

## Graffiti@Cultural Heritage

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**Abstract:** Hardly any distinct feature of urban environments and the society living in such environments is discussed for so long and controversially as the phenomenon of street art and graffiti. For the mainly juvenile supporters of the movement producing graffiti is simply a nowadays widely accepted possibility for artistic freedom of scope, whereas their opponents are putting graffiti on the same level with vandalism, violation of property rights and damage arousing an impression of blight and gang activity. On the other hand the city of Graz is well known for its cultural heritage which every year attracts a lot of visitors (European Capital of Culture 2003); considering this commercially important interrelation the people in charge are forced to do their best in heritage conservation, documentation and management. As a matter of fact there is an area of conflict established by the intentions of the persons involved: the graffiti artists, the citizens, the politicians and the tourists. Unfortunately until now there has been lack of research describing and analyzing interactions taking place in areas around historical buildings. This paper first and foremost discusses the acquisition and implementation of geo-referenced graffiti data which can be used to analyze the appearance patterns of the graffiti phenomenon especially in the main touristic/cultural heritage zones of Graz by the means of GIS and Spatial Analysis toolboxes. Methodologically the workflow consists of three different work packages, data description and acquisition, data model building and finally analysis and visualization: In the first step preliminary studies allocating (local-context-) knowledge about the characteristics of urban graffiti, the features representing architectural heritage and tourists routes are compiled. The results of this step can be used for the development the underlying GIS-database model (phase 2) holding all project-relevant spatially referenced data (conventional attributes, pictures etc.) which are analyzed in step 3 by the toolboxes of the process model. The latter employs pattern analysis and the delineation of hot spots providing a wide range of graffiti related insights: Local distribution of different graffiti types, preferred undergrounds, styles and graphical data (i.e. signs) can be compared and overlaid by touristic and socio-economic data. Finally, the evolution of appearances and appearance patterns can be visualized and mapped.

**Keywords:** Graffiti, Cultural Heritage, GIS, data modeling, Graz

### Environmental issues and motivation

As already noted in the introduction, the topic "graffiti" is still one of the most versatile and probably controversial discussed phenomena of human culture consciousness. If we accept the results of relevant studies as nearly ubiquitously valid, then one can assume that graffiti is a form of expression used by humans aged between 10 and 40 years; other characteristics of the person (such as gender, family relationships etc.) or parameters of the social environment (occupation, employment status, education, ...) seldom seem to play a significant role; this group is usually composed of students, artists and political

activists (HALSEY & YOUNG 2002). Although headlines as shown in Fig. 1 - due to the socio-political orientation of each examined medium – can only reflect a segment of the whole spectrum of opinions, they provide additional information which can be used to improve the previously established characterization of the "graffiti scene".

Zuletzt aktualisiert: 05.02.2013 um 20:13 Uhr [5 Kommentare](#)

## Illegale Graffitis nehmen zu

Polizei und ÖBB ärgern sich über Wildwuchs an illegalen Graffitis. Die Schäden gehen in die 100.000 Euro. Jetzt soll mehr kontrolliert und abgestraft werden.

"Chickbrüdaz" 08.01.2013

## Halbstarke Graffiti-Gang in Graz geschnappt



Zuletzt aktualisiert: 06.02.2013 um 12:23 Uhr [Kommentare](#)

## Schaffen von Flächen für Graffitikünstler

Bereits im kommenden Frühjahr werden heimischen Graffiti-Artisten im Klagenfurter Stadtgebiet Plakatwände zur Verfügung stehen.

Zuletzt aktualisiert: 19.02.2013 um 09:37 Uhr [10 Kommentare](#)

## Schloßberg: So verkommt das Wahrzeichen der Stadt

Graffitis an den Wänden und Eingängen, die Eingänge zu den Stollen versperrt. Das Schloßberginnere liegt brach, auch die touristische Nutzung ist unterbelichtet. Eine Bestandsaufnahme.

