

Prospective Museum Visitor Management Based on Prospect Theory: A Pragmatic Approach

Authors : Athina Thanou, Eirini Eleni Tsiropoulou, Symeon Papavassiliou

Abstract : The problem of museum visitor experience and congestion management - in various forms - has come increasingly under the spotlight over the last few years, since overcrowding can significantly decrease the quality of visitors' experience. Evidence suggests that on busy days the amount of time a visitor spends inside a crowded house museum can fall by up to 60% compared to a quiet mid-week day. In this paper we consider the aforementioned problem, by treating museums as evolving social systems that induce constraints. However, in a cultural heritage space, as opposed to the majority of social environments, the momentum of the experience is primarily controlled by the visitor himself. Visitors typically behave selfishly regarding the maximization of their own Quality of Experience (QoE) - commonly expressed through a utility function that takes several parameters into consideration, with crowd density and waiting/visiting time being among the key ones. In such a setting, congestion occurs when either the utility of one visitor decreases due to the behavior of other persons, or when costs of undertaking an activity rise due to the presence of other persons. We initially investigate how visitors' behavioral risk attitudes, as captured and represented by prospect theory, affect their decisions in resource sharing settings, where visitors' decisions and experiences are strongly interdependent. Different from the majority of existing studies and literature, we highlight that visitors are not risk neutral utility maximizers, but they demonstrate risk-aware behavior according to their personal risk characteristics. In our work, exhibits are organized into two groups: a) "safe exhibits" that correspond to less congested ones, where the visitors receive guaranteed satisfaction in accordance with the visiting time invested, and b) common pool of resources (CPR) exhibits, which are the most popular exhibits with possibly increased congestion and uncertain outcome in terms of visitor satisfaction. A key difference is that the visitor satisfaction due to CPR strongly depends not only on the invested time decision of a specific visitor, but also on that of the rest of the visitors. In the latter case, the over-investment in time, or equivalently the increased congestion potentially leads to "exhibit failure", interpreted as the visitors gain no satisfaction from their observation of this exhibit due to high congestion. We present a framework where each visitor in a distributed manner determines his time investment in safe or CPR exhibits to optimize his QoE. Based on this framework, we analyze and evaluate how visitors, acting as prospect-theoretic decision-makers, respond and react to the various pricing policies imposed by the museum curators. Based on detailed evaluation results and experiments, we present interesting observations, regarding the impact of several parameters and characteristics such as visitor heterogeneity and use of alternative pricing policies, on scalability, user satisfaction, museum capacity, resource fragility, and operation point stability. Furthermore, we study and present the effectiveness of alternative pricing mechanisms, when used as implicit tools, to deal with the congestion management problem in the museums, and potentially decrease the exhibit failure probability (fragility), while considering the visitor risk preferences.

Keywords : museum resource and visitor management, congestion management, prospect theory, cyber physical social systems

Conference Title : ICMSCHM 2019 : International Conference on Museum Studies and Cultural Heritage Management

Conference Location : Paris, France

Conference Dates : February 21-22, 2019