

# **Online Reviews for Public Service Personalization: The Case of Italian Museums**

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## **1. Introduction**

The personalization of experiences is a major issue for public service delivery (Osborne, 2018), that becomes even more central when users have the possibility to choose whether to access to services. Personalization implies first the capability to understand the diversity of users and then to tailor experiences accordingly.

In this context, user-generated contents (UGC), such as online reviews, offer a precious resource for public sector institutions for detecting users' needs and finally support personalization of experiences. Indeed, UGC praise the unique property of being an up-to-date spontaneous expression of thoughts of online users, through which the user personally contributes to the public and worldwide discussion with her own thoughts (Vlachvei & Kyparissis, 2017; Fang et al., 2016; Hausmann & Poellmann, 2013). Being the voice of actual consumers, UGC changed the role of customer, empowering the ordinary online user. Due also to the large diffusion of UGC in recent years, the influential role of online reviewers in the decision process regarding products and services has been highlighted in various research fields (e.g., Fang et al., 2016; Marciszewska B., 2005). The spread of customer-generated contents combined with the development of Data Analytics tools to process them, further evidenced the potentiality of employing the voice of customers to obtain valuable information, such as a deeper knowledge of customer satisfaction and perceptions on offered services or insights on future destinations and attractions of interest (e.g. McKenzie & Adams, 2018).

The power gained by customers of drawing their own conclusions about products and services creates the need for changes in management and organization to account for the customer's voice within the decision-making process (Baka, 2016). Yet we have to date limited knowledge on the extent to which online reviews can support personalization of experiences. A recent study conducted by Galati & Galati (2019) highlights the necessity to consider the diverse characteristics of consumers when studying customer satisfaction. In particular, individuating the culture of origin as one of the main variables of customer difference, the authors search for differences in the way Italians, Americans and Chinese travellers perceive and emphasize several hotel attributes, dividing online reviewers according to their country of origin (Galati & Galati, 2019). Another recent example of personalization of experiences supported by online reviews is the one of Liu et al. (2017), where the authors explore the determinants of hotel customer satisfaction discriminating among reviewers by language group and finding differences in the emphasis posed on hotel

attributes by foreign tourists reviewing on TripAdvisor in different languages (Liu et al., 2017).

The proposed paper enters the field of exploring the personalization of experience within public service, specifically focusing on the role of UGC on the experience of museums' visitors. Indeed, through an automatic analysis of the content of online reviews, we investigate the differences in emphasis posed by online reviewers of Italian public museums writing in different languages on TripAdvisor. This is aligned with the recognition that the perception of products and services can be different according to the cultural background and languages of customers (Chen et al., 2012; Schuckert et al., 2015).

Acknowledging that the heterogeneity in cultural background and languages affects service perceptions, the following research questions are here addressed:

RQ<sub>1</sub>: On which aspects do Italian-speaking reviewers put emphasis when reviewing online museums?

RQ<sub>2</sub>: On which aspects do English-speaking reviewers put emphasis when reviewing online museums?

RQ<sub>3</sub>: Which are (if any) the differences between the themes of interest of Italian- and English-speaking online reviewers of museums?

Specifically, the analyses consider online reviews of the 50 Italian public museums that in 2017 received the highest number of onsite visitors<sup>1</sup>. The online reviews have been collected from August 2018 to June 2019 scraping the TripAdvisor pages of these museums, collecting overall 41K reviews. We focused here on online reviews in either Italian or English language since, among the overall collected reviews, English and Italian represent respectively the 38% and 31%, while the remaining 31% of reviews is written in more than 30 other languages. The analyses here presented refer to an entire year of online reviews, to consider also possible seasonality effects within online reviews associated to selected museums.