Fig. 1 – Graffiti related headlines from selected newspapers (online versions)

Furthermore, it is undeniable that these activities in most cases cause significant damage to private as well as public (maybe even culturally valuable) property, but most often the sum of indemnity cannot be claimed from the responsible persons; so removing the damages – even in case of culturally insignificant objects - will cause remarkable budget load. One can therefore assume that the tenor of how graffiti is appraised by the public is more negative than neutral. In other words, graffiti is far less often understood as another kind of art rather than as damage to property, a judgment which otherwise is also correlated with the selection of topics in the newspaper articles: Graffiti messages with a positive connotation such as the establishment of additional legal "work areas" by town officials and private donators or sponsors from the economy - as well as the reporting about graffiti workshops is given less space. What remains is a frequently annoying

perceived artifact, which – in the eye of the beholder - produces a recognizable impression of neglect and decline in an area that at the same time has to perform as a World Heritage Site which should be presented in a positive overall appearance, especially under the terms of tourism. At a glance the activists justify their doing with intentions like the embellishment of the town, the attempt to create their sphere worth living, the protest against whatever, the graffiti tourism, the expression of collective attitude to life (Hip Hop, ...), the setting of a personal statement (personal mark), the reflection of the society's reaction or the re-claiming of the (in their view public) urban space. But - regardless of the individual's motivation – all graffiti producers have to be interested in public attention. This means that visibility, publicity, exposition and a minimum quantity of pedestrians and motorized traffic passing by are the essential criteria. Nevertheless, distinguished members of the community have often pointed out, that “serious” activists definitely respect the work of other artists as a kind of taboo zones. In that context the phrase “work of artist” consciously includes the work of all persons engaged in the cultural sector.

### **Foundations and methodology**

As already mentioned the phenomenon graffiti shows a clear spatial reference and topographic relevance. But surprisingly most of the investigations conducted until now and dealing with the graffiti topic completely ignore this relationship. Moreover, graffiti research investigations based even on census related areas usually represent the exception rather than the rule (SIEGL 1993, SCHAEFER WIERY & SIEGL 2001, BAUER 2002, SIEGL & SCHRAGE 2008 2009, PHILIP & STAHL 2011). Although the absence of such a geo-referenced dataset is often bemoaned by the scientific community most of the data collections providing information for street art research are still restricted in thematic and/or spatial ways. In contrast, the approach presented in this paper attempts to analyze this phenomenon in a more holistic and particularly spatial manner. This in principle seems to point toward a very expensive and time consuming data acquisition campaign covering the whole urbanized area of Graz, an approach which indicates the first and most important problem for the presented study: the effective definition of bounding polygons delineating representative sampling areas. Additionally, the underlying concept of a multi-discipline research approach has to deal with different feature classes of spatial entities (i.e. points, lines and areas as well as their associated attributes) and suggests the design of a complex graffiti database structure able to handle the resulting needs and problems. To enable these combined analyses, initially a three part spatial reference framework has been implemented, consisting of one data layer holding the exact coordinates/locations of the interesting entities (graffiti), a second data layer representing the footprints of the cultural heritage sites in the urbanized area of Graz and a third (administrative) layer allowing to sustain the nexus of geometric entities and statistical (mainly socio-economic, demographic and administrative) data typically related to small census units (Zählsprenkel).

During the first step the outcomes derived from preliminary investigations have shown that – except in areas near to arterial roads – in outbound traffic lanes the frequency of graffiti declines in a significant manner from the urban center to the suburbs. Time and effort for the acquisition of nearly all occurring entries within the slightly 120 km<sup>2</sup> covering area of the city of Graz could be further reduced dramatically because areas identified as of little relevance (based on the findings coming from preliminary reviews of randomly

distributed sample areas) were excluded from further investigations (after an additional screening process). Subsequently executed site inspections show that the occurrence of graffiti concentrates on certain areas along the arterial parts of the urban transportation network; also significant "exposure differences" can be noticed, probably due to the intention of the writers to make their work as visible as possible for the general public. The latter intention even brings in advantages for the data acquisition process, as a number of areas with graffiti potential are not only non-assessable but also inaccessible (not publicly accessible or invisible areas within the Graz city limits). Thus, tests performed in selected areas have shown that the estimated number of unreported cases does not exceed 3%. Facing these considerations it is obvious that the originally intended census concept covering the whole area of Graz due to statistical reasons can only be fulfilled symbolically: Anyhow, at least the applied procedure of iterative focusing finally leads to a study area of about 17.5 km<sup>2</sup> with about 27 km of road length (Fig. 2); this ensures that the whole area can be examined at reasonable costs in reasonable intervals.

