Towards a method to use social media in describing a dynamic image of a region
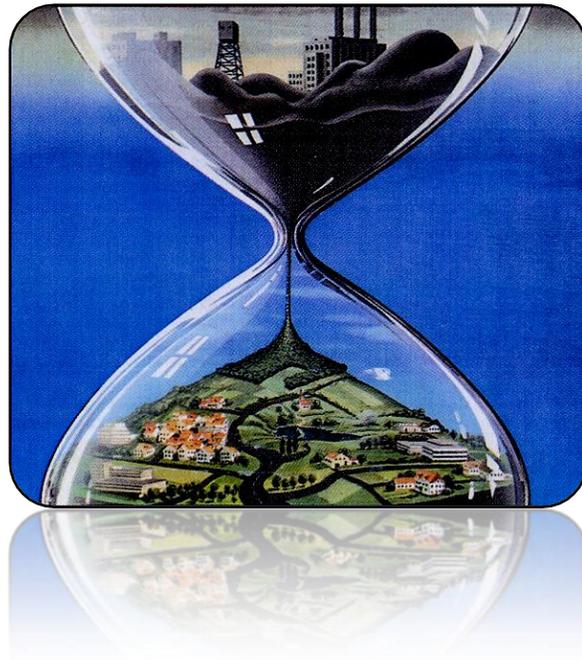

Image: Achim Prossek

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Preface

After completing the Bachelor Human Geography & Planning I decided to start with the Master Cultural Geography, since I have always been interested in the relationship between people and places. During this Master a list with subjects was presented that could be used when writing the master thesis. One of the subjects on that list immediately caught my attention: Mapping the impact of a major event on the image of the region. Usage of ArcGIS, a platform for designing and managing solutions through the application of geographic knowledge, was required. During the Bachelor I already worked with this program, so I knew the huge amount of possibilities that ArcGIS could provide when doing the research. Also the opportunity to learn a new research method which would be using social media appealed to me. This method was not always easy, but with trial and error I learned a lot and for that I want to thank my supervisor Gerd Weitkamp. I would also like to thank Gerd for helping me when I got stuck with my method.

Prior to this study I was not really familiar with the investigated Ruhr area. Before I began to look into this area I had a reasonably negative image of the region. I thought of it as an industrial area with a lot of heavy and polluting industry and many old and ugly gray buildings. However during and after this research my view of the area changed significantly. This was because of all the information I read and saw, but especially visiting the region with my family, which I would like to thank them for, ensured that my image changed. I now see the region as a diverse and dynamic, with many beautiful buildings and sights to see. I am glad that I learned more about this region through this research and from now on I would recommend everyone to visit the region at least ones. I will definitely visit the region a next time.

Abstract

This study shows a method how to get a collective image of a region based on collective behavior on social media. It also shows a way how time can be used to show changes in the image of a region. A region can try to change its image with marketing and planning. Hosting an event for example can be used to modify an image. Yet, although a region can try to create an image, it is the people who are actually giving the region its image. An individual creates an image of a region based on personal factors and acquired knowledge. This image can be shared (un)knowingly on social media in the form of videos, photos and blogs. With the use of social media and associated information like tags and location information, the individuals their images can be aggregated to a collective image. It consists of a collective compilation, a mix, of cognitive and affective elements with a dominant image as a result. The cognitive and affective elements can be covered by image dimensions like location, space, economic-technology, cultural-history, social, political and atmosphere, to create a collective image of the region. The cognitive elements include those attributes by which an individual knows or identifies the region's characteristics. Many people tend to organize their cognitive images in terms of several simple elements: paths, edges, districts, nodes and landmarks. They contribute to the 'imageability' of a region. In this study cognitive landmarks are found by performing a Hot Spot Analysis. The affective elements represent an individual's attitudes to and feelings for the region in question, developed through past experiences related to the region.

Table of contents

List of Figures and Tables

Figures

Tables

Chapter 1: Introduction

Background

Image matters, for individuals, but also for companies, places, regions and even whole countries. However, these days not only the way an individual acts, dresses or his/her body language might decide his/her image, the rise of social networks can also have an impact on the image of a particular person (Aquino and Bhasin, 2011). The last decade has seen a significant rise in social network websites and online applications where, *"like minded users share resources, create, tag and label content and rate it in some way"* (Matthews, 2006), so-called 'web 2.0' applications (O'Reilly, 2005). Web 2.0 is a term first used in 2004 to describe a new way in which software developers and users started to use the Internet as a platform whereby content and applications were no longer created and published by individuals, but instead were constantly modified by all users in a participatory and collaborative way. Web 2.0 is considered as the platform for the evolution of social media (Kaplan and Haenlein, 2010). The online applications vary greatly, ranging from websites where you can add, organize and share: bookmarks (e.g., del.icio.us), academic references (e.g., CiteULike), and photographs (e.g., Flickr). One thing that all of these websites have in common is their emphasis on online collaboration and the sharing of resources among users (Angus et al., 2008). By Kaplan and Haenlein (2010), it is rational to say that social media represents a revolutionary new trend. Internet is no longer solely used to get information from (web 1.0), but it is also used to share information with other Internet users for professional purposes or for pleasure (Angus et al, 2010). People themselves (to a degree) define the content of Internet pages, which have an interactive character. The way a person presents himself or is presented on social media by others can have an impact on his/her image. For an individual this even might affect his/her career, as a study conducted by Harris Interactive showed that 45 percent of supervisors said they used social networks, like LinkedIn, Facebook, and Twitter, to screen job candidates (Grasz, 2009).

As stated before, image does not only affect individuals. The image that a person has of a certain place or region influences his/her judgment towards the location. An image can ensure that people avoid locations or it can invite people to visit it. Due to the web 2.0 'platforms' people can communicate about these locations on social networks in the form of images (photographs and videos) and words (tags). According to Forrester Research, 75% of Internet surfers used social media in the second quarter of 2008 by joining social networks, reading blogs, or giving reviews. The huge quantity of data (photos, videos, tags) now online opens up new possibilities for extracting useful information by analyzing its distribution. However, is it possible to know what objects and views people find interesting? Can we learn something about the world, for example the image of a region, from tags and the photos people take? A person taking a photo must make numerous decisions: where to stand, which direction to point the camera, when to capture the photo, etc. These decisions are affected by the photographer's perception of the scene being photographed. From one single photo, it is difficult to conclude much, though, when looking at a large collection of photos of for example the Golden Gate Bridge, patterns of photo taking behavior can be analyzed.

With this in mind, the main question of this research was formulated:

'How can social media be used to describe a changing image of a region?'

This question immediately raises the problem of the scope of social media. Social media is comprehensive and it is therefore hard to investigate as a whole. Therefore, in answering the main question, this research performs a case study, the Ruhr.2010 case, which only focuses on one kind of social media, photo sharing site Flickr. The Ruhr.2010 case studies if an event can change the image of region, by using social media. The reason an event was chosen is that some places or regions host events, such as the Olympic Games and FIFA World Cup, in trying to modify an image. One study showed that the image of Germany had improved because of the World Cup. *"The image abroad of Germany as hard and cold, not a nation much associated with warmth, hospitality, beauty, culture or fun was improved through the World Cup" (*Maenning, 2007, p. 15).

The examined region in this study is the Ruhr area, as it was selected to be European Capital of Culture (EEC) in 2010. Can information acquired from Flickr reveal a collective image of the region and if it is achievable, is there change noticeable in the image of the Ruhr area because of Ruhr.2010?

To carry out the case study the concepts of image, events and social media have to be clear. Therefore some concepts first have to be explained in the theoretical background:

- *What is an image; how it is created; which factors influence it; and why is image important for a city or region?*
- *What are events and which role can they play regarding image change.*
- *How can social media be utilized for research on image change.*

Chapter 2 is the theoretical background and shows related work concerning image and events. The next chapter, chapter 3, focuses on social media, while it is the important factor in this study. The next chapter, chapter 4, shows the methodology that was applied in this research. The associated results are discussed and analyzed in Chapter 5. Chapter 6 consists of the conclusion and discussion of the research along with recommendations for additional research. The research ends with the references and appendices.

Chapter 2. Theoretical background

2.1 Introduction

In trying to answer the question of the case study, but also the main question of the whole research, first of all some theoretical concepts have to be explained more closely. Section 2.2 focuses on what an image is; how it is created; which factors influence it; and why image is important for a city or region. Section 2.3 explains what an event is and which kind of impacts it can have on a city or region. Also the concept of hall mark events is explained. The chapter closes with a summary, section 2.4, in which the chapter is explained briefly.

2.2 Image

What is an image? How is an image created and recreated? Why is the image people have of a certain place important?

The term image is used to define many things or phenomena (Gunther, 1959; Sirgy, 1985; Dowling, 1986; Van Riel, 1997; Jenkins, 1999). Mazanec and Schweiger (1981) for example describe image as a *"widely employed...vaguely defined"* construct. However, several complementary definitions have been used to structure image research. The term image in general refers to a set of beliefs and impressions based on information processing from a variety of resources over time, with an internally accepted mental construct as the result (Assael, 1984; Gartner, 1993).
According to Knox & Marston (2007) an image is formed by filtering. People simplify and distort real world environments. People not only filter information from their environments through their nervous system, but also fall back on personality and culture to produce cognitive images, pictures or representations of the world that can be called to mind through imagination (Knox & Marston, 2007). Cognitive images are what people visualize when they think of a particular place or setting. Distortions in people's cognitive images are the result of incomplete information and a person's own biases. Once people get beyond their immediate living area, they know few places in absolute detail. Yet the world is getting increasingly large in geographic scope, with the result that these worlds must be conceived, or understood, without many direct stimuli (Knox & Marston, 2007). What a person remembers about a place; what he/she likes or dislikes; what he/she thinks is important; and what they ascribe to various aspects of our environments all are functions of their personalities, experiences, and the cultural influences to which they have been exposed. The individual has to make 'choices' in what to take in and leave out, with filtering of the 'real world' as a result. In the case of a city, what is left in the end is a person's individual image of the city. (Ashworth & Voogd, 1990; Holloway & Hubbard, 2001; Avraham, 2004; Luque-Martínez et al., 2007; Knox & Marston, 2007). Figure 2.1 shows this process.

