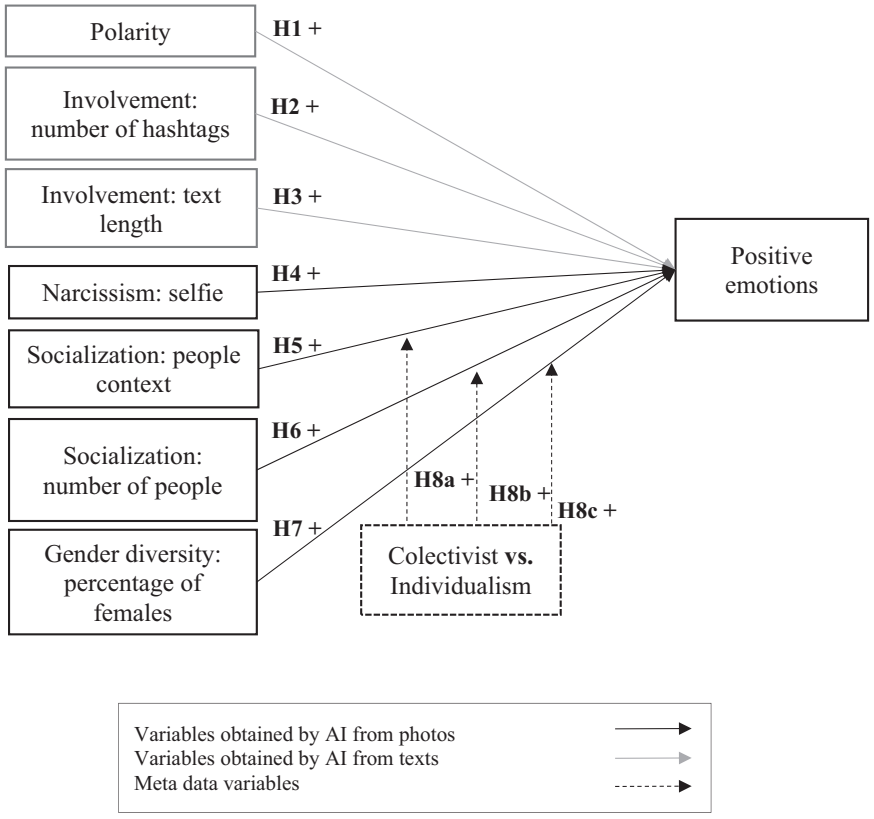

Fig. 1 Global conceptual model.

more women would reflect this evidence. And since women are more susceptible to the contagion of emotions than men (Kim and Kim 2018), the following is hypothesized:

H6: The number of people in a tourist image has a direct and positive relationship with the positive emotions expressed by the people appearing in the image.

H7: The gender diversity in an image has a direct and positive relationship with the positive emotions expressed by the people appearing in the image.

Collectivist or individualist tourists. Although socialization is a crucial factor in tourist trips, there are also tourists who prefer to enjoy their leisure time alone – they are known as solo travelers (Ghadban et al. 2023). Although the moderating effect of collectivism has already been explored in tourism contexts through culture, understanding the patterns of collectivist versus individualist tourists is increasingly important for destination marketing (Han et al. 2017; Khan and Fatma 2021). The present research delves into this moderation through the behavior displayed on social media, and proposes that tourists considered more sociable see the intensity of their emotions reinforced on trips with more people, unlike solo travelers. It is known that the number of faces in photos and the emotions expressed on the faces differ, depending on the personality of the user. Extroverted and sociable users are more likely to interact with more people, and therefore have more faces in their Instagram photos, expressing more happiness (Kim and Kim 2018), but little is known about whether collectivism can affect the emotion shown. Thus, the following is hypothesized:

H8: The collectivist or individualist nature of the tourist moderates the effect that socialization context (**a**), number of people (**b**), and percentaje of females in the travel group (**c**) have on the positive emotions expressed in the image.

Conceptual model development. The conceptual framework for our study is presented in Fig. 1, summarizing the main variables analyzed in this study through a model that includes all the research hypotheses. We investigated the attributes related to the tourism experience—specifically, polarity and involvement of the text, and narcissism, socialization, and gender of the photo—on happiness.

We posited that polarity and involvement would lead to a higher level of happiness with the destination. We posited the same with narcissism, socialization, and gender of the photo, that would lead to a higher level of happiness with the destination. Additionally, we proposed that the inclusion of collectivism and individualism in photo content would moderate the relationship between happiness and socialization and companionship.

Methodology

Analysis of tourism experience on Instagram with big data. A decade ago, the main methodologies used in research on tourism experiences were classified into quantitative methods, qualitative methods, and case studies (Lugosi and Walls 2013). With the advent of big data, new technologies and methodologies have changed the scientific landscape, thus allowing the advancement of science through the use of new data type from those obtained through classic surveys or in-depth interviews, and allowing researchers to analyze tourism experiences from a perspective linked more to actual behavior than to the intention of a specific behavior (Blanco-Moreno et al. 2023).

Technologies such as web scraping have allowed the collection of large amounts of data (Balomenou and Garrod 2019; Deng and Liu 2021), thanks to the automation of the download that allows a reduction of time (Reif and Schmücker 2020; Arefieva et al. 2021; Hauser et al. 2022; Zuo et al. 2023).

Today there is data that offers information such as location and textual or visual information, which allows tourist organizations and destinations to improve their offers and better understand customer preferences and needs (Pachni-Tsitiridou and Fouskas, 2023). Although the new technologies are presented as an opportunity to solve challenges in the investigation of tourism experiences, there is still a dearth of studies. These new technologies have allowed the analysis of tourist movement on social media platforms (Zenker et al. 2017; Deng and Liu 2021; Zhong et al. 2022; Zuo et al. 2023), and have helped to understand what type of content tourists share on their social media (Lee and Kim 2020; Arefieva et al. 2021; Hauser et al. 2022), but for the moment there is little research in relation to the emotions generated by tourists during their trips (Mak 2017; Filieri et al. 2021).

