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# A Visual Analytics Approach for Flood Risk Analysis and Decision-making in Cultural Heritage

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## Abstract

World cultural heritage is the accumulation and essence of the development of human civilization, as well as the rare and irreplaceable treasures bestowed by history. However, cultural heritage is increasingly exposed to various risks caused by natural and man-made factors. Flood risk is the most common and the most devastating risk for cultural heritage. This study proposes a visual analytics method that supports the visual analysis of flood risk from multiple aspects, including predicted flood peak flow, flood propagation, flood impact, and vulnerability. The proposed method can also provide the required information from multiple scales, including the basin-, site-, multi-cave-, and single-cave-scale levels. The combination of the visualization techniques of flood risk analysis will enable the proposed method to support users to make decisions with respect to mitigation measures. Lastly, the proposed method is evaluated by water experts and cultural heritage site managers.

*Keywords:* Cultural heritage, Visual Analytics, Flood Risk Analysis and Decision-making, Simulation

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## 1. Introduction

Cultural heritage is one of the most precious treasures that resulted in the development of human civilization. Although cultural heritage is rare and ir-

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