Towards the automatic production of graffiti orthophotos

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Abstract

Graffiti and street art are unique forms of cultural heritage which have not yet received the scientific attention they deserve. The potential of graffiti research to answer a variety of social and cultural research questions is underexploited. One reason for this lack of academic rigor lies within the very sparse availability of well-curated and publicly accessible graffiti data. One obvious foundation for a graffiti dataset is images depicting the various *pieces*, *tags* or *throw-ups*. The few existing graffiti image databases do not allow the study of the graffiti's exact shapes and dimensions as the photographs suffer from various distortions which are introduced by topography, perspective, or the camera itself. Orthophotos have the great advantage of removing above-mentioned image distortions. The creation of orthophotos, however, is time-consuming and requires considerable manual interaction, which poses a significant obstacle considering that comprehensive and up-to-date graffiti databases often deal with hundreds of images per week.

Here, we present a novel methodology which overcomes the above-mentioned limitations in present-day graffiti documentation by deriving graffiti orthophotos in a highly automated way. In contrast to conventional photographs, orthophotos are adjusted for the graffiti surface topography and had all perspective and lens distortions removed. As a result, orthophotos allow the measurement of coordinates, distances, and areas of the depicted graffiti, enabling the derivation of exact proportions and relating the object to a real-world geographic coordinate reference system. Orthophotos in this context are therefore accurate maps of graffiti. The derivation of orthophotos, however, is complex and requires not only exact knowledge about the three-dimensional surface geometry of the object but also about the camera's internal geometry and its exact location and orientation in space. We are developing a photogrammetric methodology and associated tool that derives the required information based on graffiti photos and outputs the desired orthophotos without any manual intervention during the process.

In this talk, we present this bespoke photogrammetric approach which is currently investigated in the framework of the graffiti documentation and dissemination project INDIGO and is built as a Python add-on to the commercial package Agisoft Metashape Professional. First tests were conducted at the *Donaukanal* (Eng. Danube Canal), a central waterway through Vienna and a famous graffiti hotspot. The results indicate a reliable performance of our approach: the majority (ca. 85%) of the tested graffiti images were successfully and automatically turned into orthophotos. We will present those results and discuss where further finetuning is needed and demonstrate why the presented tool has the potential to largely automize the way graffiti are being documented. This approach will enable the building of a solid and extensive database for advanced graffiti research.