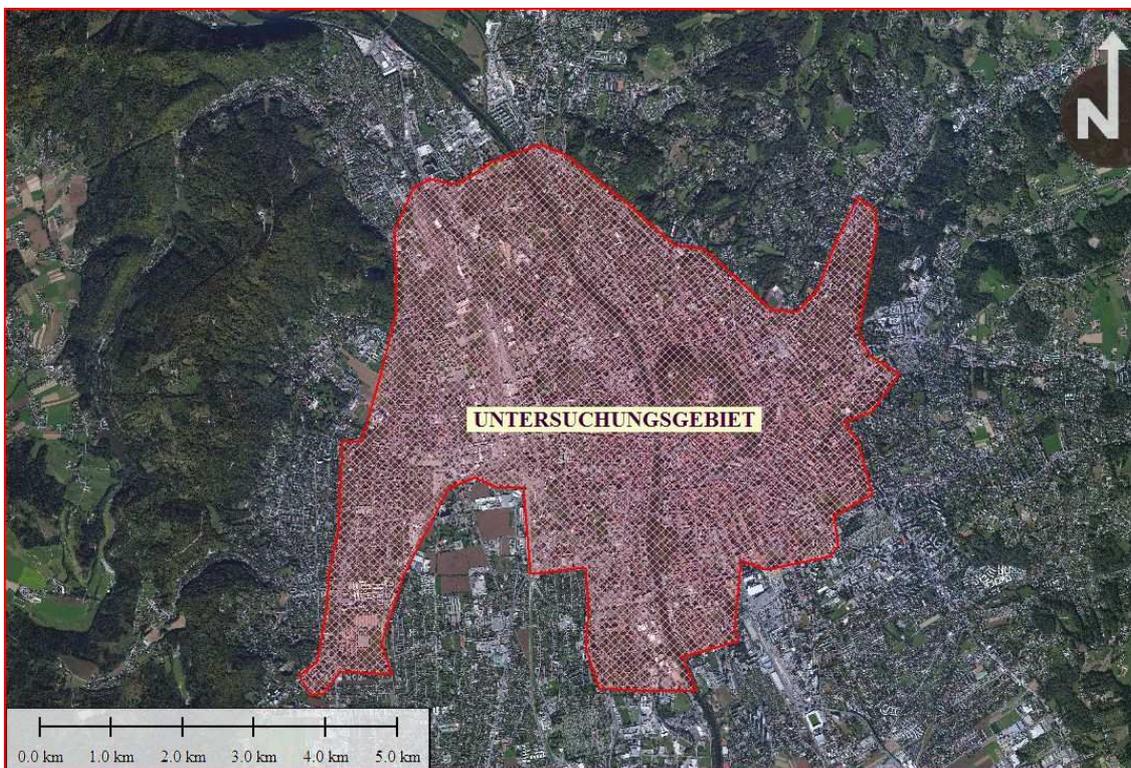


Fig. 2 – Investigation area of Graz - Layer 1 hatched in red

Whereas graffiti locations are predetermined by other causes and the administrative units of the third reference layer are usually defined by legal regulations, the content of the second layer might turn out to be a subject of discussion. To avoid problems resulting from inaccurate definitions of the term, there exist three possible sources to identify Cultural Heritage objects. The first one is based upon the Grazer Altstadterhaltungsgesetz 2008 which delineates preservation areas including these objects; unfortunately, this approach in analyses does not allow the flexibility of analyzing single objects (e.g. plague columns). As the second source the web-based, semi-official compilation of protected monuments in Graz might be used. But this solution has the disadvantage of covering hundreds of entries regardless of their context and

thematic relevance. Therefore the actual analyses are based on the list of Cultural Heritage objects presented in the officially available guide released from the Graz Tourismus Information. This catalogue of selected Grazer Sehenswürdigkeiten includes 55 objects of different types, evenly distributed over the urbanized area of Graz; aside from this these features have also a high degree of touristic relevance so that this selection seems to be a reasonable compromise (Fig. 3).