The specific choice of museums as empirical setting of the analysis is justified by the strong connection between Arts and personalization and by the increasing interest of these cultural institutions to pursue a strategy based on the personalization of the experience (UNESCO,

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<sup>1</sup> 50 Italian public museums with the highest number of visitors recorded at the end of 2017. Source: Ministry of Cultural Heritage [http://www.statistica.beniculturali.it/Visitatori\\_e\\_introiti\\_musei\\_17.htm](http://www.statistica.beniculturali.it/Visitatori_e_introiti_musei_17.htm)

2012; Falk, 2016). Indeed, user experience within Culture has a personalised nature, being strongly linked to subjective and personal emotions (Larsen et al., 2010) and the assessment of the centrality of user and the recognition of the value created through past, current and future experiences have shown not only to generate a high level of satisfaction (Marciszewska, 2005) but also to have a role in the mission of artistic organizations (Boorsma & Chiaravalloti, 2010).

This research offers a threefold contribution. First, this study proposes a different role of online reviews, studying the effects of this new source of information on service personalization. Since personalization requires the understanding of user's interests within a specific and given domain (Coelho et al., 2018), this work offers insights on the emphasis posed on different topics of discussion by visitors that review museums in different languages.

Highlighting aspects that are relevant to visitors' experience according to online reviewers writing in different languages, the proposed work also contributes to the literature on museum management. Indeed, this work informs about different areas of visitors' interests, here represented by the emphasis they pose on different topics of discussions directly expressed by visitors' through online reviews.

The proposed work can also be valuable for practitioners belonging to the field of museum management, since it offers a list of arguments of interest for specific visitors of museums, offering a way to acknowledge and deeper understand visitors' needs. For instance, managers of cultural institutions could make use of the results of this work to personalize the promotion of cultural attractions according to the emphasis posed on specific aspects by specific visitors. This work could act as a starting point for a further investigation of aspects that provide a positive experience within museums, uncovering motivations and behaviour of different types of arts consumers, allowing for a further enhancement of cultural participation.

## 2. Method

### 3.1. Sample selection and Data Collection

The analysis has been applied on the 50 largest Italian public museums by number of visitors in 2017<sup>2</sup> and it comprises three main phases: data collection, data preparation, emphasis analysis.

The first phase of the methodology is that of data collection. Online reviews have been collected from TripAdvisor scraping the webpages of the 50 considered museums from August 2018 to June 2019. This required a first step of identification and certification of authenticity of the TripAdvisor webpages for each museum, to allow only the scraping of relevant webpages.

### 3.2. Data Preparation

The second phase of the analysis concerned data preparation, which started with the language detection, performed using Dandelion API<sup>3</sup>. Then, we distinguished between reviews originally written in Italian or English and we went through a processing of the text of reviews in each of the two languages. This step has been performed within *R* software language, using *tm* and *SnowballC*<sup>4</sup>. In particular, the text processing phase included lowercase conversion, removal of particular characters (e.g. emojis, URLs, punctuation and numbers), exclusion of language-specific and context-specific stopwords (e.g. “rome”, “roma”, “colosseum”, “colosseo”) and language-specific Porter’s stemming algorithm as implemented in *SnowballC* package. This phase has been performed individually for each corpus of reviews, considering separately reviews in Italian from those written in English.

### 3.3. Emphasis Analysis

The third phase is comprehensively called “emphasis analysis”, term borrowed from Galati & Galati (2019), to refer to the problem of investigating the amount to which each specific topic is discussed among the online reviews referring to museums.

Starting from the document-term representation of each corpus of Italian and English reviews deriving from the data preparation phase (Section 3.2), the Latent Dirichlet Allocation (LDA) method has been applied to identify the topics of discussion among the

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<sup>2</sup> 50 Italian public museums with the highest number of visitors recorded at the end of 2017. Source: Ministry of Cultural Heritage

<sup>3</sup> <https://dandelion.eu/docs/api/datatxt/li/v1/>

<sup>4</sup> <https://cran.r-project.org/>

corpus of reviews. The choice of the most suitable number of topics for each analysed corpus has been performed in *R* language with the function *FindTopicsNumber* of the package *ldatuning*, exploiting the metrics proposed by Griffiths & Steyvers (2004), Juan et al. (2009), Arun et al. (2010) and Deveaud et al. (2014), varying the number of topics between 2 and 30. Once a specific number of topics has been fixed for each corpus of reviews, the topic interpretation has been performed looking at the 30 most probable words for each identified topic. To further assess the interpretation of each topic, we manually analysed the content of the reviews characterized by the highest probability of being associated to each specific topic. We recall that this phase has been performed for each corpus of reviews, considering separately reviews written in Italian from those written in other languages.

