# Landscape Perception and Construction in Social Media: An Analysis of User-generated Content

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**Abstract:** The ability to analyse and classify the perception of landscapes through social media data could become a way of integrating public landscape design and perception into planning practice. For example, the evaluation of the landscape in a given area could be supported by the use of social media data. The main question of the approach presented is whether the analysis of photographs combined with geographic and textual information from social networks provides an insight into the perception of the landscape in relation to a given space. This also means analysing how "landscape" is visually communicated on social media through images and complementary materials like text elements.

**Keywords:** Landscape, perception, social-media, social media harvesting

## 1 Introduction

As there is general consensus that the public participation has the potential to enhance planning outcomes, nowadays the question arises how much participation is reasonable for public without being overwhelmed (STEMMER, B. & KAUßEN, L. 2017). Social media in landscape planning often is seen as a platform for informing the public about planning activities. People are informed but not activated for participation, interactive functions are rarely found. There is also a mass of data generated by user voluntary in social media, which are not explicitly disseminated to participation processes but could be used as a resource especially with regard to inclusion in landscape assessment in planning processes and decision making. Thus this data available for social media harvesting could be used as public contribution and prevent overburdening of public in landscape assessment. What is needed to make use of the data is a methodological and technical framework for a systematic analysis of geographic information, texts and most importantly photographs. An approach to that is presented in the following.

The aim of the presented project is to generate intersubjective statements about the perception of the landscape in relation to a particular space. Therefore user-generated photographs and related texts as well as spatial information available on social networks will be used. It is necessary to combine qualitative methods for evaluating the photographs (visual methods) with textual (content analysis) and geographical (spatial analysis using GIS) data from social media. Only in this way user-generated data can be used to gain knowledge about the motives, backgrounds and opinions of the respective users compared to a purely quantitative and spatial evaluation (e. g. DUNKEL 2016). Qualitative approaches are considered to be particularly suitable due to the subjectivity of the individual landscape experiences. It can be assumed that explicit knowledge about the perception of the landscape by the public in relation to a concrete space can be obtained. As a result, important characteristics of the landscape can be identified and grouped by subject. Finally, within the studied spaces, landscapes should be identified, which are delimited from one another by a different perception (COUNCIL OF EUROPE 2012). The approach has the potential to make use of user-generated content in plan-

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ning processes possible so that planners gain information about the perception of the landscape at an early stage without extensive participation processes. The amount of existing data from user profiles and the abundance of evaluation possibilities against the usual participatory processes (survey, information event, etc.) form the main advantages of the developed approach.

# 2 Key Terminology

## 2.1 Social Media

Interpersonal communication and opinion forming are subject to change. Social media have an immense impact on communication change. They have gained a large user base in a very short time and it enables the public to network and exchange with each other. MACHILL et al. 2014 attributes to the social media "potentials for a fundamental change in the dissemination of information and opinions as well as the formation of opinions" (MACHILL et al. 2014, 72. Three quarters of all Internet users in Germany were already users of one or more social networks in 2011 which reflects the immense breadth of participants in social media networks (MACHILL et al. 2014). The general exchange among users is one aspect of social media, the use of opinion forming and opinion strengthening another.

Although the use of social media in current landscape planning is new, social media data and its use in the context of landscape planning research are becoming increasingly important. By integrating geographic information, user analysis become possible, which in the past had to be carried out through elaborate surveys. Social media data includes a breadth of information.

Research on the analysis of landscape perception in landscape planning based on social media data still is at an early stage. There is some research on social media (e. g. Dunkel 2016), that describes the methodical and technical framework for the evaluation of data from FlickR. FRIAS-MARTINEZ et al. 2012 did a similar research on how Twitter messages can be used to analyse a utilization of the city and landscapes at e. g. working hours, at leisure or at night. The potential of social media data for planning processes is pursued to be much higher.

## 2.2 Landscape Perception

The starting point for thinking about using this social media data in processes of landscape assessment is the assumption that the perception of landscape by an individual is subjective. This is now considered a scientific consensus (e. g. IPSEN 2006, KÜHNE 2013, STEMMER 2016, BROMME & KIENHUES 2014). In addition, the association of cultural and cross-cultural preferences of landscape characteristics is known (BRUNS et al. 2015).

The construction of a landscape in relation to a space is formed by each individual through the arrangement of his objectives and the influences as a symbolic place. While experts try to describe the perception of landscape on the cognitive level, the perception of individual individuals to the society on the, as already described, emotional-aesthetic level (IPSEN 2006).