In this era of big data, the posts that travelers share about their tourist experiences are becoming a very relevant source of analysis, since they are directly linked to the image of the destination received by other potential travelers (Deng and Liu 2021). To delve into research on positive emotions during travel, Instagram ranks as the best traveler data collection platform, since these emotions are revealed both in the photos shared by these travelers, and in the texts and hashtags linked to them.

Instagram is a social media platform that provides large amounts of data that can be very valuable for scientific research, such as photos and texts, and metadata such as date, location, and engagement data associated with each post. These data allow promoting the paradigm shift that academia needs, through the use of novel approaches such as mixed methods using the triangulation of data obtained from different sources (Filieri et al. 2021) and analysis of visual content, textual content, and metadata through artificial intelligence techniques (Volo and Irimiás 2021). In fact, the report *The 2023 Experiences Traveler* showed how social media such as Instagram are a consolidated source that consumers use to research and be inspired by when planning their next trips (Arival 2023). Specifically, this report concludes that Instagram is currently the most influential platform for those looking for new ideas about what to do while traveling, since it offers easy-to-interpret visual content that is less burdensome than reading long reviews on TripAdvisor (Arival 2023). These results are aligned with scientific literature on the publication of tourist experiences in social media (Weiler et al. 2021; Arival 2023).

Regarding user preferences, the main platform on which to share tourist experiences is also Instagram. It has 1,300 million users and generates millions of photos and videos daily (DataReportal 2023), specifically more than 130,000 daily posts related to the hashtag *#travel* (Instagram 2023), and Instagram is well known for its creativity and uniqueness (Ballester et al. 2023).

Despite being a crucial marketing tool for target image management, Instagram and the analysis of its images have been little used by academic research (Hauser et al. 2022). Therefore, as one of the most popular and recent tourist-generated content platforms in digital tourism (Yu et al. 2020), Instagram has been chosen as the central social media platform for this study.

Sample and sampling procedure. To investigate how the positive emotions tourists express in their content shared on Instagram are related to different elements of the tourist trip, this research is based on methodological pluralism. Holistic analysis of destination experiences is a challenge for science, which is why this research implemented different techniques and methodologies in consecutive phases, described in greater depth below: downloading data from Instagram posts (**first phase**) through web scraping; structuring and cleaning the database until obtaining the tourist posts (**second phase**) through Excel; analyzing textual data from Instagram posts (**third phase**) through machine learning; analyzing Instagram photos (**fourth phase**) through deep learning; clustering the photos based on their main element (**fifth phase**) through text mining; classifying tourists into collectivists and individualists (**sixth phase**) through Excel; and finally the final statistical analysis (**seventh phase**) through regressions. The investigation procedure is presented in Fig. 2.

Phase 1: database development with web scraping technique. The first phase is the creation of the database using the web scraping technique. This technique has grown rapidly in the disciplines of marketing and tourism, consisting of extracting data from web pages in an organized and automated way (Yu and Egger 2021), such as the date, anonymous identifier of the user, image, text, likes and comments, and location of the post. Web scraping has three main advantages. The first as mentioned above, is that it allows the automated, structured, and fast download of data embedded in web pages, such as Instagram. The second is that it allows obtaining any type of data on Instagram, such as texts, photos, and metadata. The last advantage is that these data can be obtained in an anonymous way, which allows compliance with the European Data Protection Law and ethics during the construction of the database (Hauer 2022).

After the implementation of the web scraping model, 150,000 Instagram posts were obtained with their corresponding texts, photos, and metadata (anonymous and numerical user identifier, location, and date of publication) from 43,000 users who published their content in 245 different locations on the destination.

Phase 2: classification and distinction between tourists and residents. Since this research focuses on content shared only by tourists during their trips, it was necessary to filter the database prior to analysis, in order to distinguish between tourists and residents. It is usually difficult to know if a photo shared by a user belongs to a tourist or a resident. To do this, it would be necessary to go to their personal profile and try to identify its origin at a glance, but when there is a large amount of data, this task can be easier. This research is based on tourist posts published since the origin of Instagram in 2010, till 2022, and each post is associated with a user with a unique and anonymous identifier that allows following the evolution of photos published at the destination.

In order to identify tourists, a triple filter was applied. The first filter is linked to the unique and anonymous identifier of each Instagram user. This data allows knowing the date associated with each Instagram post, and therefore, classifying which users (anonymized) published photos during 30 consecutive days or fewer in the destination, considering them tourists in this case, and residents otherwise (Gunter and Önder 2021). The second filter concerned knowing the number of photos published by each anonymous user, knowing therefore which users published fewer than 30 photos in the destination, considering them tourists in this case, and residents otherwise (Gomez et al. 2019). The third filter was a text analysis, to be deepened in the next phase, making it possible to discard publications containing commercial data such as email accounts, telephone numbers, or high rates of hashtags (Gomez et al. 2019).

Phase 3: machine learning text analysis. Once the database was built and filtered solely as tourists, 47,329 Instagram posts were obtained. The next step was to carry out a topic text analysis and a sentiment analysis associated with each post using artificial intelligence techniques, specifically machine learning. The machine learning model implemented belongs to the open-source

