Classification of typologies of cultural tourists at historic royal palaces using social media data

Keywords: cultural tourist, cultural tourism, tourist typology classification, social media, natural language processing

Extended Abstract

Introduction

There has never been a greater need for the identification of cultural tourists' typologies with the aim of establishing effective destination tourism management and defining corresponding strategies, considering that approximately 40% of all international tourists make a destination choice based on cultural attractions [1]. Theoretical and empirical investigations by Silberberg, Stebbins, Timothy, Christou, and McKercher have proven that two dimensions—cultural centrality and depth of experience—can be fundamental baselines in segmenting cultural tourists [2]. Previous studies were mostly conducted based on predesigned surveys (e.g. close-end questions) to classify tourist types, where they may be insufficient to detect the psycho-sociological nature of the above two variables. Recent studies have applied data mining techniques using data from social media platforms where cultural tourists' experiences are shared and evaluated [3], but they largely focus on forecasts of their characteristics, such as emotion or loyalty, as a predictive tool. Despite the attempt to develop an advanced typology classification, there is limited research analyzing the niche market of cultural tourists' behavioristic segmentation; the applicability of social media data has not yet been examined to understand the level of centrality and depth of experience for tourist classification. In this paper, we discuss a new typology classification method that can provide a baseline for determining the two core dimensions that mirror the relevant destinations' strengths for cultural tourist categorization. To do this, through the use of written reviews from TripAdvisor, this study constructs its own dataset and predicts international cultural tourist typologies based on the revision of McKercher's typologies at particular heritage destinations by applying the latest prediction models in natural language processing (NLP) that include BERT [4], RoBERTa [5], XLNet [6], and ERNIE 2.0 [7] to determine whether this approach can be readily extended to other cultural historic destinations.

Methods

Social media (TripAdvisor) datasets with ground truth tourist classification labels are not available; therefore, we constructed our own dataset. First, we crawled all available 9,894 reviews of royal historic places as our research venues (Gyeongbok Palace and Gwanghwa Gate, Changdeok Palace, Deoksu Palace, and Jonmyo Shrine of the Joseon dynasty located in central Seoul, which are linked as one consolidated palace cluster for Korea's tourism management) posted between January 1, 2004, and October 29, 2022 from TripAdvisor. Only English reviews were collected because not all international tourists shared their countries of residence, and reviewers' countries of residence did not necessarily represent their nationalities. The data consisted of review titles, contents, overall ratings, posting data, and travel type without any personal information, following the Association of Internet Researchers' Internet Research Ethics 3.0 guidelines. Second, led by a heritage expert along with two researchers in museum and heritage studies, the criteria to determine the centrality and depth of experience of the reviews for labeling tourists' typologies were established following a thorough examination of a full list of all heritage experience programs offered by the royal historic places,

as well as their psychosocio-physiologically based aspects. Third, nine combinations were created to determine three typologies: casual (C), sightseeing (SIG), and purposeful (P) cultural tourists through the scoring process of the depth-of-experience and the centrality levels using a three-point scale (0–2) for each (Table 1). Fourth, the labeled data were cross-checked by the above three experts (Table 2). Finally, we conducted tests using the above four BERT encoder models, ranging from simple to advanced. Our tests were trained on a V100 GPU card and used the vanilla hyperparameters suggested by each of the four models.

Findings and Discussion

The results of the experiments showed that the average precision scores of the above four models were greater than 80%; the average F1 scores were 0.80, 0.81, 0.79, and 0.81, respectively (Table 3). Specifically, ERNIE-2.0 generally showed excellent performance in all tasks. XLNet-base and ERNIE-2.0 outperformed the two other encoders in the classification test for C. Regarding the segmentation test for P, the precision scores of all models were greater than 80%. Concerning SIG, RoBERTa-base showed the highest performance in precision score (0.70). However, the performance of all models with respect to their SIG results was comparatively lower than that of tasks C and P.