The constructivist approaches to landscape show that this step cannot be done by the valuations of individuals. The deviations of reality through emotional-aesthetic impressions weigh too high. In the case of issues of landscape image assessment or the rating of a landscape, it is more important to depict the reality of the affected system. In this case, the population that

operates with the affected landscape as such. Regardless of its value preservation, the planner must understand the perception of the population and integrate it into their own actions.

### 2.3 Participation

From the perspective of experts, public participation is often understood as unidirectional communication. As early as 1978, BURCKHARDT describes planning as a communication tool to convey the relationships between politics, the environment and humans. This communication process creates the engaged listener's understanding and processing of arguments (HEALEY 2003). According to (ARNSTEIN 1969), the ideas and the opinion of the experts are "only" transmitted to the public, but a mutual exchange is missing. Thus, the experts form the opinion of the public, whereas participation processes should actually reflect the opinion and perception of the public.

Direct participation as a subset of participatory processes remains rare in practice, as there is a concern that participation in planning processes by the public overwhelms them and hampers planning. Investments can be very time-consuming, cost-intensive and thus have a deterrent effect on the planner. A demand for the participation of the public is interpreted differently and creates a large discrepancy between civic engagements, hunger for knowledge and actual participation offers in planning processes (BOCK & SELLE 2013).

Social-Media offers the opportunity to avoid overstrain by the public unconsciously taking part in planning processes through the publicly provided data on social networks. Ideally, an opinion should be made available to the public as a basis for planning processes.

## 3 Hypotheses

There are a few hypotheses that should be answered throughout the analysis.

1. New insights into the perception of the public in a given space can be gained and approaches for indirect public participation can be found. The term "public" is understood to mean a "broad public" according to the public types of (ARBTER & TRATTNIGG 2005). The following sub questions have to be answered for this:
   a. How can the photo and text analysis from social networks be divided into positive or negative assessed characteristics?
   b. What requirements must the present data fulfil in order to gain knowledge about the public perception of the landscape in relation to a particular space?
   c. What kind of additional knowledge can be gained?
2. Following on from the first research question, it is important to point out ways in which the analysis can be used methodically for planning practice.
   a. Do the findings gain insight in order to meet the requirements of the European-Landscape-Convention (Council of Europe 2012) and what can be learned about regional beauty, variety and the recreational value of a landscape, which are protected in the German "Act on Nature Conservation and Landscape Management" (Federal Nature Conservation Act − BNatSchG)?
   b. What added value does the analysis offer compared to other landscape planning methods?
   c. Is the approach transferable to other regions?

# 4 Methods and Workflow

## 4.1 Social Media Harvesting

The enormous potential of social media data is based on a huge amount of photographs, geographic information and text elements, such as descriptions and comments that are voluntary generated by social media users every day. Social media harvesting is hardly used in landscape planning practice, unlike other professions. As described, social media contains a huge amount of data. This requires accurate preselection for future analysis. For this elaboration, important data are photographs including metadata, geographical data and text contributions from the social network FlickR. This social network offers the possibility to sort photography by categories or tags and find images on a particular topic. Another advantage is the freely accessible application programming interface (API) to get direct access to the available data.

In order to prepare the data for different analysis, it is necessary to store them in a database. For this purpose, a tool for Geographic-Information-Systems like ArcGIS or QGis is developed. This tool can filter the desired data and stores it in a database automatically. The tool searches within a spatial extent for all available data of the social network FlickR (it is conceivable that this also works for other networks with open accessible API). The spatial extent is variably adjustable in the form of a rectangle so that it can be adapted to different locations and individual needs. In order to concretise the query of data keywords (tags) are used. Each