Figure 2.1 Formation of a cognitive image
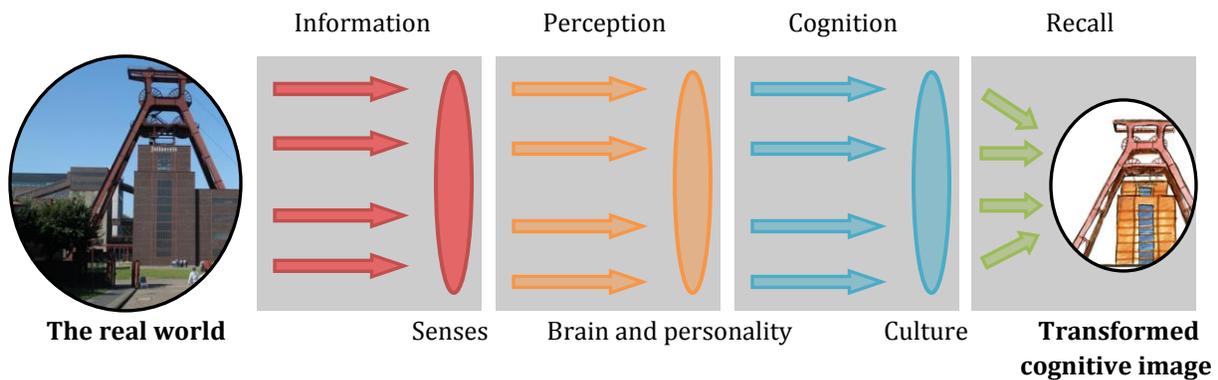
Source: after Knox & Marston, 2007, p. 219.

Shakespeare ones wrote: *"The people are the city" (*LeGates & Stout, 2009, p. 81), they give meaning to the city by 'constructing images in their mind' (Ashworth, 2011, p. 53). Both tourist and residents are involved in this process. Many people tend to organize their cognitive images of particular parts of the world in terms of several simple elements: paths, edges, districts, nodes and landmarks (Knox & Marston, 2007). They contribute to the 'imageability' of a city, defined by Lynch (1960) as: *"that quality in a (physical) object which gives it a high probability of evoking a strong image in any given observer".* According to Hospers (2009), if a city clearly lacks the five elements, it is hard for people to give it meaning, let alone form an image.

In the prior section there was established that an image is both highly individual and versatile, with the result that a city can evoke different associations among persons. Individuals form their own personal images of the city, relating different dimensions that operate in different ways and which are interrelated and nonstatic (Luque-Martínez et al., 2007). Chen & Tsai (2007) define place image as an individual's mental representation of knowledge, beliefs, feelings and overall perception of a particular place. According to Crompton (1979) and Jenkins (1999, p. 2) the definition of place image, is: *"the sum of beliefs, ideas and impressions that a person has of a destination".* Another definition by Jenkins (1999, p. 1) takes in mind the possible existence of images shared by a group of individuals and refers to image as *"the expression of all objective knowledge, impressions, prejudice, imaginations, and emotional thoughts an individual or group might have of a particular place".* So, the aggregation of individual images can give an insight into collective image and its dimensions. It can therefore be concluded that besides an individual image, groups can also share certain images of a place. However, these images are often based upon a certain level of stereotyping (Jenkins, 1999). Luque-Martínez et al. (2007) also covered collective image. According to them the image of a city is established on an individual level, though, a group of people may more or less have the same picture of a city which refers to the image of the city. An example of this is that before visiting a place, many tourists create a 'must-see list'. At the destination they try to find confirmation by accumulating the in advance selected information (Hospers, 2009; Moir, 2010; Urry, 2002). While each tourist makes his/her own 'must-see list', in the end in tourists time after time photograph the same touristic attractions (Crandall et al., 2009).

2.2.1 The ever changing city

A city consists of a mixed group of persons whose composition is constantly changing. Because of that a city is 'multi-sold'. A city is not just 'sold' to one person, but to an entire group of persons (Ashworth, 2011; Ashworth & Voogd, 1990). A city is also 'multi-used' in different ways by people, for example to work, live or for recreation and while doing this people can 'consume' a city for a couple of days, longer periods and even their entire lifetime. (Ashworth & Voogd, 1990).

The concept of city image is multi-dimensional, it is not limited solely to one urban aspect, but also includes other dimensions. (Luque-Martinéz et al., 2007) Dimensions like, space, economic-technologic, cultural-historical, social and political. The atmosphere, perceived by the 'user' of a city, also affects the city its image. (Avraham, 2000; Beerli & Martin, 2004; Hospers, 2009; Luque-Martinéz et al., 2007). According to Luque-Martinez et al. (2007) people first come up with tangible and visual aspects (e.g. buildings, infrastructure) when asked about their image of the city. Though the same research showed that the image of a city also depends on intangible aspects (e.g. education, recreational activities and the resident's attitude). Summarized the aspects of the named dimensions are:

- **Spatial aspects:** buildings, architecture, squares, (public and private) transport and infrastructure, parking, parks, (public) green, flora and fauna, noise(pollution), air quality, climate and weather, beach, lakes, mountains.
- **Economic and technological aspects:** health centers, supermarkets, municipal facilities, tourist information centers, café/bar and restaurants, hotels, theater, theme parks, zoo, casinos, sport(activities), schools/universities, homes, offices, shops, prices, employment, risk, innovation, modern/old fashioned, education level, telecommunications.
- **Cultural-historical aspects:** folklore, events and festivals, monuments/heritage, museums and exhibitions, local products, religion, well-known persons.
- **Social aspects:** encounters with citizens (polite, friendly, (in)active), issues (discrimination, unemployment, drug addiction, poverty, language barriers).
- **Political aspects:** stability, tensions and safety.
- **Atmosphere:** (un)attractive, fun, pride, (dis)satisfied, boring, stressful, stylish, modern/historical, international view, exotic, mystical, relaxed.

Knowledge about these aspects, acquired through direct or indirect information, is selected on sensory abilities, needs, interests, expectations and cultural background. In the end people substantially select the same (cognitive and affective) elements, resulting in a collective (dominant) image existing of fragmented knowledge, prejudices, clichés and stereotypes. (Ashworth & Voogd, 1990; Hospers, 2009).

The composition, usage and consummation of a city are constantly changing and therefore might have an effect on the city its image dimensions. One of the dimensions which might influence the overall image is an event, as it changes the usage and consumption and possibly the composition of a city.

2.3 Events

Research on image effects due to events has a long history and much literature on the topic has been published. Hiller (1989, 1998); Ritchie and Smith (1991) were among the first to place importance on the image effects of major events. Given the general complexity of trying to measure image effects, previous studies of cultural event impact tended to concentrate on economic or visitor impacts (Richard and Wilson, 2004). Though recently, more image related impact studies of cultural events have begun to emerge. Events have become a valuable form of cultural currency, mainly in terms of their image effects (Law, 1993; Schuster, 2001). As Hall (1992, p. 14) notes: *"it is apparent that major events can have the effect of a shaping an image of the host community or country, leading to its favorable perception as a potential travel destination".* This prospective has been a reason for events being used as an image enhancement tool, see figure 2.2 in section 2.3.3, particularly for large cities (Law, 1993; Getz, 2008; Richard and Wilson, 2004).

2.3.1 Marketing

Branding of places has increased strongly in importance in the post-modern society (Ashworth & Voogd, 1990). Increasing competition between cities in a packed field of images is one of the major factors stimulating cities to take on branding strategies (Richards and Wilson, 2004). The existing image plays an important role if a city or region wants to keep/attract people. (Negative) associations with a city can inflict long term damage for a city, while an image is persistent (Ashworth & Voogd, 1990). However, an image can change (Pellenbarg & Meester, 2009). Therefore the city should 'read' its image, so it can respond to it by trying to strengthen, consolidate or modify this image (van den Berg and Braun, 1999). With this in mind most cities turn to city marketing. "*City marketing is the long-term procedure and/or the policy consisting of several interrelated activities aimed at attracting and retaining specific audiences for a certain city*" *(*Hospers, 2009, p. 115). City marketing is used by cities to modify their image and also to increase their exposure. (Pellenbarg & Meester, 2009) According to Avraham (2004, p. 472): "*All urban marketing attempts to improve cities images and public perceptions*".

Publicity gives people the opportunity to create an image of a city which causes reactions (Hospers, 2010b; Nasar, 1998). These reactions increase the 'imageability' of a city (Lynch, 1960). Conceptualizations of a city therefore have a central role in the 'marketing' of a city. (Kavaratzis & Ashworth, 2007). One way of increasing the 'imageability' of a city is the holding of an event. Events are defined as one-time or occasionally occurring events of limited duration that provide participants with leisure and social opportunities beyond everyday experience (Getz, 2005; Pasanen et al., 2009). They often generate significant media interest and are seen in many regions as very important elements of tourism products and a way of creating and promoting tourism (Pasanen et al., 2009). Events may also encourage people to visit a place several times. As a result cities, regions and countries compete intensely for the honor of hosting events such as the Olympic Games and the FIFA World Cup (Hall, 1992; Richard and Wilson, 2004).

2.3.2 Impacts resulting from events

Through the years much of the literature on events focused on positive economic benefits, such as the increased revenues and employment created by the event. Ritchie (1984) believes these impacts to be very relevant and important, however also mentions that an assessment of the value of a particular event must also include estimates of the negative impacts, such as increasing commodity prices. Several authors (e.g. Getz, 2008; Moscardo, 2007) also suggest that more research is needed on the social, physical, psychological, environmental and tourism impacts of events and their interrelationships (Dickinson & Shipway, 2007). Positive elements of physical impacts for example relate to newly constructed facilities, as well as the improvement of local environment. The negative side looks at possible environmental damage due to development of certain events. Another negative element can be uncontrolled overcrowding of facilities that can occur during events (Ritchie, 1984).

Tourism and commercial impacts are seen as important outcomes resulting from events, and are generally positive in nature (Ritchie, 1984). However, most events rely primarily on local and regional audiences, meaning that events are important not only to tourism, but also for local residents (e.g. Getz, 2008). Moscardo (2007) has argued that even if an event attracts large numbers of tourists and generates revenue, but does not generates the involvement of the community, it is doubtful to have much of an effect on regional development. This means that without the local involvement the event remains 'disconnected' to the local environment (Pasanen et al., 2009).