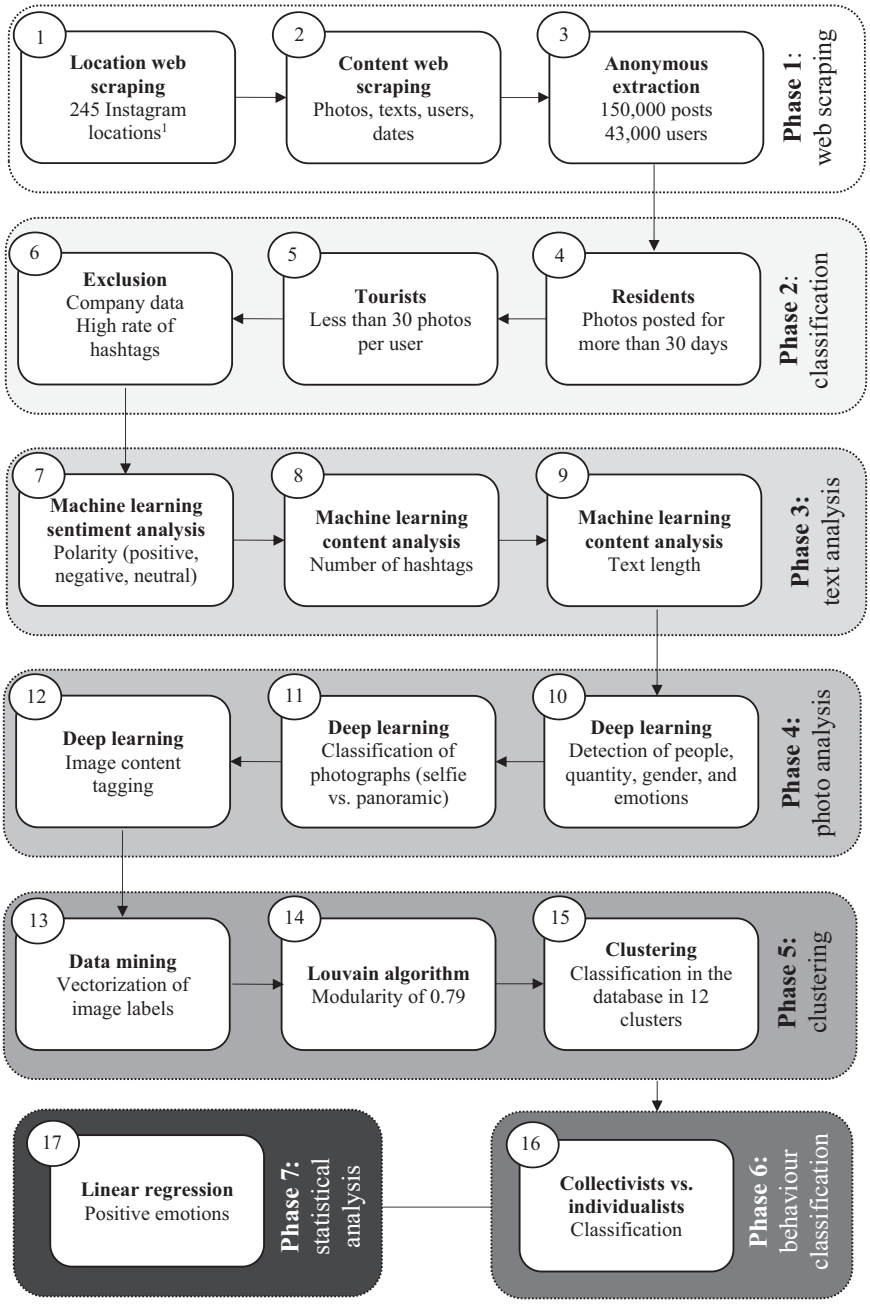

Fig. 2 Research procedure. [1]https://www.instagram.com/explore/locations/c688051/leon-spain/.

software NLTK and developed in Python (NLTK 2023). This sentiment analysis module is a tool based on a machine learning approach that analyses the given text content using its pretrained model, and returns a rating between −1 and 1, with −1 as the most negative text possible, and 1 the most positive possible. In addition, this machine learning model was applied allowing us to know the total number of hashtags in each Instagram post, along with the total number of characters.

Phase 4: deep learning photo analysis. The fourth phase consisted of extracting information from photos through artificial intelligence models, specifically deep learning, and through Siamese convolutional neural networks using the Python language. It should be noted that machine learning and deep learning are both artificial intelligence techniques, but with an important difference. While machine learning techniques work with regression algorithms and/or decision trees, deep learning techniques use neural networks that try to mimic the functioning of biological neurons (Fig. 3).

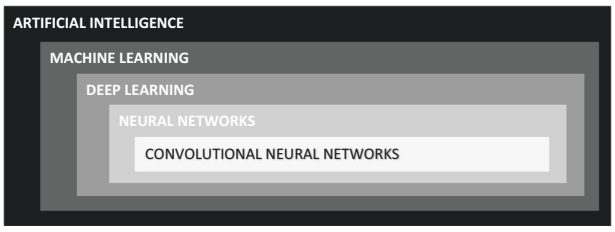

Fig. 3 Classification of artificial intelligence techniques.

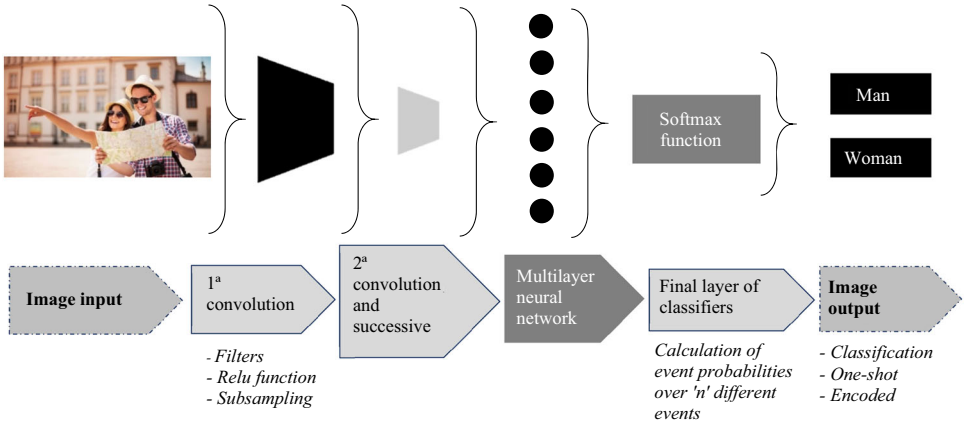

Fig. 4 Classification procedure of a neural network.