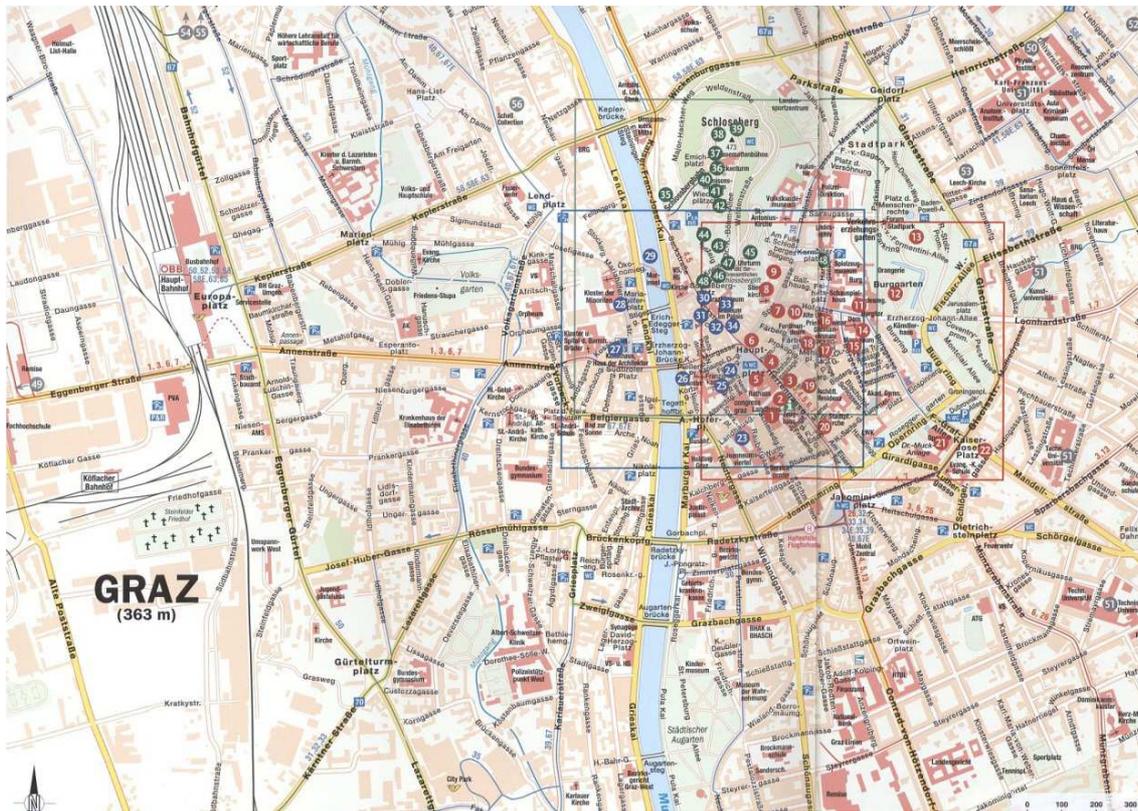


Fig. 3 – Locations of the Cultural Heritage objects used for analysis - Layer 2; the numbers indicate the location of selected Cultural Heritage objects (Copyright: Graz Tourismus Information)

Datasets compiled by following the suggestions described above will also facilitate the creation of meaningful temporal longitudinal sections. The first census was carried out under these (compared to the preliminary investigations) slightly modified conditions in the summer of 2011 and dealt mainly with the partial implementation of the principles set out in diverse strategy papers for the prevention of illegal graffiti action (MINISTRY OF JUSTICE 2005). Because of the fact that such aims definitely not coincide with the aim of the proposed project, the database collected up to now is only used to describe the current state of the phenomenon as well as for deeper exploration of the environment of this urban-cultural form of expression. In addition, the approach outlined in this paper conceptually differs in yet another way from similar graffiti studies which in most cases take in account the private aspects of the persons involved (activists as well as the bereaved); deriving the findings solely by analysis of objective parameters leaves this highly subjective aspect of the problem completely omitted. Instead of this, the analyses try to illuminate the problem in a purely descriptive manner, or by combination/multivariate analysis of different spatially referenced data levels covering different themes.