A variety of positive benefits and negative impacts might occur as a result of an event taking place. These impacts and benefits may be apparent prior to the event, throughout the event or after the event. They may be felt in different ways by a several stakeholders, including participants, local businesses, tourists and residents, and possibly result in an imbalanced distribution of impacts and benefits among them (Dickinson and Shipway, 2007).

2.3.3 Hallmark events

Much of the appeal of events is that they are unique, you have to 'be there' to enjoy the unique experience fully (Getz, 2008). Therefore it is not easy to draw generalizing conclusions on events, while they can vary in length, size and volume. However, even though no single typology of events can be given, Getz (2005) identifies different types of events, see figure 2.2.

Figure 2.2 Events and their market potential
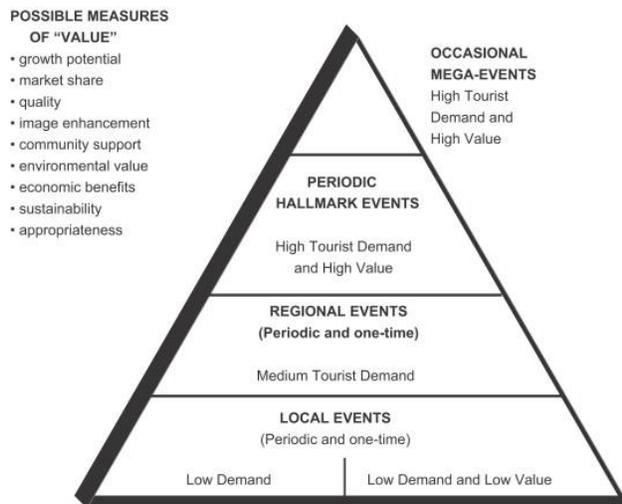
Source: Getz, 2005.

The figure shows that image enhancement is one possibility to measure the value of an event. It shows that the bigger an event is, the greater the opportunity it has to modify an image. Hallmark events for that reason can be a good approach to change a city or region its image. As Ritchie stated in 1984: *"hallmark events are events of limited duration developed primarily to enhance the awareness appeal and profitability of a tourist destination".* The interesting feature about hallmark events is that they are used to put contemporary urban tourism on display and therefore are often seen as *"image builders of modern tourism"* (Hall, 1992 cited by Shaw and Williams, 2002). They have become an essential part of place marketing (Deffner and Labrianidis, 2005). Hallmark events not only serve to improve city images, but also to increase the national and international awareness of the city and host community (Deffner and Labrianidis, 2005).

2.3.4 Tourists and residents as the image (re)creators

Literature on destination image in general and on touristic destination image in specific acknowledges that images often do not correspond with reality and are created, recreated and translated by both the individual and the institutions managing a place (Ashworth & Voogd, 1990). A central conclusion according to Ashworth & Voogd (1990) is that both users and non-users have a certain image of a place, but that the image of non-users (the people who have not seen the place with their own eyes) is less detailed and stronger based upon stereotypes. Based on this outcome, Ashworth & Voogd (1990) comment that when cities try to promote their image, most of the times it does not create a new image, but accommodates, modifies or exploits the existing image. This existing image originates from a wide variety of information sources over which marketing has little or no control. According to Ashworth & Voogd (1990) a place image is difficult to adapt, while many different forces are shaping it simultaneously. Image is created and recreated by both governments and policy makers. However, an important group of (re)creators of an image are tourists and residents themselves (Johannesson, 2005). They 'consume' the city or region like a product and after that share their experiences with others. A clear example of tourists as (re)creators of an image is the sending of postcards or sharing of photos of certain destinations or hallmark buildings (Urry, 1990). According to Lash & Urry (1994, p 15) *"the consumer takes on the role of agent of branding."* An additional category of (re)creators of destination image are the group of intermediaries like tour operators and travel agencies (Dietvorst & Ashworth, 1995).

Even though most of the research on destination image is done from a touristic point a view, residents of these destinations should not be ignored. According to Avraham (2004) residents of unfavorably perceived cities often experience a lack of pride in their city and suffer from a low self-image. This can lead to apathy towards the city and to an unwillingness to take part in activities and to volunteer to make things better. The fundamental assumption is that a positive self-image turns the city its residents into agents who talk positive about their city while conversing with residents of other cities (Tilson and Stacks, 1997). Paddison (1993) showed how the city of Glasgow, using city marketing strategies, managed to improve its image among the local residents. According to Richards and Wilson (2004) cultural events in particular have emerged as a means of improving the image of cities, bringing life to city streets and providing citizens renewed pride in their home city. Hall (1992) calls this enhancement of community pride following an event the 'halo effect' (Hall, 1992).

2.4 Summary

In this chapter the concept image is explained, but even in contemporary literature there still is not a concluding model regarding to the image of a city. For this reason it cannot be excluded that some aspects on the subject of image are overseen. It still is a complex and partially intangible phenomena. City image is a mixture of cognitive and affective elements. It is formed by the conscious or subconscious processing of a great amount of information, including personal experiences as a resident, visitor or employer, memories, representations from others in the form of brochures, movies, media coverage and the physical landscape (Ashworth, 2011). Furthermore, although city image exists on an individual level, it often contain elements that are shared by a group. These public images are collective mental representations shared by a great number of a city's participants.

Hallmark events are often organized in order to promote the image of a country, region or city to attract visitors. Therefore effort is done by policymakers, city marketers and tourist organizers to create a positive image of the chosen location. However, literature indicates that it is the people who give the city its image. They are important (re)creators of the city its image and once they give a city a negative image it is hard to change it, nevertheless, it is still possible.

Chapter 3. Social Media

3.1 Introduction

Social media is best understood as a group of online media, which share the majority or all of the next characteristics: community, participation, connectedness, openness, conversation (Mayfield, 2008). The introduction already explained some things about social media. It is a relatively new theme which increased significant the last decade. The emphasis is on online collaboration and the sharing of resources, for professional purposes or for pleasure, with other Internet users (Angus et al., 2008; 2010). According to Mayfield (2008) there are basically seven kinds of social media: Social networks, Blogs, Wikis, Podcasts, Forums, Content communities and Microblogging. One kind of social media, the content community, is a community which organizes and shares particular types of content. The most used content communities tend to form around photos (Flickr, Instagram), bookmarked links (del.icio.us) and videos (YouTube). Stuart Hall (1997) once wrote that it is necessary for people to share their (positive and/or negative) thoughts, feelings and ideas with others. This thought is reflected in content communities, while their main purpose is the sharing of media content between users (Kaplan and Haenlein, 2010).

3.2 Content community Flickr

Content community Flickr defines itself as an *"online photo management and sharing application"* (Flickr, 2012). It lets users upload their photos so that they can be stored online (Marlow et al., 2006). Flickr users can assign a privacy level to their photos depending on who they want to view them, friends and family only, or to the entire user community of the system. The users who make their images publicly available to the entire user community of the system most likely would like their images to be found and viewed by others and are not merely using the application as a place to store and organize images for their own benefit. (Angus et al., 2008) Users may also choose to be part of a group. Groups in Flickr are self-organized and clearly specific, most groups are related to special topics, such as portrait, animal, architecture, etc. (Zheng et al., 2010) In groups, *"like-minded users gather, discuss things, and share pictures"* (Wilkinson, 2007). Negoescu and Gatica-Perez pointed out (2008) that more than half of Flickr users participates in at least one group with their snapshot, which shows that a large number of users engages in group activities. These groups can either be public, on invitation only, or completely private (Bausch & Bumgardner, 2006; Angus et al., 2008) The design of Flickr, making most photos publicly viewable and easily discoverable by default, along with the emphasis on tagging, which is discussed later on, has allowed the site to expand quite rapidly over its short lifespan. Flickr currently provides access to billions of photographs (Kaplan and Haenlein, 2010; Zheng et al., 2010). One of the most important reasons for the rapid growth of Flickr is that digital images are becoming increasingly ordinary due to recent developments in photographic technology. Photography, a hobby that was originally only for *"the clever, the wealthy, and the obsessed"* (Sontag, 1979, p. 7), is now commonplace. People of all ages and backgrounds are now easily able to take photos on digital cameras and with mobile phones and upload the captured images onto computers, or directly onto web 2.0 image sites (Angus et al.,

2010). The growth of Flickr has also in part been due to the wide array of social interactions it supports, for example uploading photos, creating networks of friends, joining groups, sending messages to other, tag photos. This large quantity of communication tools and forms of social organization creates a highly interconnected media ecology that can lead users to far-away people and places in only a few clicks (Marlow et al., 2006).

3.3 The problem of information overload

Researchers discovered that with large-scale collections of web pages (Kumar et al., 1999), studying the connective structure of a corpus at a global level exposes an interesting image of what the world is paying attention to. This can be also done with photo collections from photo sharing sites like Flickr. According to Huttenlocher et al.: *"Photo sharing sites reveal information about collective perception of the world".* Crandall et al. (2009) concluded that with global photo collections, researchers can find out, through looking at collective behavior, what people believe to be the most significant landmarks and which cities are most photographed. The results provide insight into different kinds of human activity, in this case those based on images (Crandall et al., 2009). However, the explosive growth in photos and in the number of groups makes it increasingly difficult and time consuming for Flickr users, but also researchers, to find photos or groups that they are interested in. This problem is called information overload (Bawden and Robinson, 2009). As a result, it is important to make use of existing information to discover user's preferences. Recommendation systems attempt to help people deal with the information overload problem by filtering huge amounts of information according to users their taste (Resnick and Varian, 1997). One of the most successful recommendation technologies is collaborative filtering. Collaborative filtering offers a practicable way of using similar users behaviors to generate recommendations (Zheng et al., 2010). The prospects of 'making sense' of photo collections are largely dependent on metadata and information that is manually or automatically assigned to the photos by the users (Kennedy et al., 2007).