Fig. 5 Classification procedure of Deepface neural network Source: Serengil (2023).

Among artificial intelligence techniques, the most useful method for image classification is neural networks, since they allow classification (what the image represents) or detection of objects within the images. These networks are trained from images, allowing them to learn from images' pixels and labels. The networks create different layers and convolutions and become models that users can adapt in the last layers to implement in their databases (Fig. 4). For this reason, this research applied different open-source neural network models, that is, already pretrained, and an ad hoc elaborated neural network.

The first implemented neural network is Deepface, an open-source model that allows easy recognition and analysis of facial attributes using Python. It is made up of the latest generation and prestigious models such as VGG-Face or Google FaceNet, and shows a reliability higher than the human brain, located at 97.53% (Serengil 2023). This first neural network combined with another people detection model made it possible to find out the number of men and women shown in each photo, along with the emotion represented. These emotions follow the classic and extended classification of seven general emotions (Bisogni et al. 2023): happiness and surprise (considered in this research as positive emotions), neutral, and sadness, fear, disgust, and anger (considered as negative) (Fig. 5). Several people can appear in the photos, so to calculate the positivity or negativity of the images, the individual emotional data of each person was selected (between 0 and 100 for the positive ones, and between −100 and 0 for the negative ones), the summation made, and it was divided by the total number of people in the photo. Photos with a mean value greater than 0 were considered photos to have positive emotional data. Furthermore, to provide consistency to the research results, the results of photo analysis of the Deepface neural network were compared with the results of Computer Vision, an artificial intelligence service from Microsoft, integrated into Azure Cognitive Services (Azure 2023), and a correlation of 96.5% were obtained.

The purpose of this research is to delve into the positive and hedonic emotions transmitted by users, as one of the main purposes of tourist trips (Holbrook and Hirschman 1982); photos with negative feeling were not the object of this study. For this reason, finally, since only the photos in which positive feeling transmitted was the majority, the research focused on 39,235 posts.

The second neural network, elaborated ad hoc for this research, made it possible to know the level of narcissism of each photo, that is, to distinguish between photos taken in selfie format, or

Table 1 Image labeling and clustering example.

Image	Tags	Cluster
10004344.jpg	outdoor, text, person, footwear, ground, person, shoes, feet	Socialization
10004198.jpg	outdoor, text, old, castle, cloud, art, sky, painting	Day heritage
10005326.jpg	building, church, outdoor, place of worship, old, stone, big, wall clock, tower, medieval, architecture, cathedral, gothic, arch, sky, chapel, abbey, parish	Night heritage
10004104.jpg	indoor, floor, drinking, person, footwear, soft, clothing, ground, bottle, food, people, alcohol	Food
10004206.jpg	building, outdoor, street, stone, castle, sky, land, vehicle, car, window	Transport
10004118.jpg	building, arch, stone, court, ceiling, church, vault, arcade	Other

Table 2 Structure and classification of the database.

Variables	Measurement	Technique	Authors
Positive emotions	Mean of positive emotions in a photo	Deep learning	Serengil (2023)
Polarity	Text sentiment between −1 and 1 in the text	Machine learning	NLTK (2023)
Involvement: number of hashtags	Number of hashtags in the text	Machine learning	NLTK (2023)
Involvement: text length	Number of characters in the text	Machine learning	NLTK (2023)
Narcissism: selfie	Dichotomic (selfie or panoramic photo type)	Deep learning	Ad-hoc development
Socialization: people context	Dichotomic (photography cluster whose main motive is people)	Louvain Algorithm	Azure (2023)
Socialization: number of people	Number of people in the photo	Deep learning	Serengil (2023)
Gender diversity: percentage of females	Percentage of women in a photo	Deep learning	Serengil (2023)
Collectivist vs. Solo traveler	Dichotomic (collectivist or solo traveler)	Statistical mean	Serengil (2023)

not. To generate this selfie photo detection model, the neural network was trained with a free database, made up of more than 78,000 labeled images collected by the University of Florida (Bhatt 2020). The parameter of ¾ of the pixels made up of people's faces was established to consider a photo as a selfie, that is, the neural network detects what amount of space the faces occupy in the photo, and if it is more than ¾, it will classify the photo as a selfie. Since there is no artificial intelligence criterion that allows to know automatically if a photograph is a selfie or not, in this case the angle of the photograph was evaluated, and it was established that the face in the photo must occupy more than ¾ of the pixels.

Phase 5: image labeling and clustering. To label and cluster the photos, it is necessary to first know their content. For this purpose, Computer Vision was applied, an artificial intelligence service from Microsoft, integrated into Azure Cognitive Services (Azure 2023) which analyses the content of images and offers a structured database with the identifier of each photo in the first column, and the labels of the objects in each image in text format, in another column; therefore, this application allowed annotating each image with different labels (Table 1).

In the first phase, the labels of each photo were transformed into vectors based on frequencies of term-frequency inversely, and these vectors were calculated by the number of times that each word appeared in the corpus, divided by the total number of words in that corpus (Yu and Egger 2021). Papers based on inverse frequency terms indicate how much each label contributes to each image (Chen et al. 2023).

After vectorization, the Louvain algorithm was applied to categorize the images into different clusters, since it is a grouping method based on maximizing the similarity within the group and minimizing the similarity between groups, that has been widely used as an image segmentation technique (Yu and Egger 2021). In this research, the Louvain algorithm was applied to transform the image data into different highly interconnected clusters. The image labels make it possible to form a graph of networks allowing the grouping of highly connected images (Yu and Egger 2021). The parameters applied to obtain the best match were a principal component analysis of 5 (i.e., preprocessing parameter on the original data to remove noise), with k-neighbors of 150 (i.e., the number of nearest neighbors that will be used to form the k-Nearest-Neighbor plot) and a resolution of 2 (i.e., parameter for the Louvain community detection algorithm that affects the size of the retrieved clusters). These parameters allowed us to obtain 6 clusters, with a modularity of 0.79. A single cluster grouped all the photos showing people enjoying an experience. This cluster does not group all the photos in which people appear, but rather groups the photos in which the main focus is people. For example, a photo in which two people appear with a monument in the background would not be included in this cluster, while a photo with several people enjoying a meal would belong to the cluster 'socialization.'