We underline that the proposed procedure is general in the sense that it can be applied to various written contents, ranging from online reviews to social media messages, and concerning different settings, from Culture to hospitality and tourism.

In this specific study on online reviews of considered museums, the phases of data collection and preparation (Section 3.1.-3.2) resulted in the individuation of 30 languages among the 41K reviews for which a language has been recognized<sup>5</sup>. Italian and English reviews represent respectively the 31% and 38%, while all other languages correspond to the remaining 31% of the overall collected reviews<sup>6</sup>. For the purposes of personalization, we decided to differentiate reviews according to the language in which they have been written, considering separately reviews originally written in Italian and those written in English (Section 3.2). After preparing the text of reviews according to the specific language (either Italian or English), we modelled each corpus of reviews through LDA, applying the procedure described in Section 3.3. This resulted in the identification and interpretation of different topics of discussions for each of the considered corpus of reviews.

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<sup>5</sup> <https://dandelion.eu/docs/api/datatxt/li/v1/>

<sup>6</sup> Reviews collected within August 2018 and July 2019 on TripAdvisor accounts of the 50 Italian public museums with the highest number of visitors recorded at the end of 2017. Source: Ministry of Cultural Heritage [http://www.statistica.beniculturali.it/Visitatori\\_e\\_introiti\\_musei\\_17.htm](http://www.statistica.beniculturali.it/Visitatori_e_introiti_musei_17.htm)

## 4. Results

Results are here divided into three main sections, to answer each of the research questions:

RQ<sub>1</sub>: On which aspects do Italian-speaking reviewers put emphasis when reviewing online museums?

RQ<sub>2</sub>: On which aspects do English-speaking reviewers put emphasis when reviewing online museums?

RQ<sub>3</sub>: Which are (if any) the differences between the themes of interest of Italian- and English-speaking online reviewers of museums?

In particular, the first section presents the topics of discussion individuated within Italian reviews (RQ<sub>1</sub>), while the second section shows the topics derived from English reviews (RQ<sub>2</sub>). Finally, the last section offers a critical analysis on the differences (RQ<sub>3</sub>) among the topics of discussions previously individuated.