## Data model and data processing

According to the primary objectives of this survey a data model which is able to meet most of the needs has to comply with a set of requirements. The emerging graffiti database management system has to provide a scalable, geo-referenced multi-purpose data collection embedded in a homogenous spatial domain allowing virtually unlimited combination of different thematic layers coming from different sources in different formats. This demand allows the denomination of a coarse variable set consisting of date, time, spatial reference, graffiti related information and additional "context variables" (e.g. location and type of Cultural Heritage objects, demography, income, ethnicity, ...). In terms of design and development the data model recently used is a synthesis from the results of previous surveys with different scope and coverage and the outcomes of the first main survey (supported by students of the Institute of Geography and Regional Research, University of Graz); these findings lead to the incremental modification of the provisional data model used in the initial stage of the project; this initial stage model itself is based on the elements of the Wiener model of the Graffiti Research (SIEGL 2002) which defines a set of 23 variables enabling a basic toolbox for multivariate classification. Because of different objections for the present study a special criteria catalogue is used which is only partly consistent with the Vienna basic model.

The author's strategy is to use only variables which describe the phenomenon by objectively recordable and documentable criteria. Following this concept five questions work as a starting point for the ongoing development. Where? (Locational Description). Who? (Coarse characterization of affected/concerned organization). How? (Description of the entity with respect to the surroundings). What? (Description of the entity), and When? (The time of first/next recording). Tab. 1 presents the most up to date version of the set of external attributes and their feature characteristics assigned by the investigator during the post processing procedure.

Attribute	Feature Characteristic
1) Object Type	Wall, Door/Gate, Infrastructure, Traffic Sign, Information Board, Window, Miscellaneous
2) Party involved	private, Company, public
5) Date (Key)	Creation Date of Record
6) Exposition	Wall, Front, Passage, Rooftop, Hidden, Miscellaneous
7) Graffiti Underground	Concrete, Stone, Plasterwork rough, Plasterwork fine, Metal, Wood, Paper/Carton, Synthetic Material, Asphalt, Miscellaneous
8) Graffiti Type	Writing, Murials, Tags, Etching, Political Graffiti, Ultras, Gang, Adbusting, ThrowUps, Miscellaneous
9) Graffiti Mounting Height	low (in relation to the reaching area of an adolescent) medium high
10) Graffiti Size	small (<1/2 m <sup>2</sup> ), medium (about 1/2m <sup>2</sup> ), large (clearly > 1/2m <sup>2</sup> ), very large (longer than 3 m)
11) Graffiti Tool	Aerosol Can, Pen, Scraper, Etching, Paint Roller, Brush, Miscellaneous
12) Graffiti Color	unicolor, bicolor, multicolor
13) Graffiti Statement	Statement, Meaning, Symbolism of the Graffiti
14) Overview Picture (low-res)	Overview Picture Code/Path
15) Control Picture (hi-res)	Control Picture Code/Path
16) Notes	Additional Remarks, Addendum, Hints

Tab. 1 – External attributes and their Feature Characteristics (Note: Camera – specific (inherent) attributes like the EXIF parameters are not listed here)

In this context the aspect of "Where" attracts special attention. The workflow (Fig. 4) focused on data acquisition and data collection operations, as well as mapping the objects and their surroundings. The hardware primarily consists of GPS-enabled cameras producing high-resolution images (consisting of 18 or more megapixels). The pictures are used to give an impression of the scene itself as well as to provide graphical details of the signs. As an additional benefit for the project, the cameras used are also able to

record the observer's coordinates (relative to an arbitrary reference system), the direction of view in the moment the photo is taken and other photographically relevant data which can be used for further Overlay Analyses. When using the memory-saving JPEG image format, information like coordinates, line of vision, angle of aperture can be easily stored in the EXIF header for later analysis, so that a maybe necessary visual re-adjustment of location coordinates or angles can also be done in the lab without great expenditure of time (as well as the complete assignment of the viewpoints to all photos). Fig. 4 gives an overview about the applied processing steps and their working together.