Phase 6: classification of collectivist and individualist tourists. After clustering the images based on their content, the database was classified based on the content of each user. To do this, through the unique and anonymous identifier of each user, all the photos were identified and were classified into images without people, with one person, or with several people. When several people appeared in the photos, it was considered a photo that showed collectivism, and otherwise it was considered individualist. Next, the individualist and collectivist photos were averaged, and that user was tagged. For example, a user with three photos with several people, and one photo with one person, was considered a collectivist.

The structure and final classification of the database is represented in Table 2.

Phase 7: variable manipulations and statistical analysis. Linear regression was carried out using IBM SPSS version 26 software to find out if there is a dependency relationship between positive emotions and the different variables obtained in the Instagram photos and texts (IBM 2023).

Linear regression analysis made it possible to find out which independent variables best explain the positive emotions dependent variable: the sentiment expressed in the text, number of hashtags included in the text, amount of written text, narcissism as the main reason for the photo, number of women in the group (percentage), and socialization (number of people

Table 3 Descriptive analysis.

Variables	Min.	Max.	Mean	Standard deviation	*n*
Positive emotions	0.00	1.00	0.14	0.334	47,329
Polarity	−1.00	1.00	0.12	0.265	39,235
Involvement: number of hashtags	0	37	4.50	7.54	47,301
Involvement: text length	0	2,201	128.41	215.09	47,280
Socialization: number of people	0	21	0.46	1.12	47,321
Gender diversity: female's percentage	0.00	1.00	0.13	0.31	47,329
	Frequencies				
	Min.	**Max.**	**0 (*n*)**	**1 (*n*)**	**Total (*n*)**
Narcissism	0	1	93%	7%	47,329
Socialization: people context	0	1	72%	28%	47,329

and people context). Before proceeding with the statistical analysis, certain variables were manipulated so that the results were clearer. Specifically, the dependent variable 'intensity of positive emotion' was transformed to a range from 0 to 1000, instead of 0 to 1. In addition, the logarithm was applied to the continuous quantitative variables. In addition, the different outliers found were also eliminated.

The moderating role of the type of user publishing the photo was also investigated: how a sociable person versus an individualist person saw their level of emotion affected, depending on whether they traveled with more women, more men, or simply with people in general. A model was then developed to systematically test the study's hypotheses, with the statistical equation of the model shown below:

$$\text{Positive\_emotions}_i = b_0 + b_1\text{Polarity} + b_2\cdot\log(\text{Number\_of\_hashtags}) + b_3\cdot\log(\text{Text\_length}) + b_4\text{Narcissism} + b_5\text{People context} + b_6\cdot\log(\text{Number of people}) + b_7\text{Gender diversity} + e_i$$

Results

Descriptive analysis. In general, the study findings revealed tourist behavior in the form of taking pictures at the destination. The photos that showed positive polarity obtained an average of 0.14, between 0.00 and 1.00, that is, people broadly showed their happiness in them. The general means and standard deviations can be seen in Table 3. The distribution of the variables can be seen in Supplementary Appendix 1.

It was observed that the average intensity of positive emotion was somewhat low (0.14). This was because, although it is logical to think that very positive emotions are felt in tourism since they occur in a leisure context, this was not reflected in the photographs that tourists shared. Surely this was related to the fact that the moments that caused the most intense emotions were not usually captured in photographs, since people at that moment were living that experience, and surely did not think about capturing the emotion photographically (Gao and Kerstetter 2018; Bisogni et al. 2023).

Main analysis and post hoc analysis. Linear regression analysis was performed to examine the effects of the independent variables on the dependent variable, and the assumptions of linear regression analysis were met. For this, multiple regressions were implemented since the variables reflected a social context, centering and squaring the people variable (Aiken et al. 1991). In general, the majority of independent variables significantly predicted the positive emotions shown in the photos.

Regarding the variables related to the text (i.e., model 1 or previous analysis): the polarity of the text, number of hashtags, and the amount of text were significant, so H1, H2, and H3 were accepted, although with a very low R^2: 1.6%.

Regarding the variables related to photographs (i.e. model 2 or main analysis): people socialization context during the trip, amount of people, and percentage of women were significant, so H1, H5, H6, and H7 were accepted, but not H2, H3, and H4 (narcissism). The main model obtained an R^2 of 64.6%, therefore the results showed a strong effect of the independent variables on the dependent variable ($R^2 = 0.664$, $p < 0.00$), explaining 64.6% of the variance (Hauser et al. 2022), while the previous model, only composed of text variables, had very little explanatory power when emotions were explained ($R^2 = 0.016$, $p < 0.00$), therefore, the most credible moment to measure the emotional experience through the tourists' photographs was when the experience was taking place, and not afterwards.

Regarding all the text and photo variables, along with collectivism (i.e., model 3 or post hoc analysis), a high explanatory power of the model continued to be obtained with R^2 of 59,3% ($R^2 = 0.593$, $p < 0.00$). In this case the R^2 were not comparable because we moved from a sample of 39,235 to one of 8,034. All the variables were below 2.2 in the VIF value on the previous, main, and post hoc analysis.

Although all of the independent variables were significant—that is, each of the variables was found to have a significant impact on positive emotions—some variables had a greater effect than others.