Our study shows that user-generated data (UGD) has the potential to be an informative resource for discovering cultural tourists' decision-making and experiences for segmenting their typologies. Prior studies have often explored the construction of cultural tourist classifications using proactive data collection, and even in cases where UGD is applied, their forecasting does not adequately reflect the qualitative data's contexts. In this study, on the other hand, the value of social media data interpreted specifically from the perspectives of tourists' motivation and personal reflection on the activities they participated in at royal historic places was investigated using NLP models. Our approach can open further discussions on how different the conceptual construction of typologies is compared to an actual empirical approach, thereby supporting the elaboration of current theoretical typology frameworks.

Conclusions and Limitations

We explored how the prediction of cultural tourist typology can contribute to establishing an empirical method through a comparison of NLP encoders' performance using social media. This study sheds light on ways to extract two important variables, centrality and the experience span of cultural tourists, from UGD and applies the latest NLP for the first time. However, there are other behavioral features that can be used to enhance the prediction accuracy of the tourist segmentation strategy, such as the sightseeing category, which should be studied in future work.

References

[1] UNWTO. 2018. Tourism and culture synergies. Madrid, Spain: UNWTO. ISBN 9789284418961.

[2] McKercher, B.; and du Cros, H. 2003. Testing a cultural tourism typology. International Journal of Tourism Research, 5: 45–58.

[3] Qi, S.; Wong, C. U. I.; Chen, N.; Rong, J.; and Du, J. 2018. Profiling Macau cultural tourists by using user-generated content from online social media. Information Technology and Tourism, 20: 217–236.

[4] Devlin, J.; Chang, M. W.; Lee, K.; and Toutanova, K. 2019. BERT: Pre-training of deep bidirectional transformers for language understanding. NAACL HLT 2019.

[5] Liu, Y.; Ott, M.; Goyal, N.; Du, J.; Joshi, M.; Chen, D.; Levy, O.; Lewis, M.; Zettlemoyer, L.; and Stoyanov, V. 2019. RoBERTa: A robustly optimized BERT pretraining approach. arXiv:1907.11692.

[6] Yang, Z.; Dai, Z.; Yang, Y.; Carbonell, J.; Salakhutdinov, R.; and Le, Q. V. 2019. XLNet: Generalized autoregressive pretraining for language understanding. Advances in Neural Information Processing Systems, 32: 1–18.

[7] Sun, Y.; Wang, S.; Li, Y.; Feng, S.; Tian, H.; Wu, H.; and Wang, H. 2020. ERNIE 2.0: A continual pre-training framework for language understanding. AAAI 2020 – 34th AAA.

Figures and Tables

A.1. Labeling guidelines for motivation and experience scales

Centrality (Motivation) scale (0–2)

Level	C0	C1	C2
Description	Visiting historic royal palaces is incidental and spontaneous. Cultural attraction plays little or no role in making the decision to visit.	Visits historic royal palaces to experience something fun and new or to interact with local people to see their ways of living.	Visits historic royal palaces to have a deep and intellectually challenging cultural experience.

NOTE: C0: Unimportant or not very important; C1: Neither important nor unimportant to participate in cultural activities; C2: Very important or main reason for visit.

Experience scale (0–2)

Level	DE0	DE1	DE2
Description	Sensory (mainly emotionally related) activities	Mix of sensory and shallow learning experience	Intellectual cultural learning or educational experience

NOTE: Depths of experience—DE0: Mainly focused on sensory activities; DE1: Mix of sensory and shallow intellectual activities; DE2: Mainly focused on intellectual activities.

NOTE: The above labeling guidelines are simplified versions of the original guidelines.