3.4 Data about data

Metadata is 'data about data'. It is often highly structured information, about books, articles, photographs, or other items that are designed to support precise functions. These functions are generally to facilitate some organization and access of information (Mathes, 2004).
Document repositories or digital libraries for example often allow documents in their collections to be organized by assigned keywords. Traditionally such categorizing or indexing is either performed by an authority, for example a librarian, or else derived from the material provided by the authors of the documents (Rowley, 1995).
The expression folksonomy, a blend of the words 'folk' and 'taxonomy', was created by Thomas Vander Wal (Smith, 2004) to describe the growing practice of tagging whereby, people freely use their own words in order to add explicit meaning to the information or object they are 'consuming' (Anderson, 2007). Collaborative tagging is most helpful when there is nobody in the 'librarian' role or there is simply too much content for a single authority to classify (Golder & Huberman, 2005). Vander Wal (2005) describes this as 'bottom-up social classification'. Quintarelli (2005) adds to this by describing it as a 'grassroots' approach to classification where people are moving away from

hierarchical authoritative formats. When using Flickr the user can explain uploaded photos with the use of additional information, like for example tags (Angus et al., 2010). In this context, tags tend to be keywords describing either the content or the context of the photo in order to assist with the organization and following retrieval of the photo by both the image uploader and other users of the system (Angus et al., 2010).

3.5 Research on tagging

Previous work (e.g. Kim et al., 2010; Shepitsen et al., 2008) on tags proved that tags are good indications of users their preferences. Marlow et al. (2006) found that while most users use very few distinct tags, a small group uses extremely large sets of tags. As (Biddulph, 2004) has observed, some tags are used by many people and are generally meaningful, while other tags are used by fewer people and often carry personal or specialized meaning to them. According to Golder & Huberman (2005) tagging is fundamentally about sensemaking. Sensemaking is a process in which information is categorized and labeled and through which meaning emerges (Weick et al., 2005). When someone interacts with the outside world, he/she makes sense of the things he/she encounters by categorizing them and ascribing meaning to them. Though, categories are often not well defined and their boundaries are unclear. Items often lie between categories or equally well in multiple categories. The lines someone ultimately draws reflect his/her own experiences, daily practices, needs and concerns and social factors (Weick et al., 2005). Because many experiences are shared with others and may be nearly universal within a culture or community, similar ways of organizing and sensemaking do result. Golder & Huberman (2005) give two reasons why the same tags might occur again and again. These being imitation and shared knowledge. Flickr users may imitate the tag selection of other users if for example a user does not know how to categorize a particular photo. A user may use the suggested popular tags as a way of looking to others to see what the 'right' thing to do is. In this case, choosing tags used by others may seem like a 'safe' choice, or one that does not require time or effort. Still, imitation does not explain everything. Shared knowledge among taggers may also account for their making the same choices. Recall the social aspect of sensemaking. It is likely that users of Flickr, or other tagging systems, share some features like, language, culture, education and so forth (Golder & Huberman, 2005).

3.5.1 Tagging: personal or social incentives?

Golder & Huberman (2005) suggest that a significant amount of tagging, if not all, is done for personal benefit. These conclusions are based on the frequency distribution of tag usage, they believe that the tags that are used most frequently by users are the tags which are generally most 'useful'. Similarly, Hammond et al. (2005) define user motivations as 'selfish' and 'altruistic'. They argue that the nature of a web application is responsible for driving a particular tagging practice for its users. They claim that because Flickr users are likely to be managing personal collections of their own photos, they are far more likely to adopt a 'selfish' tagging discipline (Angus et al., 2008). In contrast, other research suggests that users on Flickr are primarily motivated by social incentives to tag, including the opportunity to share and view the images of other users (Marlow et al., 2006; Ames & Naaman, 2007; Angus et al., 2008). Ames & Naaman (2007) found that people were above all motivated to tag for the general community, with self-organization and social communication

tied for second (Angus et al., 2010). However, according to Angus et al. (2008) it must also be noted that while organizational and selfish tags are only of actual value to individuals/groups, social and altruistic tags can be of value to both to individuals/groups and to the wider Flickr community. Therefore, while it can be presumed that users of Flickr are primarily motivated by social factors when tagging images, it could in fact be that they are tagging only for personal benefit when at the same time using tags which are social/altruistic in nature.

3.6 Location information

Another and relatively newer used type of metadata which can be associated with photos and which has shown to be beneficial in browsing and organizing photo collections (Naaman et al., 2004; Pigeau and Gelgon, 2004; Toyama et al., 2003) is location information. Location information can prove valuable in understanding photos their content. Photos are geo-referenced ('geo-tagged'): linked with metadata describing the geographic location, latitude-longitude, in which the photos were taken. Location metadata becomes increasingly available, primarily through location aware camera-phones and digital cameras and from user input (Toyama et al., 2003). For instance, Flickr has a huge amount of photos with location metadata available. This number will most likely continue to increase in the future as a result of ongoing development in technology.

3.7 Combining metadata

Recently a lot of studies started to combine both tags and location information to observe photo collections (Ahern et al., 2007; Cao et al., 2010; Rattenbury et al., 2007). For example Kennedy et al. (2007) use tags and location information to show how community-contributed collections of photographs can be mined to successfully extract practical knowledge about the world. According to them geographical labels and tagging patterns can lead to summaries of important locations and events.
Crandall et al. (2009) use the spatial distribution of where people take photos to define a relational structure between the photos that are taken at popular places. The key observations underlying their approach is that photos taken very near one another are likely to be of similar things. Moreover, according to Li et al. (2009), if many people have taken photos at a given location, there is a high likelihood that they are photographing some common area of interest, or what they call a landmark. The next step Crandall et al. (2009) take consists of selecting a representative image of the photographed landmark. To choose a representative image they used the information revealed by the collective behavior of Flickr users. In the end they were able to create representative images of the top landmark in each of the top 20 North American and European cities.

3.8 Summary

Organizing electronic content is not new, although a collaborative form of this process, called tagging, is enormously growing on the web. Tags are considered as metadata and can help in explaining for example the content of photos. Marking photos with these tags is a common way of organizing these photos for navigation, filtering or search later on. Location information is another type of metadata which is increasingly used. The combination of both types of metadata seems to be beneficial, and therefore is more and more used, for researchers who are searching for specific image content.

There is a huge amount of metadata from different individuals from over the whole world available these days on the Internet. Commonly it can offer a collective and representative image of the world.

3.9 Conceptual model

Figure 3.1 is based on the concepts explained in the theoretical background and this chapter and addresses the main question: *'How can social media be used to describe a changing image of a region?'*

Figure 3.1 Conceptual model
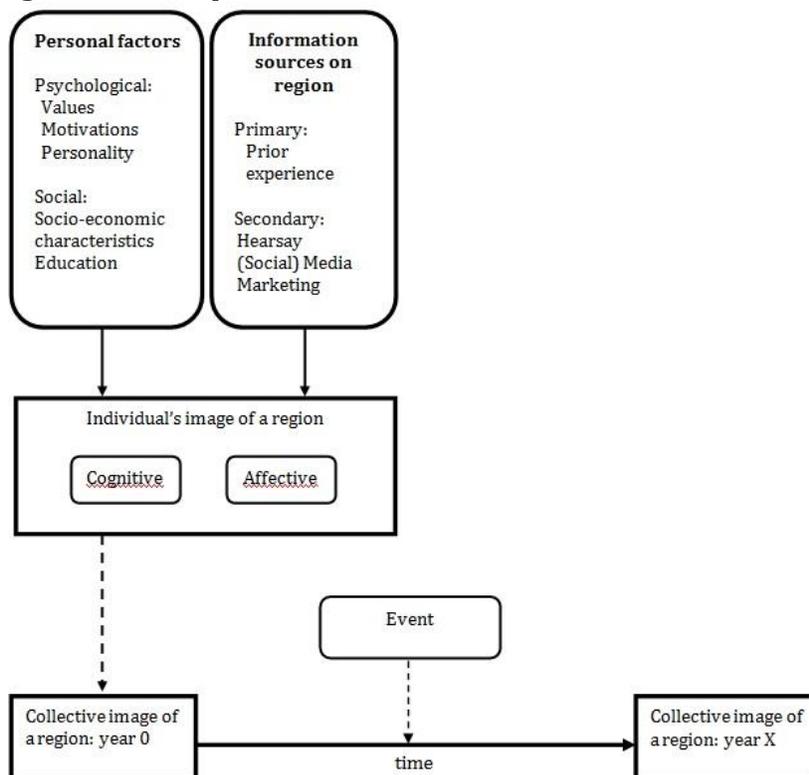
The residents and tourist as image (re)creators is the group that this research focuses on. Every individual resident or tourist forms an image of a region based on personal factors and information sources. This created regional image is a mixture of cognitive and affective elements. The cognitive elements include those attributes by which an individual knows or identifies the region's

characteristics. The cognitive element that this study in particular focuses on is landmarks, while many people tend to organize their cognitive images of particular parts of their world in terms of landmarks (Knox & Marston, 2007). They contribute to the 'imageability' of a region (Lynch, 1960). The affective elements represent an individual's attitude and feelings for the region in question. The cognitive and affective elements cover the image dimensions, space, economic-technologic, cultural-historical, social and political and atmosphere, mentioned in section 2.2.1

The collective image of a region is created by aggregating the individuals their images. After this the collective image of a region in year 0 (the year one decides to take as starting point) is compared with the collective image of a region in year x (the chosen ending point). The case study focuses on image change due to an event and therefore events are linked to the timeline. Is there a change of image noticeable because of the event?

Chapter 4. Methodology

4.1 Introduction

The European Capital of Culture (ECC) event, the event focused on is this research, is an occasional hallmark event and can thus be placed high in the pyramid (figure 2.2) created by Getz (2005). The event was chosen, as the size of the area, in this case the Ruhr area, made it realistic to expect a large amount of data available. Also the goal of the event, Ruhr.2010, was the change the region its image and therefore it is ideal to investigate. With data subtracted from Flickr this case study tried to found out if the image of the Ruhr area changed and in particular since the event took place. So, does Flickr show a change in the image of the Ruhr area because of Ruhr.2010? The methodology is carried out in five main parts: background of the case study; data collection and selection; analysis and classification of tags, hot spot analysis to find significant 'landmarks' and finally looking for representative images.