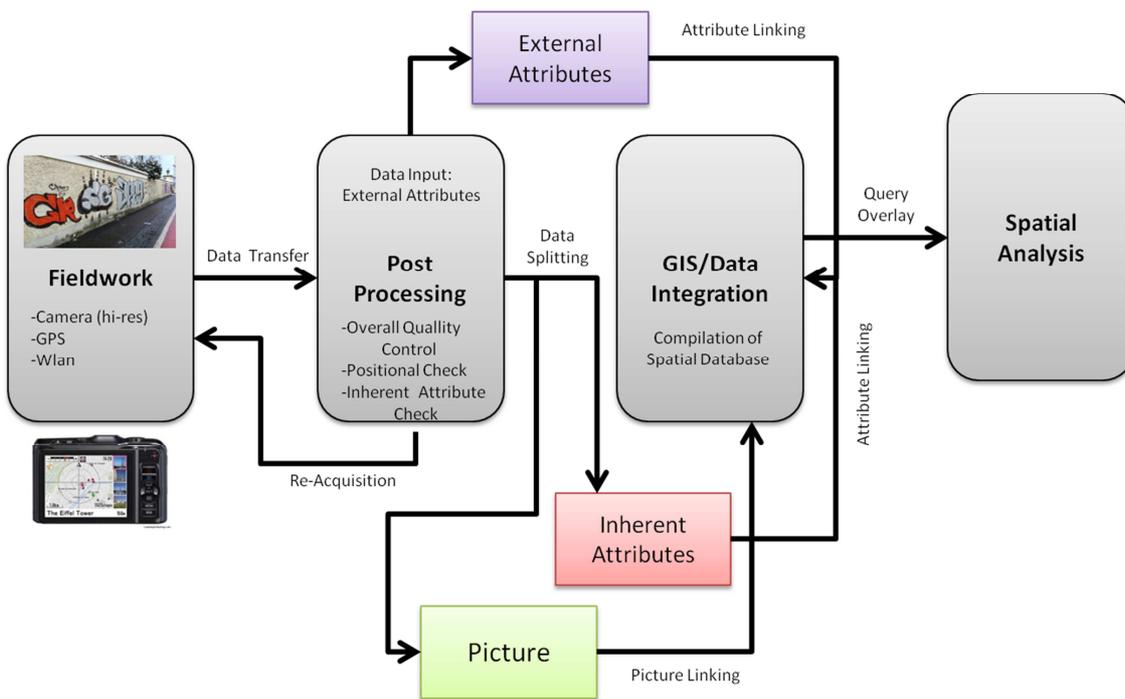


Fig. 4 – Workflow diagram showing the main work packages (Fieldwork, Quality Control, Re-Organisation and Integration of automatically and manually acquired data and Analysis)

## Analysis and results

The intended benefit (e.g. the usable analysis toolbox) of the information system described in this paper is twofold. The content implemented so far and the structure of the database can be used without any difficulty for doing powerful general purpose GIS - analyses with or without consideration of the spatial aspect. But in addition to that, the system is also able to provide Cultural Heritage related insights like the verification/ falsification of “taboo zones” around monuments.

### Selected results of general purpose analyses (Type I Analyses)

In the current stage two different types of evaluation were realized, which in principle can be roughly described as “queries” and “overlay operations.” Former variant is trivial, so that at this point, based on a selected case study only the second type of analysis will be discussed. From the available analysis scenarios Cultural Heritage versus Sports/Ultras was singled out to describe the capabilities of the system in more detail. The chosen theme was especially well suited for the analysis, as the “Sportstadt Graz” apart of