A.2. Ground truth determination chart (nine combinations)

Type	Motivation: Depth of experience (C:DE)			
P (Purposeful cultural visitor)	(2:2)	(1:2)	(0:2)	
SIG (Sightseeing cultural visitor)	(2:1)	(2:0)		
C (Casual cultural visitor)	(1:0)	(1:1)	(0:0)	(0:1)

A.3. Definitions of three types of cultural tourists

Type	Definition	Phenomenon at historic royal palaces in Korea
Purposeful cultural tourist (P)	Culture seeking (learning about other cultures) is important or the main reason for visiting destinations. This type prefers to have intellectually challenging or deep cultural learning experiences.	- Deep cultural learning experience sought by (i) joining guided tours, (ii) visiting museums or galleries, (iii) participating in specialized cultural experience events, and (iv) active access to mobile application guides. - Levels of immersiveness in cultural learning are high.
Sightseeing cultural tourist (SIG)	Like the purposeful type, culture seeking is a major reason for visiting destinations. However, this type of cultural tourist pursues a shallower sensory experience (e.g., entertainment-oriented site exploration) rather than a deep cultural learning experience.	- Pleasure seeker wanting to experience especially something traditional or fun: trying to absorb the palace scape. - Does not consider intellectually challenging activities. - Prefers a wide array of experiences rather than pursuing any one activity in depth.
Casual cultural tourist (C)	Culture seeking plays a limited role in deciding to visit destinations: it is neither important nor unimportant. Also involved in activities at destinations in a shallow manner (e.g., for sensory experience).	- Curiosity and novelty seeker: interacts with local culture and people to find new discoveries - Leisure and relaxation are important.

Table 1. Data construction: Labeling guidelines (A.1.), Ground truth determination chart (A.2.), and Definitions of three types of cultural tourists (A.3.)

Context (title)	Comment (review)	Centrality (C)	Depth of Experience (DE)	Classified label
History buffs - must visit	The tour to the palace will give you insights of Korean history, particularly the monarchy. We had a great tour guide, who gave us detailed historical accounts of Korean Peninsula history and the dynasty that once led the monarchy. The Changing of the Guards was also an interesting experience. Although it was in a smaller scale than what I have seen in other countries, it's always good to witness this spectacular display of a nation's culture. The concept and mechanics are similar as in other countries, but the uniforms are different. Fun colors, interesting style. Palace tour takes a lot of walking. Palace grounds is a work in progress. Since most of it was destroyed during the war, the government is trying to rebuild, replicate and preserve whatever is left of it.	C2	DE2	P
Stunning	A pleasant surprise. This is a 600-year old heritage site. Awesome beautiful place to visit. Loved the stroll around the palace.	C1	DE0	C
Beautiful palace to feel Choseon's atmosphere	This palace was one of beautiful palace in Seoul. This palace was very beautiful and could feel about Choseon royal family's atmosphere. There had many beautiful architectures of Choseon that was Korea's dynasty. I didn't understand why Chandeokgung and Changyeonggung's entrance fee paid separately, but it was certain that there was very beautiful.	C2	DE1	SIG

Table 2. Examples of reviews with the data construction results. *Classified labels*—P: Purposeful cultural tourist, C: Casual cultural tourist, SIG: Sightseeing cultural tourist. Orange: centrality span; Green: experience span.

Types	Precision	Recall	F1-score
C	0.81	0.78	0.79
P	0.89	0.87	0.88
SIG	0.67	0.74	0.70

[BERT-base]

Types	Precision	Recall	F1-score
C	0.82	0.77	0.79
P	0.86	0.91	0.88
SIG	0.70	0.72	0.71

[RoBERTa-base]

Types	Precision	Recall	F1-score
C	0.84	0.70	0.77
P	0.85	0.91	0.88
SIG	0.64	0.75	0.69

[XLNet-base]

Types	Precision	Recall	F1-score
C	0.84	0.77	0.80
P	0.88	0.90	0.89
SIG	0.68	0.75	0.71

[ERNIE-2.0]

Model	Precision	Recall	F1-score
BERT-base	0.81	0.80	0.80
RoBERTa-base	0.81	0.81	0.81
XLNet-base-cased	0.80	0.79	0.79
ERNIE-2.0	0.82	0.81	0.81

[Average of the above four models regarding the prediction results for the typology classification]

Table 3. The results of different methods of pre-training: precision, recall, and macro F1-scores of the touristy types (C, P, SIG) depending on each model