4.2 Background of the case study: The Ruhr.2010 case

At this moment the ECC event is the largest and most important cultural initiative by the EU (Deffner and Labrianidis, 2005). In 1985, the event was initialized at an intergovernmental level by the Council of Ministers. According to Mélina Mercouri, at the time Greek Minininster of Culture, culture was not of less significance than technology, commerce and the economy. It was her idea to launch a 'European City of Culture' to bring European citizens closer together. The variety and the common cultural characteristics among Europe should be paid more attention to, as European cities present a rich asset of ancient and contemporary culture. This new program was not only stimulating urban development of Europe, but was also contributing to the European ideal (Palmer, 2004, Luxembourg 2007). The primary objectives, developed by the European Commission for the ECC program, state that *"the richness and diversity of European cultures and the features they share"* should be pointed out, *"greater mutual acquaintance between European citizens"* needed to be supported and *"a feeling of European citizenship"* further encouraged (European Commission, 2009). Or, as Richards and Wilson (2004, p. 1936) put it: *"make culture of the cities accessible to a European audience [...] and create a picture of European culture as a whole".* The title European Capital of Culture implies that the program takes place in just one city. Though, since 2007 the EU also suggested to spread the event on a regional level. An example of this is the event hosted in 'Luxembourg and Greater Region' were the event took place in five regions across Luxembourg, Belgium, France and Germany (OECD, 2009).

Germany was chosen to host the European Capital of Culture event for the third time in 2010. The first time being in 1988 in Berlin and the second time in Weimar in the year 1999 (European Commission, 2009). This time, the Ruhr area, a region in Germany was selected to host the event in 2010. With over 5 million people living in the region it is Germany its biggest agglomeration (RVR, 2009), see figure 4.1.

Figure 4.1 The location of the Ruhr area in Germany (left) and an overview of the Ruhr area (right)
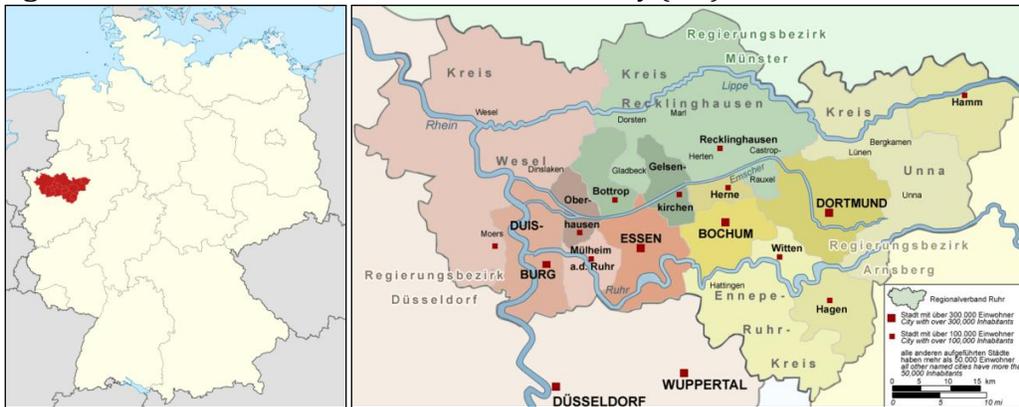
Source: Wikipedia, 2012

The regional identity in the Ruhr area developed slowly and was based on size. The population developed some community pride from their contribution to the fast developing, most modern, and largest industrial region of the world (Ditt and Tenfelde, 2007). However, the rest of Germany thought of the area as black, polluting and over industrialized. This negative image stuck to the Ruhr area in the outside world and even amplified after the industrial decline and the virtual disappearance of the coal industry from the 1960s (Terlouw, 2010).

According to planners of the ECC event the region its image of smoking chimneys, declining steel industry, harsh working conditions and a poisoned landscape was out of date and damaging the Ruhr its image and therefore needed to be changed. The ECC event was seen as a good opportunity in trying to modify the area its image. The overall vision of the event, called Ruhr.2010, was to convert the big and diverse region, consisting of 53 smaller and larger cities, into one big metropolis. Issues that went along with the effort in uniting a region into a city are ones of the regions diversity, authenticity and rich cultural assets. Further aims were to 'illuminate' and to promote oneself on an international level (Ruhr GmbH, 2009). Five cities, Duisburg, Oberhausen, Essen, Bochum and Dortmund, were chosen to act visitor centers from where visitors could start their cultural experience. (Ruhr GmbH, 2009).

The landmark chosen to exemplify the transformation of the Ruhr area was the heritage site Zeche Zollverein built in 1920. Its functionalist architecture made it a futuristic icon of modern industry in the 1920s. Over the years it developed into a futuristic place with modernist architecture. *"By housing both a museum of the industrial past and a cultural and design centre for the future, the Zeche Zollverein combines and embodies the charisma of a glorious past with the charisma of a magnificent future"* (Terlouw, 2010, p. 343).

4.3 Method of data collection

The Ruhr area can try to modify its image by organizing Ruhr.2010, however according to this research it is the users of the region who (re)create its image on social media. There is a growing body of work which makes use of Flickr geo-tagged photos (e.g. Clements et al., 2010; Crandall et al., 2009). Lee et al. (2011) for example choose to avoid the overhead and small scale of manual surveys and instead collect a massive dataset of travel itineraries on a global scale by collecting the metadata

of 95 million Flickr photos. The data for this research consists of metadata associated with 91 thousand photographs posted on the photo sharing website Flickr, for which precise geographic coordinates (geo-tags) were known. These photos are geo-tagged, automatically by cameras (such as GPS enabled smartphones), or manually using the Flickr interface.

The social media platform used in this research, Flickr, was chosen for a couple of reasons. First, launched in 2004, it is one of the oldest and most established of the web 2.0 sites (Levy & Stone, 2006). Second, as of August 2011, Flickr held more than six billion images and is expected to increase by one billion each year (L.A. Times, 2011). Of these billions of photos a rising amount are geo-tagged, making it an extremely rich source from which data can be taken. Third, Flickr has its own Application Programming Interface (API) which easily allows for the extraction of image data on a large scale (Angus et al., 2010) Utilizing Flickr's API, a program was written which retrieved metadata about the Ruhr area during the following years: 2008 until 2012. For this research the 'participants' were all individuals (resident or tourist) who made a picture in the Ruhr area between 2008 and 2012 and shared this on Flickr. With the use of a bounding box in this program, a comma-delimited list of four values defining the of the Ruhr area, data was collected. The four values represent the bottom-left corner of the box and the top-right corner. In this research those values were: , minimum_longitude (6.6), minimum_latitude (51.3), maximum_longitude (7.8), maximum_latitude (51.7.) It should be mentioned that the values for the bounding box were chosen, as the Ruhr Area does not have a fixed boundary. According to Prossek (2012) there is not a proper definition of the Ruhr area, however there is an agreement on the borders, the Ruhr Regional Association. The values for the bounding box are based on maps by the Ruhr Regional Association and Wirtschaftsförderung metropoleruhr GmbH.

The result after running the program was an Excel list of merely metadata (PhotoID, Date taken, Latitude, Longitude, UserID and Tags) on photos that were taken in the area. For 2008, this list included data on 17.919 different cases (photos); 2009: 17.777; 2010: 16.837; 2011: 17.860 and 2012: 20.804, making it a total of 91.197 cases over all the years. The actual photos (visual content) used in this research were gathered later in the process.

4.3.1 Data selection

In this research, after the initial data retrieval (91.197 cases), data selection was done. Wrong cases (e.g. wrong dates, latitude, longitude) were removed. The next step was filtering to prevent imbalances in the final results, while the aim of this research is to make every individual of equal importance. In this research, a user providing one case is just as significant as a user providing hundreds of cases. The assumption in this research is that if a user uses exactly the same tagset and/or same coordinates it is most likely a photo of the same subject. A tagset contains all the tags (maximum 75) belonging to one particular photo.
The first step in the filtering process was to remove cases were a user used exactly the same tagset for numerous photos. In the end there was a list of metadata wherein an individual user could occur multiple times, but not with the exact tagset for different photos. Each photo in the list has a unique tagset, yet the same tagset among different users was still possible.
The next step was to filter on exactly the same latitude-longitude for each individual user, resulting

in a list where a user only had different coordinates. Like tagsets it is was possible for the same coordinates to occur, while different individuals can take a photo at exactly the same spot. Table 4.1 gives an overview of the process to this point and associated numbers. N stands for number. The rest of this research is based on the results of the second filter.

Table 4.1: Overview of the filtering process

	2008	2009	2010	2011	2012	Total
N cases initially	17.919	17.777	16.837	17.860	20.804	91.197
N cases first filter	4.556	4.774	4.655	4.936	5.881	24.802
N cases second filter	2.522	2.831	2.761	3.474	4.124	15.712

After the second filter the focus shifted to finding out the occurrences of every tag in the list. Bearing in mind that every individual in this list is of equal importance for the final results, the goal was to come up with lists for each individual user (479 in 2008), wherein each tag was a unique tag used by this user. The list of all the tags by one user were run through a word counter, which not only count words but also determines the frequency count of keywords in a text (OnlineWordCounter, 2012). For some individuals this list was just one tag, but for others this could be a list of hundreds of different tags.

In the end there was a list of tags containing the unique tags for every individual (479 in 2008), however users could have used same tags, so some tags occurred more than once. This list was run through the word counter, resulting in a list of tags that showed for each tag how many different users had used it, for example the tag Germany was used by 143 of the 479 different users in 2008. In the time frame of this research, it was not possible to analyze all the tags. At the same time the frequency of the tags fell relatively quickly and it also showed that the lower the frequency, the more incoherent and personal (e.g. names) the tags were. So, like Cao et al. (2010), to look for a collective image only tags that were occurring ten times or more are used in the coding process.

4.4 Content analysis

Some scientist argue with each other if content analysis is a more quantitative or qualitative method (Rose, 2007). The foundation of the method is searching how often a particular element occurs, which requires qualitative skills to place the findings in context (Krippendorf, 1980; Rose, 2007). Subjectivity is therefore not excluded, however minimizing the prejudices of a researcher can be pursued by following a firm phased plan (Rose, 2007; Whitford & Ruhanen, 2010 p 482.):

1. Data selection: All relevant data that is used in answering the research question is selected, for example trough filtering which is done in this research.

2. Distinguishing categories: This is a crucial step in the process. The categories being used need to be complete and cover all subjects. Some categories are obvious, while others are formed during the process. They need to be interpretable for everyone, making the process of allocating subjects to the categories susceptible to endless repetition. This research uses categories and subcategories, allowing the data to be analyzed even more specific.

3. Coding: The tags are 'labeled' to a category and including subcategory. Golder & Huberman (2006) point out the problem with unclear words and tags. Unclear words can have many related senses, for example the tag 'bat' could mean the small nocturnal mammal or a wooden implement with a handle. The process of coding is done manually and therefore needs to be done with great care, while it is the foundation of later results and conclusions.