Regarding the model 2 or main analysis, the dependency relationship between the polarity of the text published by a tourist, and the positive emotion felt by them and reflected in the photo, was positive and significant, therefore H1 was accepted ($B = 25.01$, $p < 0.00$). The effect of the number of hashtags and the text length became non-significant in this second model, therefore hypotheses H2 and H3 were not accepted. This may be because in the context of a social media platform such as Instagram, visual content has much more weight than textual content.

Regarding the variables related to the content extracted from the photos on model 2 or main analysis, the level of narcissism in the photo was not significant, therefore H4 was not accepted. The socialization context also affected the positive emotions reflected in the photo, finding a positive and significant relationship both socialization context ($B = 19.00$, $p < 0.00$) and number of people ($B = 13.36$, $p < 0.00$), for which reason H5 and H6 were accepted. Lastly, the gender diversity of the people accompanying the traveler also influenced the positive emotion felt and expressed in the photo, so was positive and significant ($B = 190.91$, $p < 0.00$) and it was also the strongest relationship of all, therefore H7 was accepted (Table 4). Furthermore, it was observed that the variables that had the greatest weight in the analysis were the number of people, the diversity and the polarity of the text, in this order.

Once the influence of the independent variables on the dependent variable was verified, a post hoc analysis was carried out (i.e., model 3 or post hoc analysis), introducing a personal characteristic of the user as a moderating variable: their level of

Table 4 Coefficients and regression analysis.

Variables	Previous analysis[a]			Main Analysis[b]			Post hoc analysis[c]		
	B	β^2 Standardized Coefficients	t	B	β^3 Standardized Coefficients	t	B	β^4 Standardized Coefficients	t
Constant	-	-	42.76	-	-	122.52	-	-	22.651
Polarity	49.75***	0.04	7.86	25.01***	0.020	6.58	23.90***	0.03	3.789
Involvement (number of hashtags)	−2.17***	−0.12	−24.36	−0.004	−0.0003	−0.08	−0.03	−0.003	−0.848
Involvement (text length)	0.11***	0.001	0.29	−0.25	−0.003	−1.12	−0.02	−0.0003	−1.504
Narcissism	-	-	-	3.13	0.002	0.71	38.17***	0.03	11.801
Socialization (people context)	-	-	-	19.00***	0.003	7.38	31.90***	0.05	7.830
Socialization (number of people)	-	-	-	13.36***	0.65	130.90	10.75***	0.58	29.962
Gender diversity (percentage of females)	-	-	-	190.91***	0.18	42.43	179.23***	0.19	25.410
Collectivist	-	-	-	-	-	-	−9.45	−0.021	−0.064
Collectivist x Socialization (people context)	-	-	-	-	-	-	22.66*	0.02	2.454
Collectivist x Socialization (number of people)	-	-	-	-	-	-	−0.19	−0.02	0.443
Collectivist x Gender diversity	-	-	-	-	-	-	5.07	0.004	1.444

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.
[a]R^2: 0.017; R^2 adjusted: 0.016; Standard error: 0.331 on 39,235 df; F: 224.6; df:3; Sig.: 0.000.
[b]R^2: 0.647; R^2 adjusted: 0.646; Standard error 0.190 on 39,235 df; F: 1.025; df:7; Sig.: 0.000.
[c]R^2: 0.593; R^2 adjusted: 0.593; Standard error: 0.139 on 8,034 df; F: 1,066.21; df:11; Sig.: 0.000.

socialization or individualism. It is important to mention that by introducing these variables, the sample was considerably reduced, moving from a sample of 39,235 to one of 8,034. The model obtained an R^2 of 59.3%, therefore the results showed a strong effect of the independent variables on the dependent variable and improving the explanation of the previous analysis ($R^2 = 0.593$, $p < 0.00$), explaining 59.3% of the variance (Hauser et al. 2022).

It was found that not all independent variables had a significant impact on positive emotions, and considering the significant variables, not all had the same effect on the dependent variable.

Regarding the variables extracted from the text, when introducing the moderating variable related to collectivism in the regression, it was observed that the polarity of the text ($B = 23.90$, $p < 0,00$) continued to be significant, therefore H1 was still accepted. The effect of the number of hashtags ($B = -0.03$) as well as the text length ($B = -0.020$) ceased to be significant when the degree of collectivism or individualism of a user who shared their experience on Instagram intervened as a moderator, therefore H2 and H3 were rejected.

Regarding the variables extracted from the information found within the photos, the tourist's narcissism continued to have a positive and significant effect on the dependent variable ($B = 38.17$, $p < 0.00$), therefore H4 was still accepted, although it is also important to keep in mind that in this variable the sample was unbalanced.

Socialization continued to be positive and significant, both the socialization context ($B = 31.90$, $p < 0.00$) and the number of people ($B = 10.75$, $p < 0.00$), therefore H5 and H6 were still accepted.

Finally, the gender of the companions was also positive and significant, and the percentage of women was ($B = 179.23$, $p < 0,00$), therefore H7 was still accepted.

In this post hoc analysis, the results also reflected how being a more collectivist tourist enhanced positive emotion in photos that reflected a sociable trip ($B = 22.66$, $p < 0.01$), for which reason H8a was accepted. However, this effect did not occur in other non-people-focused destination attribute photos.

Also, the number of people was not significant ($B = -0.19$), so H8b was rejected, and no differences by gender were found, that is, the gender concentration of the group was not significant ($B = 5.01$), therefore H8c was rejected.

In this model 3 it was observed how the variables that had the most weight were the number of people, the diversity of the group, the context of people, and polarity, in addition to collectivism. This could makes sense, given that collectivist people would see their level of emotion enhanced and would travel with more people.