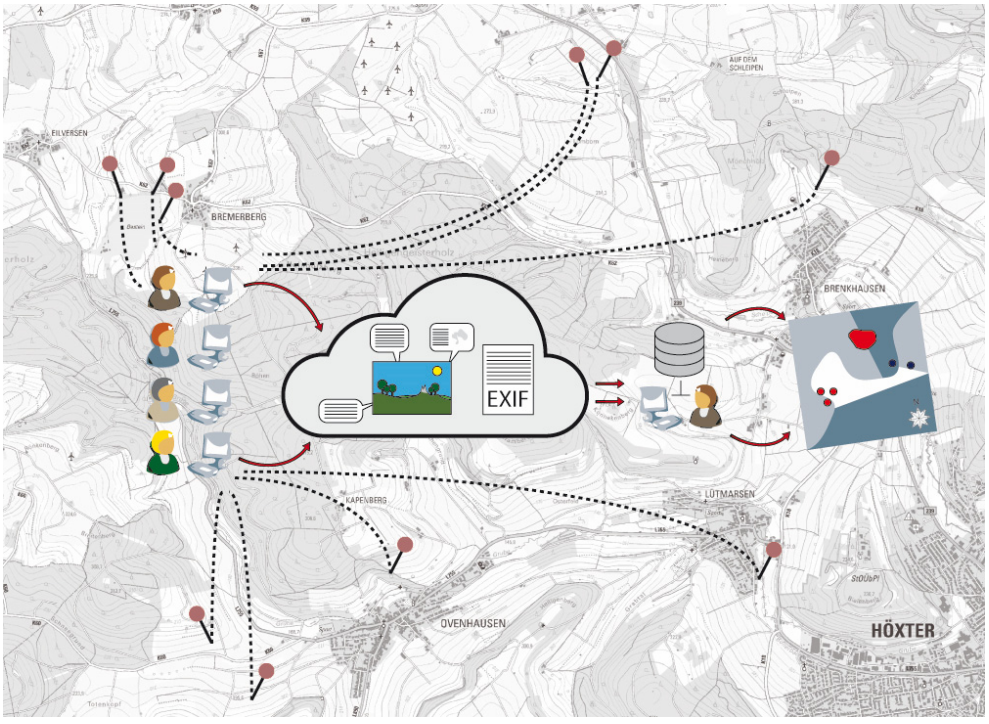


**Fig. 1:** Workflow of social-media-harvesting

image published on FlickR contains keywords such as “nature” or “landscape” to categorise the images. This feature will be used here to get access to particular data. The keywords have a very important function and must therefore be carefully defined and selected.

Within this method we can compromise the amount of data which is available to what is really necessary for this elaboration.

### 4.2 Data Analysis

The analytical methods of the data obtained depend primarily on their quality and scope. Ideally, different aspects can be explored. At a higher level, the analysis can be subdivided into quantitative and qualitative analysis, which matters the most. The quantitative analysis deals above all with the distribution of the photographs within the given space. It is quite meaningful in which period at which place a certain number of photographs were shot. The temporal aspect must not be left out. It can be assumed that different places are frequented at certain seasons. Based on the distribution, statements can be made about point of interest (POIs) and also distinctive locations can be identified.

In addition to the quantitative analysis, the data can also be qualitatively evaluated. For this purpose, the triangulation of especially qualitative methods for evaluating the photographs (visual methods), as well as the textual and geographical data is necessary. Only in this way user-generated data can be used to gain more knowledge about the motives, backgrounds and opinions of the respective users. Qualitative approaches are considered to be particularly suitable due to the subjectivity of the individual perceived described above.

## 5 Expected Results

The analysis of the data can be used to gain insight in order to meet the requirements of the European-Landscape-Convention (COUNCIL OF EUROPE 2012) on how to analyse and protect the characteristic features of a landscape and how to “enhance, restore or create landscapes” in planning processes. We can also learn more about regional beauty, variety and the recreational value of a landscape, which are protected in the German “Act on Nature Conservation and Landscape Management” (Federal Nature Conservation Act − BNatSchG). Particular characteristics might also be exhibited. The added value of insights allows an intersubjective assessment of the landscape.

It can be assumed that the analysis of the data is intended to enable a characterization of the respective landscapes, thereby highlighting the positive and character-forming elements of a landscape that corresponds to the perceptions of the public. In addition, the breadth of the analysis can be used to show regional differences and schemes in the perception of the public as well. It is to be assumed that limitations to the described approach are to be found in the user-generated contents itself.

The quantity of data might vary from region to region as well as the quality of written contributions. In combination, the analysis of photographs and geographic or textual information from social networks provides insight into the perception of the landscape in relation to a given space. The analysis of landscape photographs and text contributions in social media shows that there are region-specific landscape perceptions and thus differentiated evaluations

of landscapes. Characteristics that are perceived as disturbing in some regions might be important to the public as a landscape component in another.

# 6 Conclusion

The analysis and classification of perception of landscapes through social media data has the potential to become a method to integrate public landscape construction and perception in planning practice. The evaluation of the landscape in a given area will then be supported by the use of social media data.

To introduce a method for planning practice further research is needed. Especially it is necessary to identify quality standards for the data sets in order to carry out continuous and comparable analysis in different regions under similar conditions. Also the development of landscape perception over time should be included in further investigation.

At the current state of the ongoing research we can only make assumptions about the quality of the available data, thus it is not yet possible to give detailed information on the qualitative methods to be used. Details on the methodology of the approach will be presented at the Digital Landscape Architecture Conference 2018. First insights into landscape perception in social media over the investigated space are expected in the first half of the year.

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