4. Analyzing: The last step of content analysis is studying the results. The results can be compared with each other and/or relations can be found. In the case of this research the different years (2008 until 2012) are compared and to search for possible relations.

By closely following these steps it is possible, for the researcher or even others, to repeat or pursue the research later on (Rose, 2007).

4.4.1 Categorizing

The process of categorizing in this research is largely based on the work of Luque-Martinez et al. (2007) and Beerli & Martin (2005). Their dimensions of a city (see chapter 2) are chosen as base for categorizing in this research. The following categories emerged: Public space, Cultural-history, Economics and technology, Social, Politics and Atmosphere. The category Location is added on own initiative to categorize location indicators. The category Politics was not present in any of the years, so therefore it was taken out as a category. Table 4.2, based on Luque-Martinez et al. (2007) and Beerli & Martin (2005), gives an overview of the categories and associated subcategories used in this research. Further information on this table can be found in Appendix I.

Table 4.2 Categories and subcategories

Categories					
Location	Public space	Cultural-history	Economics and technology	Social	Atmosphere
Subcategories					
Global	Urban space	Culture	Facilities	Attainability	Positive experience
Continental	Natural space	Events	Leisure and recreation	Demographic composition	Negative experience
National	Environment/Ecology	Monument/sight	Sport	Private	Reputation
Regional	Infrastructure and transport	Religion	Education		Atmosphere
Local		Art	Reside		Color
		Public figures	Vigor		
		Music	Employment		
			Developments and innovation		
			Telecommunications		

4.4.2 Coding

With the statistical program IBM SPSS Statistics 19, every collective tag (used by ten or more different individuals) was ascribed to one of the categories and associated subcategory. The existing theory was followed as much as possible, but occasionally there was a tag which was hard to ascribe

to a (sub)category. Therefore some new subcategories were created during the coding. For example Art and Private. These subcategories are not directly traceable to the theory of others, like Luque-Martinez et al. (2007) and Beerli & Martin (2005). After all the tags, for each year individually, were ascribed, there could be looked if it was possible to draw conclusions on the collective image based on tags for the Ruhr area.

4.5 Hot spot analysis

After the tag based content analysis was done the research focused on visual content. The aim was to find hot spots. In this research every found hot spot represents a landmark formed through people's cognitive images, however not all these locations necessarily constitute landmarks in the traditional sense of the term. As mentioned earlier it is possible to discover, through collective behavior, what people consider to be the most significant landmarks.

Like Crandall et al. (2009), given a large collection of geotagged photos the aim is to find popular places at which people take photos. The number of photos taken at a place are an indication of the relative importance of that location (Ahern et al., 2007). Some people take many photos at one location whereas others just take one, potentially leading to imbalances in results. In this research this imbalance is taken into account. By measuring how popular a place is the number of distinct photographers who have taken a photo at this location is considered, rather than the total number of photos taken. The importance of a landmark increases with the number of individual users that have taken photos there.

Visual inspection of points on a map can reveal some clusters of high photo activity, but it is difficult to distinguish distinct patterns using visual analysis alone. Spatial statistics can help with this. Analysis with ArcGIS 10.1 (a platform for designing and managing solutions through the application of geographic knowledge) was performed using the Spatial Statistics Hot Spot Analysis tool, which uses the Getis-Ord Gi* algorithm. Given a set of weighted data points, the Getis-Ord Gi* statistic identifies clusters of points. The hot spot analysis in this research is for the most part done in the same way, as explained in the hot spot analysis tutorial 'Exploring EMS 911 call data using Hot Spot Analysis' (Scott, 2009). The analysis identifies statistically significant spatial clusters, in this research of high photographed places, cognitive landmarks, in the Ruhr area.

The steps:

1. Project the data: The coordinate system used in this research was: WGS_1984_UTM_Zone_32N

2. Aggregate incident data: It is important to aggregate the data, in this case the places were photos were taken, before analyzing. This aggregation is done to get a set of weighted data points. There are several ways of doing this (Scott, 2009, p. 7), but there was chosen to apply the Integrate and Collect Events method. This is a great option for the data because there are many concurrent and almost concurrent points in the photo data. In the Integrate step features within a chosen distance, 100 meters, of each other snap to the same location creating a 'stack' of concurrent features with the same X and Y coordinate. After that the Collect events tool creates a single point feature at each location in the dataset with a count field reflecting the number of points found at

that location. For example, if Integrate snaps 20 nearby features together, Collect Events combines those 20 points into one single point with a count (weight) of 20.

In this research features within 100 meters, based on Crandall et al. (2009) and Lee et al. (2011), of each other were chosen to snap to the same location. Crandall et al. (2009) call this the individual-landmark scale.

3. Run Hot Spot Analysis: The next decision made was an important one: choosing the right conceptualization of spatial relationships. The hot spot analysis tool works by looking at each feature within the context of neighboring features. A feature with a high value is interesting but does not have to be a statistically significant hot spot. A statistically significant hot spot shows a feature with a high value, surrounded by other features with high values. Because there needs to be looked at each feature in relation to its 'neighbors', the decision had to be made what it meant to be neighboring features. This research chose Inverse Distance whereby the conceptual model of spatial relationships is one of distance decay. All features impact/influence all others, however the farther away something is, the smaller the impact it eventually has. There was not any difference between a chosen distance band or an automatic computed distance band and therefore the threshold value was left to default. The result of the Hot Spot Analysis tool, see map 2 of figure 4.2, was a new feature class where every feature of the dataset is symbolized based on whether it is part of a statistically significant hot spot, a statistically significant cold spot, or is not part of any statistically significant cluster. The red areas are hot spots, areas where high numbers of photos are surrounded by other areas with high numbers of photos. The beige areas are not part of statistically significant clusters. In this research there were not found any cold spots (blue).

4. Further analysis: To get a collective image of hot spots only significant hot spots with at least ten different users (based on the tag threshold) were taken into account. To find these landmarks the hot spot layer's table had to be opened in ArcGIS. In this table there was a selection made by attributes, in this case the GiZScore had to be ≥ 1.65, so only the significant hot spots remained. The new layer created from this selection was joined (Spatial Join Tool) with the layer that arose after the Integrate procedure, to create a layer which showed the hot spots and photos belonging to them when opening the attribute table. Subsequently every individual hot spot was tested on the amount of different users, while only hot spots with no less than ten different users are in analyzed on their content later on.

To make the former four steps more approachable the process is visualized, see figure 4.2.

Figure 4.2 The process from raw data (map 1) to significant hot spot/landmarks with a least ten different users (map 4)

Map 1: Each red point represents a single photo (based on latitude-longitude coordinates) taken in 2008. This is real data and represents 2.522 photos taken in the Ruhr area.

Legend:
• Taken photo

Map 2: The significant hot spots in 2008. For the year 2008 this meant 38 hot spots (landmarks) with 698 photos belonging to them.
The red areas (>1.65 - 1.96 Std. Dev.; 1.96 - 2.58 Std. Dev.; >2.58 Std. Dev.) are significant hot spots, or areas where high numbers of photos are surrounded by other areas with high numbers of photos.
The beige areas (-1.65 - 1.65 Std. Dev.) are not part of statistically significant clusters.

Legend:

Significant hot spots
GiZScore
○ -1.65 - 1.65 Std. Dev
○ 1.65 - 1.96 Std. Dev.
● 1.96 - 2.58 Std. Dev.
● > 2.58 Std. Dev.

Map 3: The rectangle shows the borders of the bounding box. This map is for visualization purposes only, it is easier to quickly visualize how the hot spots are located. Though, the real statistical analysis happens feature by feature, thus in map 2.

Legend:
Visualization
Value
- High : 10.6368
- Low : -0.385586
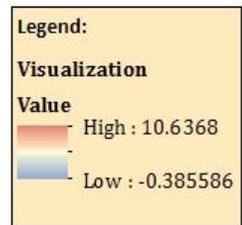
Map 4: Hot spots with a least ten different users. In 2008 there were six hot spots that met this requirement. Three hot spots cluster above Duisburg.
Table 5.15 in section 5.4 will show the results of map 4 for all the years.

Legend:
● Hot spots ≥10 different users

5. Comparing different years: In this step the results of the five years are compared. What is the impact of Ruhr.2010?

4.6 Representative Images

The last task considers the question of what is being photographed at a given hot spot (landmark), by selecting the representative image from that specific landmark. The approach used in this research is based on the work of Crandall et al. (2009), Kennedy et al. (2007) and Cao et al. (2010). In their researches they try to find one representative image per landmark and that is why this research also looks for one image per landmark. According to Crandall et al. (2009) their method is capable of scaling to the global scope of their data and produces considerably better results than randomly selecting photos from a landmark location, or selecting photos based simply on textual tags. Given a set of photos known to be taken near a landmark, the intent is to select a representative image of the landmark. The information revealed by the collective behavior of Flickr users is used in choosing the representative cognitive image. People take photos because they think a subject is visually interesting, pleasing, or distinctive: it is as if photos of a landmark are 'votes' for what the visual representation of the landmark should be. The representative images found in this research are thus formed trough collective behavior of the users. To find the representative image of a hot spot there was searched for subsets of photos that were visually very alike, whereupon the representative image from among the most dominant subset is chosen (Crandall et al., 2009).

After doing the hot spots analysis with ArcGIS 10.1, 76 hot spots, containing a total of 2.047 photos, were found with ten or more different photographers. Each photo used in this research was downloaded one by one with the use of a program called DownloadR. DownloadR can find photos from Flickr based on metadata like User, Tags, Place and Date taken. Though, about 7% of the photos were not found, because some users were not using their account anymore.

The process of choosing the representative image of a hot spot (landmark) was done in the following way, see figure 4.3.