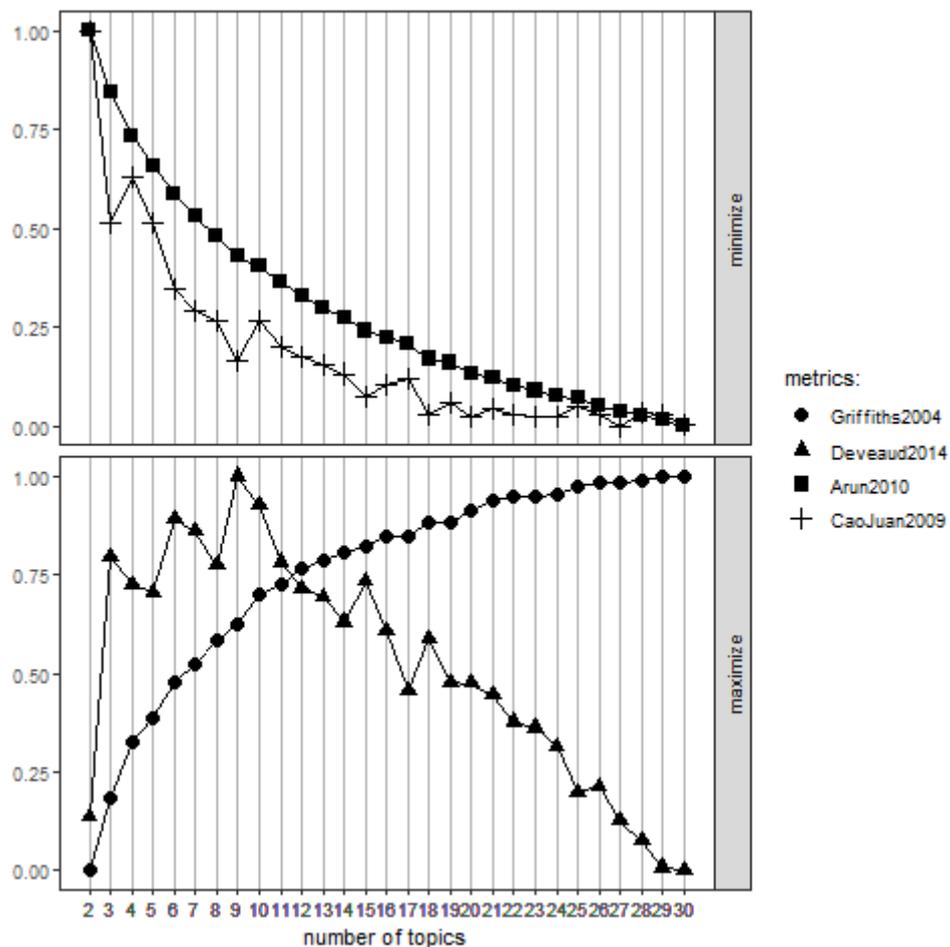


Figure 1: Choice of the number of topics of discussion among Italian reviews performed through function *FindTopicsNumber*, package *ldatuning* in R language.

In a second step, we applied the LDA procedure to Italian reviews searching for 12 topics of discussions. Looking at the 30 most probable words for each topic and reading the reviews characterized by the highest probability of being associated to each topic, we interpreted and named the 12 topics as follows (see also Table 1):

1. *View and panorama*: comments on view, landscape and panorama experienced during the visit of the museum
2. *The museum from outside*: comments on the exterior features of buildings, including parks and gardens
3. *A special day*: aspects connected to the description of the experience on a specific day, including delightful and odd situations
4. *Ticketing*: comments on ticketing purchase, booking and access to visit
5. *Art & Collection*: comments concerning the artwork and the collection exhibited by the museum
6. *Charming Antiquity*: aspects connected to antiquity, mostly related to the Romanesque history
7. *A day in the past*: description of a specific experience of visit, usually referred to archaeological sites
8. *Unfortunately*: aspects of the experience connected to dissatisfaction, displeasure or inconvenient events
9. *Palaces & decorations*: comments connected to courts, royal palaces and magnificent decorations
10. *At least once*: aspects connected to the description of experiences that according to reviewers should be undertaken at least once in a lifetime
11. *Guided Tours*: comments on the visit, either with an audio guide or with a guided tour
12. *The Museum*: aspects connected to the cultural institution, its tradition, history and collection



Topic Name	Topic description	Top 10 most probable words	% of reviews characterised by topic
<i>View and panorama</i>	comments on view, landscape and panorama experienced during the visit of the museum	"bell" "vist" "visit" "bellissim" "castell" "assolut" "val" "davver" "pen" "post"	12%
<i>The museum from outside</i>	comments on the exterior features of buildings, including parks and gardens	"giardin" "molt" "parc" "regg" "intern" "vill" "stanz" "visit" "cur" "bellissim"	9.4%
<i>A special day</i>	aspects connected to the description of the experience on a specific day, including delightful and odd situations	"visit" "stat" "anni" "dop" "fatt" "temp" "tant" "pot" "fin" "giorn"	6.4%
<i>Ticketing</i>	comments on ticketing purchase, booking and access to visit	"bigliett" "ingress" "fil" "prenot" "prim" "eur" "far" "cod" "pag" "entrar"	10.2%
<i>Art &amp; Collection</i>	comments concerning the artwork and the collection exhibited by the museum	"oper" "arte" "galler" "capolavor" "bellezz" "artist" "ammir" "dipint" "ital" "quadr"	9.7%
<i>Charming Antiquity</i>	aspects connected to antiquity, mostly related to the Romanesque history	"stor" "luog" "roman" "citt" "mond" "temp" "antic" "monument" "pass" "unic"	9.8%
<i>A day in the past</i>	description of a specific experience of visit, usually referred to archaeological sites	"trov" "sit" "sol" "giorn" "piccol" "gir" "cas" "part" "port" "men"	5%
<i>Unfortunately</i>	aspects of the experience connected to dissatisfaction, displeasure or inconvenient events	"sol" "turist" "personal" "esser" "poc" "pecc" "perc" "cos" "indic" "nessun"	6.5%
<i>Palaces &amp; decorations</i>	comments connected to courts, royal palaces and magnificent decorations	"palazz" "real" "sal" "intern" "affresc" "piazz" "secol" "chies" "cappell" "cupol"	8.6%
<i>At least once</i>	aspects connected to the description of experiences that according to reviewers should be undertaken at	"ved" "volt" "meravigl" "ogni" "sempr" "unic" "senz" "emozion" "lasc" "dir"	7.8%
<i>Guided Tours</i>	comments on the visit, either with an audio guide or with a guided tour	"vis" "guid" "molt" "consigl" "interest" "organizz" "percors" "bambin" "ottim" "apprezz"	7.2%
<i>The Museum</i>	aspects connected to the cultural institution, its tradition, history and collection	"muse" "sal" "mostr" "rep" "pian" "collezion" "grand" "statu" "import" "archeolog"	7.3%