Discussion and conclusions

General discussion. The destination image is made up of the content shared by both the DMOs and the tourists themselves during their trips (Filieri et al. 2021). Tourists feel emotions when they travel and receive quality service (Cuesta-Valiño et al. 2023d), and increasingly they share them on their social media platforms through content such as photos, texts, and hashtags (Mak 2017; Filieri et al. 2021). Analyzing this type of content is key for DMOs needing to understand how tourists behave in their destinations and how these tourists feel when they travel (Jin et al. 2020), because these feelings are directly linked to consumer loyalty (Núñez-Barriopedro et al. 2021); however, so far there is knowledge lacking about when tourists are at their happiest and how they express this feeling to their community. This research addresses this gap in literature, to shed some light and to understand how this type of tourist behavior is relevant to developing DMOs' marketing strategies, and how happiness implies changes in tourists' behavior, such as their commitment or purchase intention (Gutiérrez-Rodríguez et al. 2023).

In addition, this research was based on a mixed methods approach, after downloading 150,000 posts from Instagram, the main social media platform for tourism photos and the most influential (Weiler et al. 2021; Arival 2023). Using the technique of web scraping, it applied different artificial intelligence techniques to different data sources, such as photos, analyzed through deep learning, which allowed extracting the number of people in the photos, their gender, and their emotion; such as texts, analyzed through machine learning, which allowed knowing the polarity of the text, the number of hashtags, and the length of the text; and finally such as the metadata, which allowed filtering the databases and analyzing only the content published by tourists during their trip.

The results obtained revealed that there were different elements within the tourist experience that caused positive emotions in tourists, such as joy and happiness. In addition, these emotions were reflected in their photographic content they shared on social media (Coelho et al. 2018).

Firstly, in relation to the variables extracted from Instagram texts after the implementation of machine learning techniques, an interesting result was the effect of the positive emotions felt during the tourist experience on the sentiment expressed in the texts that accompanied the photo, reflected in two ways: in the tourists' facial expressions, and in their description of their experience in text format (Filieri et al. 2021).

However, the results did not show that there was a strong relationship between positive emotions felt, and involvement at their textual level through more hashtags and more amount of text.

On the one hand, although this effect was significant when only the text was analyzed, the number of hashtags and the number of mentions was no longer significant if we included variables related to the emotion expressed in the photographs.

Several authors previously concluded that the user's involvement with the destination, reflected in the amount of text or the number of hashtags, can vary depending on the type of experience (Wang et al. 2022). This may be due to the platform on which users share the content, Instagram, where photographic content is promoted over text, unlike other social media platforms such as Facebook or X (Twitter) (Volo and Irimiás 2021). On the other hand, the polarity of the text was significant in the three models, and with a high weight in the explanation of the tourists' emotion, it could be therefore concluded that tourists expressed their happiness both through the texts that made up their posts, and through images.

Secondly, and related to the variables extracted from the photos using deep learning techniques, the results also allowed us to conclude that the fact of sharing the trip with other people allowed generating more positive emotions. As previously studied, tourists travel to feel happy (Zhang et al. 2023), and this happiness is enhanced thanks to the social component of tourist experiences (Triantafillidou and Petala 2016).

Thirdly, another conclusion derived from the results of this study was that when the group was made up of more women than men, these positive emotions were reinforced. This was due to the different tastes and preferences that women show compared to men, which can sometimes generate conflicts during trips (Collins and Tisdell 2002; Junek et al. 2006; Heimtun and Jordan 2011; Li et al. 2011); and it is also related to the particular tastes of women, who normally decide to travel for pleasure, while men travel more for work, which can affect the emotion captured in the photo (Collins and Tisdell 2002). These results should not be taken completely into consideration, given that in our database there was an imbalance in the sample of this

variable, but the results shed some clarity on the behavior of tourists.

Lastly, the results of the post hoc analysis showed that the personality of the individual, understood as collectivist or individualist, also influenced the generation of emotions, reflecting that collectivist tourists enhanced their positive emotions if they traveled with other people. In addition to the involvement related to the importance of people in relation to the context, these results also allowed us to explain that the travel group was not equally relevant for all types of tourists, but that for collectivist people, it was much more important to travel with people to enhance their positive emotions. In this specific case, when collectivism moderated relationships, it was observed that when a user experienced a positive emotion, they were more likely to take a selfie to show it to their community, that is, to have a more narcissistic desire for themselves and for photographing their own person, directly linked to tourist experiences (Casale and Banchi 2020; Araujo-Batlle et al. 2023). This result was in line with academic literature, which previously concluded that users generally take selfies when they feel good and are experiencing positive emotions and decide to photograph themselves in front of other elements of the destination (Christou et al. 2020).

Therefore, the results first reflected how, in order to enhance the happiness of tourists, it mattered who one had the experience with. Also, gender was important, since in that group of people, the most important were the females. The main implication of this result was the demonstration that people were more relevant than context to generate emotions during a tourist experience.

But what the tourist did was also important, that is, how that emotion felt during their experience led them to photograph themselves in a certain way. In this case, when tourists felt more emotion, they behaved in a more narcissistic way.

The results also showed that photography was a key element to understanding tourists' emotions, much more than the text associated with the photo and its characteristics, such as polarity, text length, and the number of hashtags. The main implication of these results was the explanation that an image was much more important than the description associated with it, especially on a platform focused on photographic content such as Instagram. This allowed two clear advances: on the one hand, in academic literature, providing clarity about the emotions felt in real time by tourists, in addition to their relevance in the tourist experience, and on the other hand, in new research methodologies, developing an innovative analysis that united text, images and metadata.

Theoretical contributions. This study makes notable contributions in terms of travelers' positive emotions during their tourism experience and related literature. Firstly, the different factors that make up the destination image (cognitive or rational, and affective or emotional) were already known (Gartner 1994), but it was not known how these emotions allow the image of the destination to be built from emotions that tourists express in the photos taken during their experience and that they share during their trips.

Secondly, it was also known how tourist experiences are made up of different elements, such as emotional, social, and contextual factors (Coelho et al. 2018); however, up until now no further study had been done on how these elements affect the intensity of the emotion felt during the tourist experience, but rather after its completion (Huang et al. 2019).