Figure 4.3 Process of selecting of a representative photo
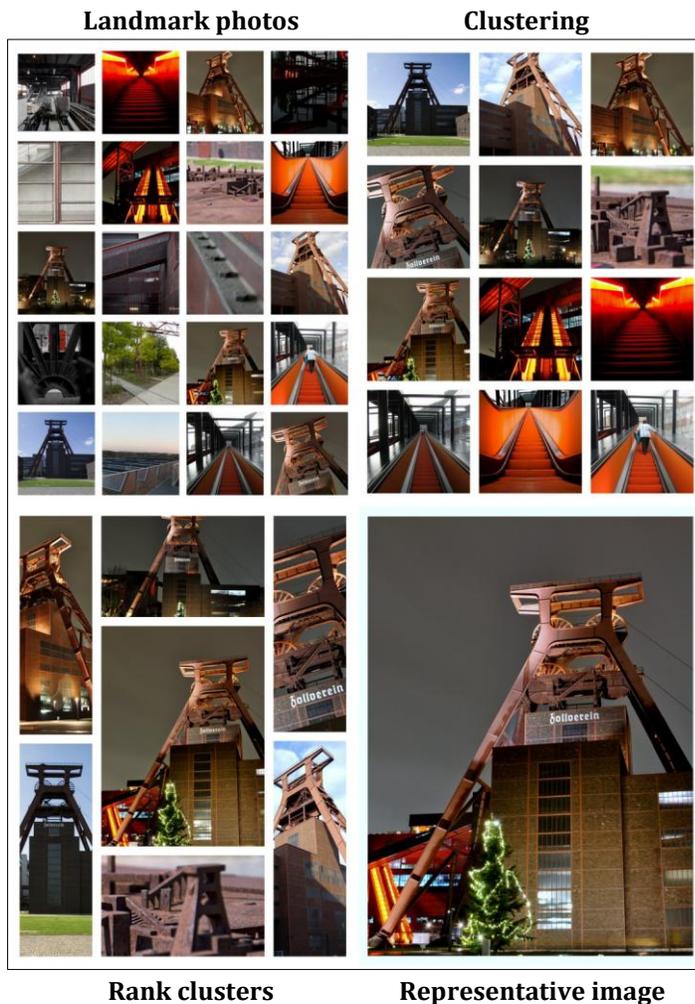
The photos in figure 4.3 are all from one particular hot spots in 2009. This hot spot contains 20 different photos, see the collage under Landmark photos in the figure. The first step that needs to be taken when looking at these 20 photos is to cluster them by analyzing their content. Looking at the example of figure 4.3, under Clustering there can be seen two different subsets of photos: a subset of seven photos containing the Zeche Zollverein mine and a subset containing six photos of orange stairs. One of the photos, photo number seven in the Clustering picture, belongs to both the subsets, because it contains both the coal mine and the orange stairs. The other eight photos are not needed while they do not belong to a specific subset.

When the clustering was done, the subsets were ranked on the amount of photos belonging to them. With seven photos the mine was the most prominent subset. The final step of the process is to choose the representative image of the most prominent subset. The representative image of figure 4.3 is chosen because it was taken at night (like three others), it is a front view (like three others), it contains the name Zollverein (like three others) and it shows a Christmas tree, like one other. It even contains the orange stairs, so all in all it is the representative picture for this hot spot (landmark). The process seen in figure 4.3 was done on 76 hot spots (landmarks), resulting in 76 representative images.

4.7 Considerations and limitations

An important consideration that has to be made is that the literature used for this research mainly focuses on the impact of events on a city and not a region. However it can be assumed that all of the theory used and mentioned in these works could also be relevant on a bigger scale, the region. Researchers like Pellenbarg & Meester (2009) and Bradley et al. (2002) also talk about a regional image, so it is a scale that is being investigated. Besides, the Ruhr area may be seen as a region, it is presenting itself as one big metropolis (Ruhr GmbH, 2009). Another consideration that has to be made is that an occasional hallmark event is expected to attract a crowd which is believed to differ from the regular tourists (Jenkins, 1999). According to research organization Mintel (2004) the social status of the ECC generally attracts a professional, middle class and highly educated audience. Mintel also notes that there is a clear tendency noticeable what kind of visitor is mostly attracted by the ECC event. These visitors, *"all those attending events in the ECC cultural program or visiting the ECC host city"* (Mintel, 2004), can be divided into 'residents', 'day visitors' and 'tourists'. Tourists can be of domestic or foreign origin but stay at least one night during the ECC. The largest visitor group is 'residents' which makes around 30-40% of all visitors, followed by 'domestic tourists', which count for around 30% and 'day visitors' and 'foreign tourists' count for 10-20% each of the visitors. The residents are more represented at theatre performances, whereas (international) tourists are more likely to attend exhibitions. The majority of the visitors are also not interested in a large amount of the venues offered. 80% of the visitors are attending only 20% of the events offered, which strengthen the development of few big 'blockbuster' events in the cities (Mintel, 2004).

Chapter 5. Results Ruhr.2010 case

5.1 Introduction

This chapter shows and analyses the results of the Ruhr.2010 case study. Section 5.2 first looks add the collected data and the data that was left after the filtering procedure. These results are the foundation for the subsequent outcomes. Section 5.3 shows the results of the tag based analysis (collective tagging, categorizing and coding). The next step is visualizing the content of the collected data in section 5.2, by performing a Hot Spot Analysis (section 5.4). How many hot spots (landmarks) are found after the selection mentioned in section 4.5? Visual maps with the representative images from 2008 until 2012 give insight into the procedure. The results show a collective regional image of the Ruhr area based on the metadata of many unique individuals.

5.2 Results of the collected data after filtering

Table 4.1 already showed the results of the filtering of the initial data. A total of 91.197 cases were identified using the Flickr API across the five years. After the two filtering steps (see section 4.3.1) 15.712 cases remained and those were eventually used in this research. An analysis was carried out which looked at the tag frequency for the 15.712 cases. There were 85.269 tags used in total, with 28.017 unique tags. Altogether roughly 6% of the cases had no tags assigned to them. Table 5.1 shows the results when looking at the tags. It shows the amount of tags used per year, the unique tags per year, the number of individual users and finally the amount of tags that were used at least ten times or more.

Table 5.1 Results of the filtering process

	2008	2009	2010	2011	2012	Total
N cases used in this research	2.522	2.831	2.761	3.474	4.124	15.712
N of tags used	14.259	15.005	16.524	17.390	22.091	85.269
N of unique tags	7.923	8.398	8.345	8.879	10.395	28.017*
N individual users	479	574	707	808	930	2.468*
N tags used ≥ 10 times	146	143	186	190	249	314*

The * symbol in the table indicates that this number is not the total sum of that particular row. For example the reason why the total number of individual users is not the sum of 2008 until 2012 is that an individual who had taken photos in 2008 could participate in multiple years. The number of 574 does not mean that there were that amount of new photo takers in that year. When looking at unique tags and number of tags used ≥ 10 times it is the same situation, unique tags in 2008 could also occur in 2009 and the same tags used ≥ 10 times could arise in multiple years.
Table 5.1 shows an increase in the number of individual users over the years. Compared to 2008, the number of individual users increased with 95 (19,8%) in 2009; 133 (23,2%) in 2010 compared to 2009; 101 (14,3%) in 2011; and 122 (15,1%) in 2012. The increase of individuals was largest in 2010 which could be a result of Ruhr.2010. When looking at the number of tags that were used at

least ten times or more there first is a decrease of 2,1% from 2008 till 2009; followed by an increase of 30,1% (2009 till 2010); 2,2% (2010 till 2011) and 31,1% (2011 till 2012).

5.3 Tag based analysis results: Collective tagging, categorizing and coding

A regional image is multi-dimensional. To find out which dimensions in the Ruhr area are prominent the tags were categorized into the chosen categories and subcategories, see table 4.2. Table 5.2 gives an overview of the tagging behavior of the users. It shows that in every year the category Location was most used. So most users when assigning their tags give an indication, global till local, of the location were a photo was taken. Three other dominant categories are Public space, Economics and technology and Atmosphere.

Table 5.2 Overview of users their tagging behavior

	2008	2009	2010	2011	2012	Total
Location	1.026	1.110	1.405	1.370	1.566	6.477
Public space	621	573	756	775	1.122	2.847
Cultural-history	195	190	447	366	492	1.690
Economics and technology	406	410	500	833	1.324	3.473
Social	47	22	106	62	96	333
Atmosphere	600	680	911	698	1.227	4.116

When looking at the usage of the categories over the years Location shows an increase of 52,6% from 2008 until 2012 (from 1.026 to 1.566). Public space increased with 80,1 %; Cultural-history with 152,3%; Economics and technology with 226,1%; Social with 104,3% and Atmosphere with 104,5%. The category Social was used the least, though, in contrast to the category Politics, it still occurred.

However the aim of the Ruhr case was to find if the event, Ruhr.2010, had changed the image of the region. The year 2010 therefore has to be seen as the key year and compared with the years before and after. Figure 5.1 illustrates this and table 5.3 shows the numbers and percentage change of each category regarding the previous year.

Figure 5.1 Change in the image dimensions
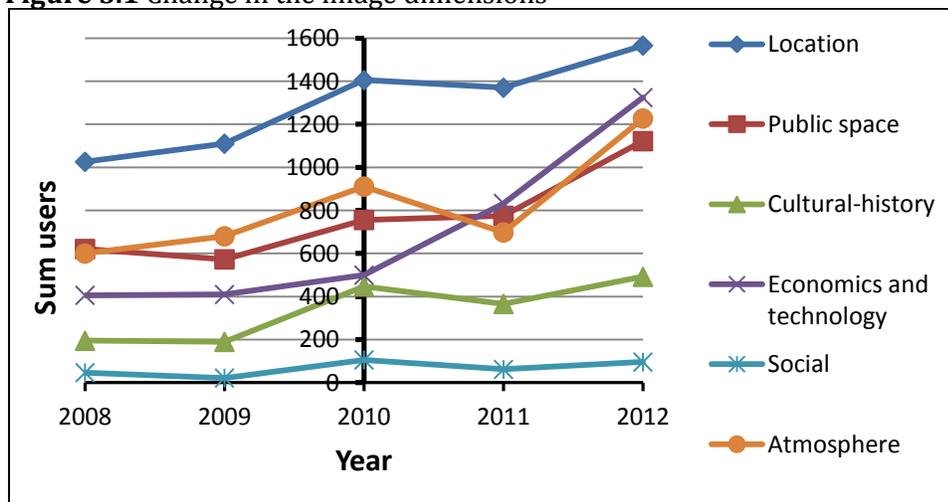
Table 5.3 Changes in users their tagging behavior