two rival football clubs also has a ice hockey club in the top flight and numerous other smaller sports clubs with a noteworthy fan culture. To demonstrate the capabilities of the system, the following research questions were formulated: is a spatial concentration of sporty motivated graffiti detectable, either in special urban quarters (e.g. in the historical city center) or in the field of sports venues? Are there more similarities or more differences in the signatures of sports-related graffiti culture? What sports are particularly subject of graffiti? To answer these questions, an additional data layer was introduced named "sports facilities", which locates the sport venues in Graz carrying all relevant information. According to their different audiences' effectiveness, different buffer distances were applied to delineate the sport specific search radii. During the analysis revealed a structural problem of this topic, namely the potential falsification of the results by the fact that most of the bigger sports facilities are rather located on the periphery of a city, whereas the total stock graffiti shows a significant concentration in the inner city area. Apart from a significant increase in the environment of semantically clear dominant UPC-Arena no striking correlation has been detected between sports facilities and Ultras. The appearance of the vicinity of this large football stadium is dominated by the signs of the big rival follower organizations of the two city clubs (especially in this area the graphical expulsion competition of the rivals can be well documented by photo-time series). The area outside of this range is dominated by football, but rarely in a conspicuous concentration, as in the precincts of the University, distinct fan pubs and certain schools, suggesting conclusions about the personal background of the fan groups; other concentrations can be assigned particularly to very active individuals due to the style or the pattern of organized groups. Taking into account other criteria it can be summarized as follows: the majority of predominantly monochromatic graffiti decoration is located on plain fronts or walls of buildings of public institutions (75%) followed by private ownership (23%). Abnormalities are also shown by the mounting height of the works: near sports facility more than 36% below the "typical working level" of adolescents were attached, which corresponds to approximately twice the city average. The size distribution in turn reflects the availability of open areas in the vicinity of stadiums: 75% medium and large graffiti in these areas compared with only 20% of small graffiti. These relationships are nearly reversed in the inner city area, even though the (Geo-) Information System in its present stage of development is quite capable to meet the needs (queries or intersections perform satisfactorily with additional data layers) the first results of excessive testing operations recently conducted clearly show the direction in which the development should be promoted. Apart from the integration of levels of information not yet involved in the analysis the expansion of the functionality of the whole system (HAWORTH ET AL. 2013) might be the future area of activity. This can be done by the automation of already implemented analytical skills, particularly an improved visualization module (perspective, the correct position draping of the acquired entities) and an accelerated handling during an eventually crowd based data acquisition process ( including data transmission and recording the database entries in the cloud via web-based mapping apps). Finally still outsourced sub-functions, such as the testing of similar graffiti on compliance may also have to be included in the kernel and thus increase the compactness of the package.

### **Selected results of special purpose analyses (Type II Analyses)**

In contrast to Type I Analyses (which use locational information to describe spatial characteristics of graffiti) the Type II Analyses are usually much more focused on a specific topic. Therefore in most of these

scenarios additional theme layers as well as more complex (that means not available out of the box) processing routines are required. The exemplary case of so called taboo zones (i.e. areas around the monuments which are said to remain graffiti – free because of the respect graffiti artists show for the work of other artists) can be broken down to a couple of detail problems: are the monuments/the immediate vicinity of monuments really free from graffiti? How are the graffiti in the neighborhood of monuments distributed? Are graffiti artists attracted by the increased publicity in streets with a huge amount of pedestrians/tourists? It is obvious that answering these questions is not possible without the inclusion of additional data layers. In the presented case a DOM with 1m resolution and data from the 3D City Model of Graz (for further information see references) are used for visibility calculations to delineate the areas which can be seen from an observer's position as shown in Fig. 5 (or vice versa: to delineate the area from which a particular monument can be seen; in this case only one Cultural Heritage object – the statue of Franz I., Emperor of Austria, is relevant for the investigation).