*Table 1: Description of Italian topics of discussion, with most probable words and percentage of Italian reviews characterised by each topic.*

## Analysis of English reviews

The procedure previously described has been applied also to the around 16K reviews of museums written in English, collected as described in Section 3.1.

As a first step, we identified the existence of 14 topics of discussions among the content of English reviews based on the metrics proposed by Griffiths & Steyvers (2004), Juan et al. (2009), Arun et al. (2010) and Deveaud et al. (2014) (Fig. 3).

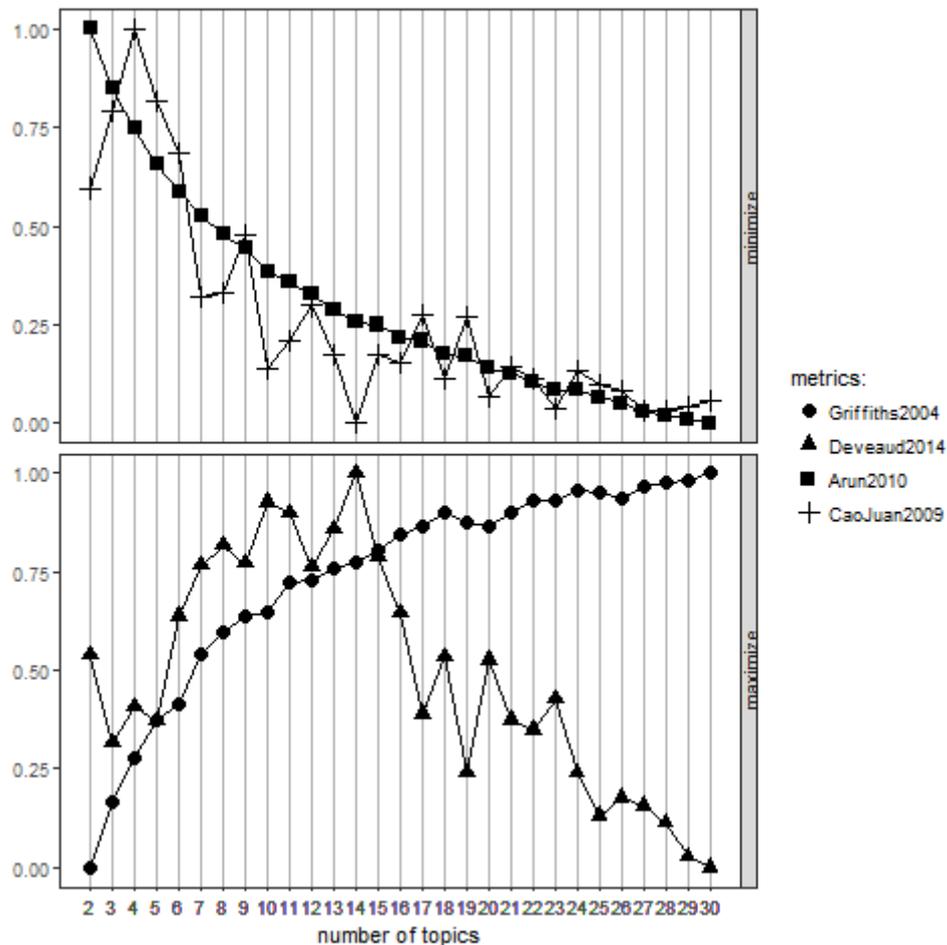


Figure 3: Choice of the number of topics of discussion among English reviews performed through function *FindTopicsNumber*, package *ldatuning* in R language.