This study also describes the main elements that make it possible to enhance the positive emotions of tourists, such as sharing the trip with other tourists (Triantafillidou and Petala 2016; Zhang et al. 2023), as long as the group has the same needs and preferences, and positive emotions are enhanced when traveling preferably for pleasure (Collins and Tisdell 2002; Junek et al. 2006; Heimtun and Jordan, 2011; Li et al. 2011). Likewise, this study offers clarity on how tourists, when they are having a positive experience, show their narcissistic side enhanced and decide to photograph themselves (Casale and Banchi 2020; Christou et al. 2020; Araujo-Batlle et al. 2023), and express their positive feelings in text (Filieri et al. 2021), but do not get involved through more elaborate and long texts (Wang et al. 2022).

Lastly, another important theoretical contribution of this research is the analysis of the collectivist or individualist nature of tourists, and their consequent behavior when sharing on social media platforms. Although the moderating effect of collectivism had previously been analyzed in tourism contexts (Han et al. 2017; Khan and Fatma 2021), this study sheds light on how it can be known whether a user is collectivist or individualist through their behavior in social media, and how this feature will enhance their positive emotions felt during the experience.

The application of the web scraping download technique allowed us to obtain a large database comprised of big data, which was analyzed using artificial intelligence techniques for the different sources, photos, texts, and metadata shared by travelers on the Instagram platform.

Methodological contribution. There is a continuing lack of mixed methods research in travel and tourism research in general, given the limited number of studies that integrate quantitative and qualitative analyses, with different types of data such as photos, texts, and metadata, and with a large amount of data (Filieri et al. 2021).

Therefore, this research adopted a mixed methods approach, combining analysis of visual content (photos) through the artificial intelligence technique of deep learning; analysis of textual content through the artificial intelligence technique of machine learning (texts); and analysis of the metadata allowing filtering the large set of data in the database.

Adopting this approach allowed us to improve the understanding of the value of research based on mixed methods, as well as to enlarge social science research with a limited number of this type of study (Filieri et al. 2021) that provides a more complete picture of the phenomenon under research.

Managerial implications. In an effort to achieve the main objective of DMOs which is to attract new visitors to their destinations, through the creation of a strong destination image, tourism marketers should take advantage of the results shown in this study in relation to the elements that allow users to generate positive emotions and how they share them with their community. Understanding how users generate happiness, and how they express it on social media platforms, is of vital importance for tourism managers, who can anticipate it, since this feeling is linked to revisiting the destination and attracting potential tourists interacting with this content (Reitsamer and Brunner-Sperdin 2017).

In addition, it had previously been shown how tourist happiness affects the intention to revisit and the tourists' involvement with the destination. Therefore, tourism managers can have greater control over these variables if they understand how the happiness of tourists works in the destination, also influencing future travel behavior (Filieri et al. 2021).

This research also detected that users were more likely to generate positive emotions when they traveled in a group than when they traveled individually, so it is important to develop tourist experiences that promote socialization. Marketers must

also consider user behavior during their travel experiences. When a user has a positive experience, they are more likely to take a photo in selfie format and see how their narcissistic side grows, showing their community more clearly the happiness they feel, so it could be interesting for marketers to promote selfie points at destinations.

In addition, positive emotions are enhanced when users travel with a greater number of people and a greater percentage of women, so a strategy to be implemented by destinations may be related to promoting travel packages for groups of friends.

Limitations and future research. This exhaustive analysis is not without its limitations. In the first place, the analysis was carried out on all the tourists at a single destination, which has its particularities and could generate different impressions on tourists. This study focused on an inland, cultural, and gastronomic destination, with different tourist attractions, but whose tourist attributes were different from other types of destination, such as sun and beach, nature, or urban tourism. Therefore, future research could be applied to other types of tourism at other destinations.

In addition, this study did not consider the cultural differences or demographic background of the users. For example, not all cultures express their emotions in the same way and with the same intensity, just as not all cultures are in the habit of traveling in larger groups, smaller groups, as couples, or individually.

Another peculiarity of this study is that it was carried out with a sample of almost 40,000 tourist posts in a context of positive tourist experiences, which could limit the generalization of results since there may also have been negative experiences that should have been taken into account. In addition, posts of only Instagram images were analyzed, while this social media platform is in continuous evolution and has recently incorporated other types of content such as stories or reels through which tourists also show their tourist experience, that could constitute a future line of research, or even other platforms such as TikTok (Barta et al. 2023).

The purpose of this research is to find an explanation for the happiness felt by tourists in destinations, not to predict it. Therefore, given that the explainability of this model has already been demonstrated, it would be important to develop predictive models through techniques such as machine learning that allow this happiness to be predicted. Explanations presuppose predictions, in the sense that predictions provide evidentiary support for a scientific theory, but predictions, conversely, can exist in the absence of explanations (Buchholz and Grote 2023). For this reason, we consider that, after explainability, it is important to find support through prediction.

Since the ultimate goal of DMOs and their destination marketing strategies is to persuade people to visit their destination, it would be interesting to examine the effects of the variables analyzed in this study on other social media platforms where DMOs publish their campaigns and tourists share their content, such as Facebook or X (Twitter), to better understand how tourists express their emotions on other platforms. Although this study focused on the main tourist photographic content platform, analyzing other platforms could also be interesting, for example, to understand how tourists behave on other social media platforms that promote photographic or video content less than text, such as Facebook or X (Twitter).

Data availability

Data can be provided on reasonable request for academic purposes only.

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Author contributions

All authors are responsible for all parts of the paper, and all authors contributed to the study conception and design. Ana M. González-Fernández managed the funding for the research. The theoretical support for the research model and data analysis were performed by Sofía Blanco-Moreno and Roman Egger. The first draft of the manuscript was written by Sofía Blanco-Moreno, and then, refined and edited by Pablo Antonio Muñoz-Gallego and Ana M. González-Fernández. All the authors read and approved the final version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This article does not contain any studies with human participants performed by any of the authors.

Informed consent

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Additional information

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