Abstract

Looting of archaeological sites is a global problem. To quantify looting on a nationwide scale and to assess the validity and scope of the looting reports and modern encroachment, satellite archaeologist have turned to mapping looting from space. High-resolution satellite imagery has become a powerful tool and resource for monitoring looting and site destruction remotely and proves to be an independent way to cross check and analyze against varied and unreliable reports from media and government agencies. It is estimated that over a quarter of Egypt's 1100 known archaeological areas have sustained major damage and site destruction directly linked to looting. The organized looting and illicit trafficking of art and antiques, known as cultural racketeering, is a multi-billion dollar worldwide criminal industry that thrives in Egypt during times of political and economic turmoil and potentially funds drug cartels, armed insurgents, and even terrorist networks. This study analyzes methods used to monitor site looting at the archaeological site of al-Lisht which is located in the Egyptian governorate of Giza south of Cairo. Monitoring damage and looting over time has been largely dependent upon direct human interpretation of images. The manual image comparison method is laborious, time consuming, and prone to human-induced error. Recently, partially-supervised methods using deep convolutional neural networks (CNNs) have shown astounding performance in object recognition and detection. This study seeks to demonstrate the viability of using deep convolutional neural networks (CNNs) within the field of archaeology and cultural heritage preservation for the purpose of augmenting or replacing the manual detection of looting. It brings recent advancements from the field of Artificial Intelligence to an applied GIS challenge at the intersection of remote sensing and archaeology. The objective is to show that CNNs are a more accurate and expedient method for the detecting of looting with wide-ranging application beyond this specific research.