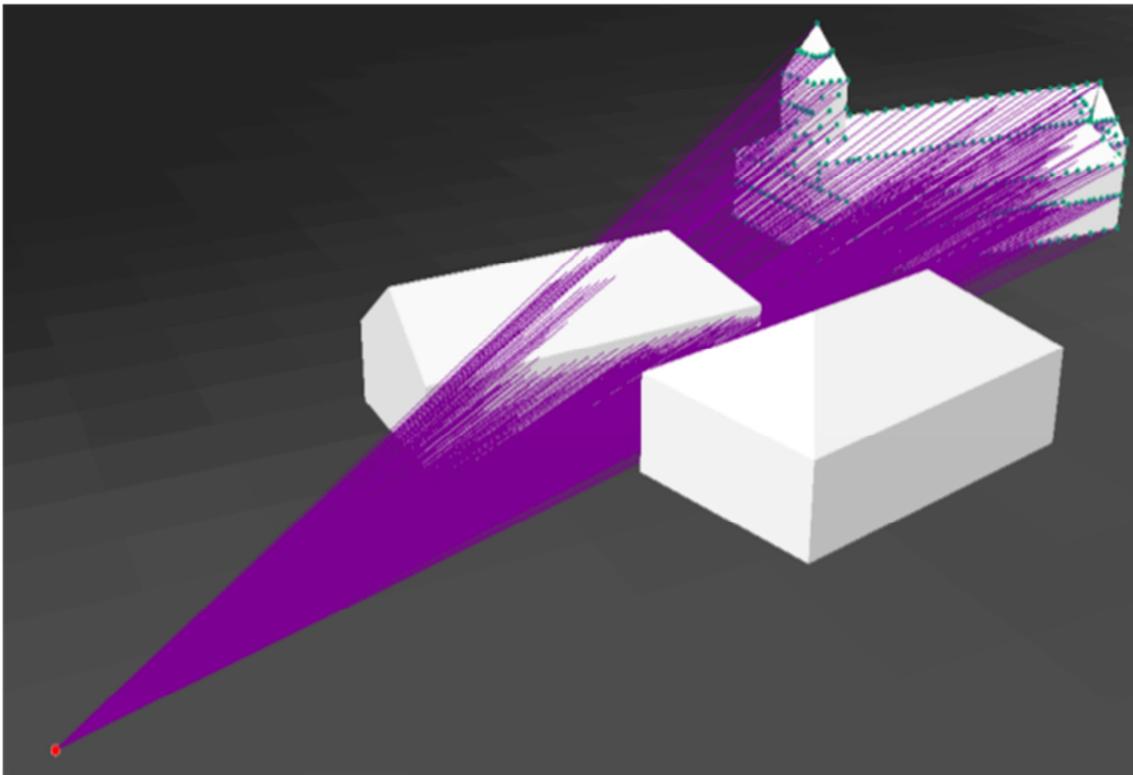


Fig. 5 – Results of the visibility calculation based on selected objects extracted from the 3D City Model of Graz

Furthermore, a road network dataset is created loaded with pedestrian/tourist flow data of the Freiheitsplatz area which has been counted by students during field campaigns from april to october 2012 (pedestrians and tourists, total, by gender, at 9-10 am, 12-1 pm, 4-5 pm and 9-10 pm). Last but not least a layer containing intensity and locations of the street lights has been added to the standard database to enable the creation of a night-time illumination model; this has been done to incorporate a dusk to dawn situation for the graffiti artists as well as for the pedestrians. After this enhancement of the fundamental dataset the concluding analysis generates the results in Fig. 6 exemplary shown for the Freiheitsplatz – site.



Fig. 6 – Analysis of the taboo zone “Freiheitsplatz” (Copyright of orthophoto: GIS Steiermark). The blue star locates of the monument, the yellow dots mark the graffiti and the colored lines indicate the pedestrian/tourist flow (red= strong, orange=medium, green=little).

The findings for this investigation site clearly point out, that the so called taboo zone in the vicinity of the monuments can be proven, regardless of the pedestrian/tourist flow. Even the walls limiting the Freiheitsplatz and facing the monument can be classified as nearly graffiti free. Unlike this situation there can be found an extremely high concentration of graffiti in the feeder streets of the square where the attraction of the monument coincides with huge amount of pedestrians/tourists passing by (i.e. Hofgasse, Ballhausgasse, Hartiggasse, the upper part of the Sporgasse and Stiegengasse). The accumulation in the Paulustorgasse is probably caused by other influences (e.g. the existence of a police stations nearby) as well as the relatively low concentration in the lower part of the Sporgasse (maybe caused by the local environment which seems

to be less attractive to graffiti artists). Summing up the results calculated in an analogue way for all 55 Cultural Heritage objects and demonstrated by the example "Freiheitsplatz" for most cases a taboo zone can be delineated. In general, these zones were surrounded by a network of feeder streets where - depending on the daily pedestrian load - the amount of graffiti usually decreases to the farther end of these streets. Additionally, deviations from these findings can be recognized in districts where other influences (attractiveness of area, underground, exposition of buildings etc.) produce overlay effects.

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