Afterwards, modelling the text of English reviews through LDA, we were able to interpret and name the 14 topics as follows (see also Table 2):

1. *Views of the antiquity*: comments associated to amazing views, mostly from cultural sites in Roman style

2. *The structure of museum*: comments on the exterior features of buildings, such as the architecture and the structure of the museum
3. *Accessibility of museum*: description of ways to get to the museum, for instance by public transports, car or walking
4. *Ticketing*: comments on ticketing purchase, booking and access to visit
5. *Art & Collection*: comments concerning the artwork and the collection exhibited by the museum
6. *Amazing history*: aspects connected to historic sites and places
7. *Avoiding the crowd*: aspects connected to information and suggestions on how to avoid visiting museums during particularly crowded times
8. *It looks like*: comments related to comparisons of visited museums with other experiences, familiar places or different artistic sites
9. *Take your time*: comments associated to the time required to visit cultural institutes and to be dedicated to specific activities connected to the visit
10. *Definitely worth visiting*: comments connected to the description of experiences suggested to peers by the reviewers
11. *Guided Tours*: comments on the visit, either with an audio guide or with a guided tour
12. *Inconvenient experiences*: aspects related to inconvenient events associated to the visit, such as frauds, schemes and pickpocketing
13. *Walking around*: comments connected to the description of walks and open areas
14. *Ancient ruins*: aspects connected to historical places and ancient ruins, usually related to preservation

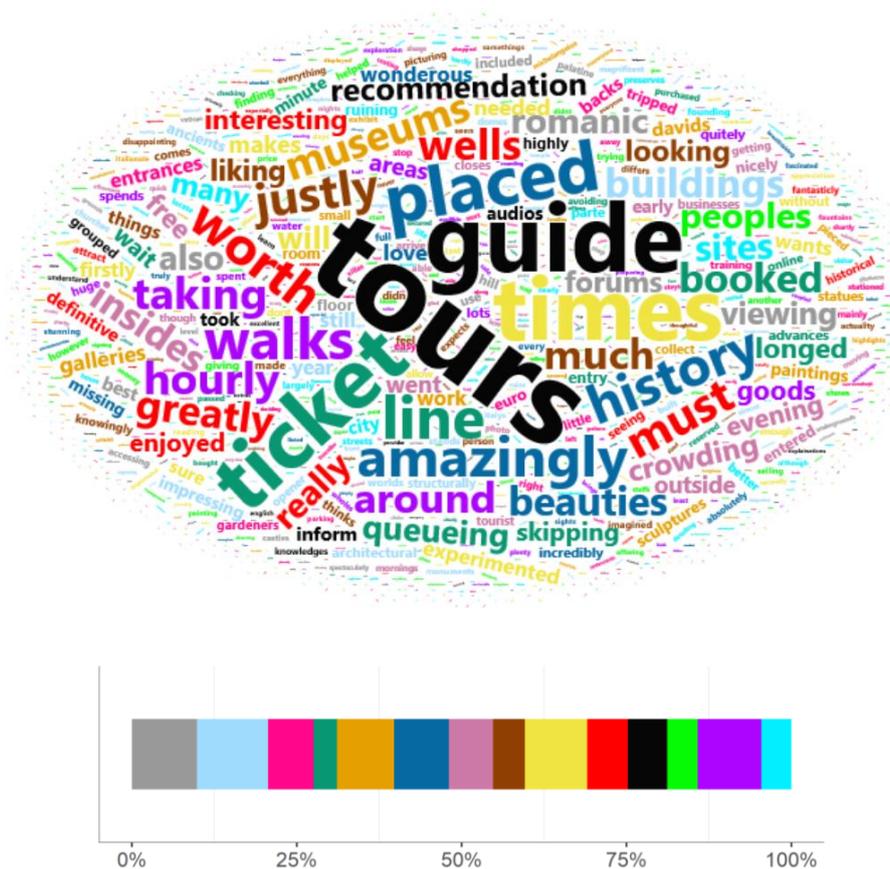


Figure 4: (Top) Wordcloud of words employed in online reviews written in English. (Bottom) Incidence of topics within English online reviews of museums. Each colour is associated to a specific topic.

