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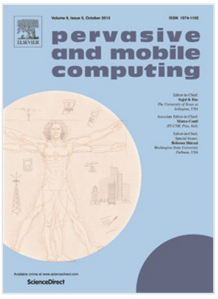

Visualizing, clustering, and predicting the behavior of museum visitors

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Visualizing, Clustering, and Predicting the Behavior of Museum Visitors[1]

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Abstract

Fine-arts museums design exhibitions to educate, inform and entertain visitors. Existing work leverages technology to engage, guide and interact with the visitors, neglecting the need of museum staff to understand the response of the visitors. Surveys and expensive observational studies are currently the only available data source to evaluate visitor behavior, with limits of scale and bias. In this paper, we explore the use of data provided by low-cost mobile and fixed proximity sensors to understand the behavior of museum visitors. We present visualizations of visitor behavior, and apply both clustering and prediction techniques to the collected data to show that group behavior can be identified and leveraged to support the work of museum staff.

Keywords: proximity sensing, mobile sensors, museum visitor analysis, hierarchical clustering, visualization, recommendation, prediction, matrix factorization.

1. Introduction

Museums provide the public with a variety of services including learning, entertainment and social interaction, and they are increasing in popularity [2]. Yet, there are few accessible methods for museum staff to gather actionable information about the visitor experience, learn from past experiences, evaluate shows for funders, and improve future work. In the museum community at large, including science, technology and historical museums, professionals advocate the use of evaluation techniques throughout the design process [3, 2]. Within the art world, evaluations can help optimize the layout of ongoing shows, improve traveling exhibitions, inform future design choices [4], and strengthen requests for funding [5]. However, conducting evaluation studies using traditional research methods is expensive, often forcing management to cancel such studies due to budget constraints [6]. Low-cost sensor networks designed to meet the needs of fine-arts museums could simplify evaluation and ensure its integration within routine design processes.

[1] Note that this paper is an extended version of the work entitled "Leveraging Proximity Sensing to Mine the Behavior of Museum Visitors" [1].

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