To identify the most discussed topics by English reviewers, we also evaluated the incidence of each topic on the total number of English reviews. In particular, we observed that the description of the structure of museums, such as the architecture and the buildings, is the topic most discussed by English reviewers. Indeed, almost the 11% of overall English reviews is characterized by words linked to the architecture and the buildings of museums, that we summarized under the name “*The structure of museum*” (light blue in Fig. 4). Beside talking about the structure of the museum, English reviewers discuss mostly over walks in open areas (10% of reviews characterized by “*Walking around*”, dark purple in Fig. 4), panorama over antique sites (10% of reviews characterized by “*Views of the antiquity*”, gray in Fig. 4), and proper schedules and timing of visits (9% of reviews characterized by “*Take your time*”, yellow in Fig. 4). On the contrary, the rarest topic of discussion among English reviewers is the one related to comments on ticketing purchase, booking and access to visit. Indeed, *Ticketing* (dark green in Fig. 4) represents the predominant topic of discussion only among the 4% of considered English reviews.

Topic Name	Topic description	Top 10 most probable words	% of reviews characterised by topic
<i>Views of the antiquity</i>	Amazing views, mostly cultural sites in Roman style	"view" "forum" "roman" "also" "hill" "includ" "great" "floor" "palatin" "access"	9.9%
<i>The structure of museum</i>	Exterior features of buildings, such as architecture and structure of the museum	"build" "year" "structur" "roman" "architectur" "still" "dome" "church" "built" "ancient"	10.8%
<i>Accessibility of museum</i>	ways to get to the museum, for instance by public transports, car or walking	"walk" "entranc" "garden" "train" "easi" "back" "took" "trip" "stop" "take"	6.9%
<i>Ticketing</i>	ticketing purchase, booking and access to visit	"ticket" "line" "queue" "book" "long" "skip" "wait" "entri" "onlin" "minut"	3.6%
<i>Art &amp; Collection</i>	artwork and collection exhibited by the museum	"museum" "galleri" "work" "david" "paint" "sculptur" "room" "statu" "collect" "exhibit"	8.6%
<i>Amazing history</i>	Aspects connected to historic sites and places	"place" "amaz" "histori" "beauti" "must" "love" "incred" "wonder" "stun" "truli"	8.3%
<i>Avoiding the crowd</i>	information and suggestions on how to avoid visiting museums during particularly crowded times	"insid" "crowd" "free" "went" "outsid" "even" "earli" "busi" "morn" "first"	6.7%
<i>It looks like</i>	comments related to comparisons of visited museums with other experiences, familiar places or	"just" "look" "like" "much" "realli" "think" "thing" "know" "feel" "didn"	4.9%
<i>Take your time</i>	comments associated to the time required to visit cultural institutes and to be dedicated to specific activities	"time" "will" "make" "sure" "take" "need" "want" "allow" "first" "last"	9.4%
<i>Definitely worth visiting</i>	description of experiences suggested to peers by the reviewers	"visit" "worth" "well" "must" "interest" "great" "realli" "definit" "enjoy" "attract"	6.2%
<i>Guided Tours</i>	comments on the visit, either with an audio guide or with a guided tour	"tour" "guid" "recommend" "inform" "audio" "high" "group" "knowledg" "took" "book"	6.0%
<i>Inconvenient experiences</i>	aspects related to inconvenient events associated to the visit, such as frauds, schemes and pickpocketing	"peopl" "howev" "tri" "just" "sell" "money" "want" "staff" "seem" "help"	4.6%
<i>Walking around</i>	comments connected to the description of walks and open areas	"hour" "walk" "around" "good" "take" "lot" "area" "spend" "water" "spent"	9.6%
<i>Ancient ruins</i>	aspects connected to historical places and ancient ruins, usually related to preservation	"site" "ruin" "mani" "citi" "area" "life" "preserv" "larg" "still" "part"	4.5%

*Table 2: Description of English topics of discussion, with most probable words and percentage of English reviews characterised by each topic.*

## Comparative Analysis

Through a first qualitative comparative analysis of English and Italian topics of discussion, we observed that Italian reviewers emphasize different aspects compared to English reviewers. Indeed, comparing the results summarized in Table 1 and Table 2, it is possible to observe that reviewers of museums writing in Italian are more focused on landscapes (*View and panorama*, 12% of Italian reviews) and on ticketing (*Ticketing*, 10.2% of Italian reviews), rather than describing a specific experience: *A day in the past*, *A special day*, *Unfortunately* represent the topics less diffused among Italian reviewers with respectively the 5%, 6.4% and 6.5% of Italian reviews discussing the topics.

On the contrary, English-speaking reviewers do not discuss frequently on ticketing issues (*Ticketing*, only 3.6% of English reviews) but put more emphasis on buildings (*The structure of museum*, 10.8% of English reviews), views (*Views of the antiquity*, 9.9% of English reviews), walks (*Walking around*, 9.6% of English reviews) and time to visit cultural institutions (*Take your time*, 9.4% of English reviews).

## 5. Conclusions & Future Developments

The empirical results here presented evidence differences in the topics discussed by Italian- and English-speaking reviewers of Italian museums. Even if this work is still in an embryonal phase, it could already offer some insights in the direction of identifying different needs and perceptions according to different visitors of museums.

We recall that we focused only on online reviews in Italian or English since, among the overall collected reviews, English and Italian represented respectively the 38% and 31%, while the remaining 31% of reviews was written in more than 30 other languages. Moreover, we underline that the choice to analyse an entire year of online reviews of Italian museums has been made to consider also possible seasonality within topics discussed through online reviews associated to selected museums<sup>7</sup>.

We underline that the proposed procedure of *emphasis analysis* here proposed is general in the sense that it can be applied to various types of textual contents, ranging from online reviews to social media messages as well as newspaper articles. Moreover, we chose here

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<sup>7</sup> 50 Italian public museums with the highest number of visitors recorded at the end of 2017. Source: Ministry of Cultural Heritage [http://www.statistica.beniculturali.it/Visitatori\\_e\\_introiti\\_musei\\_17.htm](http://www.statistica.beniculturali.it/Visitatori_e_introiti_musei_17.htm)

to specific setting of museums, but the procedure could be applied in different areas, from Culture to hospitality and tourism.

The first contribution of this research is given by the interpretation of online reviews as a new source of information to analyse service personalization. In particular, results offer insights on the emphasis posed on different topics of discussion by visitors that review museums in different languages.

This work also contributes to the literature on museum management, since it highlights aspects that are relevant to visitors' experience according to online reviewers writing in different languages and informs about different areas of visitors' interests, here represented by the emphasis they pose on different topics of discussions directly expressed by visitors' through online reviews.

A third contribution of the proposed work is the relevance of the results for practitioners belonging to museum management. Indeed, this work highlights a list of arguments of interest for specific visitors of museums, offering a way to acknowledge and deeper understand visitors' needs. For instance, managers of cultural institutions could make use of the results of this work to personalize the promotion of cultural attractions according to the emphasis posed on specific aspects by specific visitors.

This work could act as a starting point for a further investigation of aspects that provide a positive experience within museums, uncovering motivations and behaviour of different types of arts consumers, allowing for a further enhancement of cultural participation.

Possible further developments of this work could include an extension of the quantitative analyses of online reviews to further explore the complex nature of customer value and service perception, key aspects for the understanding of customer satisfaction within cultural sector (Hume & Mort, 2008).

Additional extensions of this work will also consider the comparison of languages among different platforms for online reviews, such as for instance differences in topics discussed on Google Maps and TripAdvisor, to allow a further generalization of results across channels and to contribute to the research on social media analytics (Xiang et al., 2017).

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