	2008	2009	%	2010	%	2011	%	2012	%	Total
Location	1.026	1.110	+8,2	1.405	+26,6	1.370	-2,5	1.566	+14,3	6.477
Public space	621	573	-7,7	756	+31,9	775	+2,5	1.122	+44,8	2.847
Cultural-history	195	190	-2,6	447	+135,3	366	-18,1	492	+34,4	1.690
Economics and technology	406	410	+1,0	500	+22,0	833	+66,6	1.324	+58,9	3.473
Social	47	22	-53,2	106	+381,8	62	-41,5	96	+54,8	333
Atmosphere	600	680	+13,3	911	+34,0	698	-23,4	1.227	+75,8	4.116

Table 5.3 shows that all the categories were used more in 2010 than in 2009 and also 2008. When comparing 2009 till 2010 with 2008 till 2009 a big difference is noticeable. 2009 shows an increase in numbers for three categories, but also a decrease in three categories when compared with 2008. Instead of three increased categories in 2009, all the six categories increased in 2010. Especially the category Social shows a huge increase, however the number of this category is far less than that of the other categories. Another category that stands out is Cultural-history, while it shows in increase of 135,3% in 2010. The reason for this could be the fact that the subcategory Events is covered by this category. Results later on go further into this. Also the percentage increase from 2009 till 2010 compared with the increasing categories from 2008 until 2009 is striking. For example the amount of tags related to the category Economics and technology increased from 1,0% (2008 till 2009) to 22,0% the year after (2009 till 2010). The year 2010 shows noticeable difference to the two previous years. If this can be ascribed to Ruhr.2010 the two consecutive years have to tell.
The year after Ruhr.2010, 2011 shows a important pattern, four of the six categories decrease in numbers while table 5.1 showed an increase in users from 2010 till 2011 with 14,3%. Thus, the users their collective behavior for four categories reduced in 2011. The other two categories increased, especially Economics and technology (66%). The following year, 2012, shows an increase in all the categories compared to 2011 and five of the categories compared to 2010. Only the category Social is used more in 2010 than 2012. At this point it is hard to say if the event has changed the image of the Ruhr area. If you would compare 2010 only with 2009 and 2011 you could argue that the impacts of Ruhr.2010 are visible, while all of the categories vastly increased in 2010, compared with 2009, and the majority deceased the year after the event. The results of 2012 make it hard to make assumptions.

Though, as mentioned earlier, the usage of social media is increasing, so it is not strange to see higher numbers in 2012 than in 2010. A better way of looking if there has been a change of image is therefore to look at percentages. Table 5.4 gives the numbers and percentages for each category for each year, table 5.5 the hierarchy of the categories and figure 5.2 illustrates it.

Table 5.4 Overview of the usage of the categories

	2008	%	2009	%	2010	%	2011	%	2012	%
Location	1.026	*35,4*	1.110	*37,2*	1.405	*34,1*	1.370	*33,4*	1.566	*26,9*
Public space	621	*21,5*	573	*19,2*	756	*18,3*	775	*18,9*	1.122	*19,3*
Cultural-history	195	*6,7*	190	*6,4*	447	*10,8*	366	*8,9*	492	*8,4*
Economics and technology	406	*14,0*	410	*13,7*	500	*12,1*	833	*20,3*	1.324	*22,7*
Social	47	*1,6*	22	*0,7*	106	*2,6*	62	*1,5*	96	*1,6*
Atmosphere	600	*20,7*	680	*22,8*	911	*22,1*	698	*17,0*	1.227	*21,1*
Total	2.895		2.985		4.125		4.104		5.827	

Table 5.5 Hierarchy in the usage of categories

	2008	2009	2010	2011	2012
Location	1	1	1	1	1
Public space	2	3	3	3	4
Cultural-history	5	5	5	5	5
Economics and technology	4	4	4	2	2
Social	6	6	6	6	6
Atmosphere	3	2	2	4	3

Figure 5.2 Percentage change in image dimensions of the Ruhr area
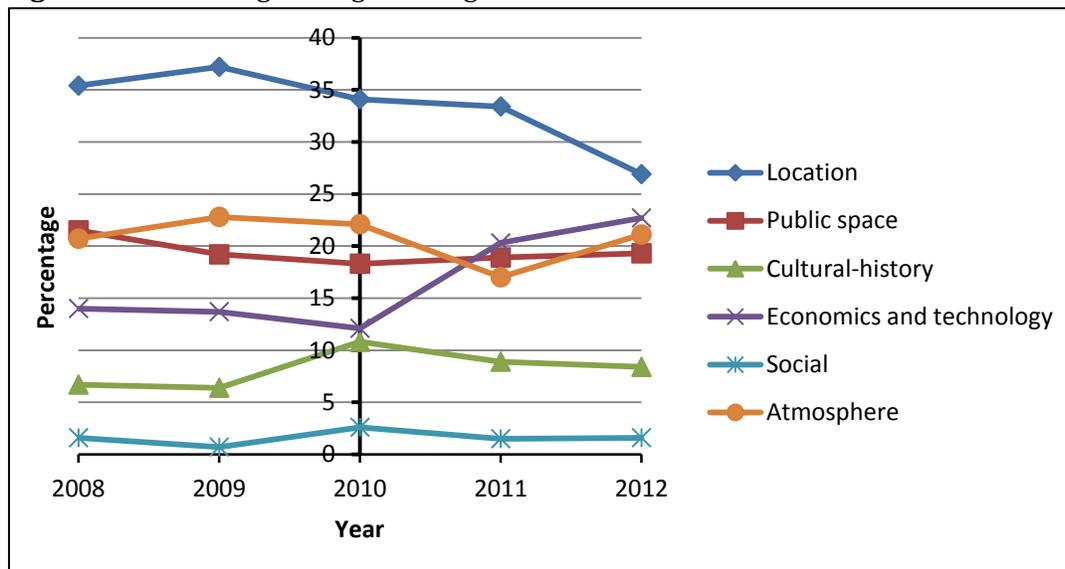
Did the use of the image dimensions change from 2008 until 2012? Figure 5.2 shows that the usage is changing throughout the years. Table 5.3 and figure 5.2 show the six dimensions (categories) used in this research by which people their collective tags were categorized. The year of the event, 2010, is the starting point and shows that Location was collectively used the most by the users with 34,1% (see Table 5.4) of the time. In the years before and after 2010 this is also the case, however the percentage of the category is declining and comes closer to the categories Economics and technology, Public space and Atmosphere. Atmosphere was the second most used category in 2010

with 22,1%. Table 5.3 and the curve in figure 5.2 show that the percentage of this category fluctuates in the years before and after. The third category in 2010 is Public space with 18,3%, but this is the lowest percentage for this category in the five researched years. Economics and technology (12,1%) is fourth and shows the same curve as Public space, yet the percentage increase in 2011 and 2012 is much larger. The fifth category in 2010 is Cultural-history which shows a fluctuating curve with a peak in the year the event took place. As said before, the reason for the peak in 2010 may be due to the fact that this category covers the subcategory Events. The least used category, Social, also shows a peak in 2010.

Table 5.5 shows that location was the most used category in 2008 and remained to be the most used category in the following years. Public space went from second to third and eventually is fourth. Atmosphere was third in 2008, changed to second (2009, 2010) and fourth (2011) and was third in 2012. Economics and technology in the first three years was fourth, but became and remained second from 2011. Cultural-history was fifth in 2008 and staid fifth. This is the same for Social, it was sixth and staid this in the following years.

If looked at 2010 in table 5.5 it shows that the hierarchy is exactly the same as in 2009 and only differs from 2011 on Economics and technology and Atmosphere. Just by looking at the categories there is not any sign that the event had an impact on the previous and following years. However, the subcategories could tell a different story and are therefore investigated. So, the focus now shifts towards the subcategories. Which subcategory was used the most and how did they develop? The upcoming section gives an overview of the subcategories and at times looks at associated tags for additional information.

Table 5.6 Location overview

	2008	%	**2009**	%	**2010**	%	**2011**	%	**2012**	%
Global	0	-	10	0,9	11	0,8	14	1,0	16	1,0
Continental	22	2,1	28	2,5	40	2,8	29	2,1	38	2,4
National	243	23,7	254	22,9	326	23,2	292	21,3	299	19,1
Regional	398	**38,8**	412	**37,1**	495	35,2	440	32,1	600	38,3
Local	363	35,4	406	36,6	533	**37,9**	595	**43,3**	613	**39,1**
Total	1.026		1.110		1.405		1.370		1.566	

Table 5.6 shows a synopsis of the aspects within the Location element. The bold percentages show the dominant subcategory of each year. Tags that are regional and local are most used in the Ruhr area. Prior to Ruhr.2010 the largest subcategory is Regional, during and after Ruhr.2010 it is Local that is used the most. The event could have changed the users to tag on a more local scale. Table 5.7 illustrates the collective tags that were the subject of the subcategory Local. The first thing that is noticeable is the change in 2010. The amount of different tags mentioned by ten or more users goes from 11 (2008 and 2009) to 16 in 2010 and remains 16 in the prior years (2011 and 2012). More different places are collectively tagged during and after the event. So, the event seems to make an impact on the region. Dortmund generally is the most tagged city (four out of five times). In 2010 Essen was tagged the most. Ruhr.2010 as an event took place in the whole Ruhr area, however the city that run for European Capital of Culture was Essen. So, initially Essen got the most attention of all the places in the area and therefore possible attracted the most public attention in 2010.

Table 5.7 Tags and numbers of subcategory Local

	2008	N	2009	N	2010	N	2011	N	2012	N
1.	Dortmund	83	Dortmund	93	Essen	114	Dortmund	129	Dortmund	114
2.	Duisburg	72	Essen	79	Duisburg	108	Duisburg	109	Essen	114
3.	Essen	62	Duisburg	78	Dortmund	89	Essen	92	Duisburg	111
4.	Bochum	44	Bochum	46	Bochum	39	Bochum	49	Bochum	56
5.	Oberhausen	27	Oberhausen	30	Oberhausen	34	Oberhausen	43	Oberhausen	35
6.	Mülheim	15	Gelsenkirchen	22	Gelsenkirchen	23	Gelsenkirchen	39	Gelsenkirchen	27
7.	Gelsenkirchen	14	Recklinghausen	14	Halde	20	Herne	20	Halde	25
8.	Hattingen	13	Mülheim	12	Bottrop	15	Bottrop	15	Hattingen	21
9.	Bottrop	12	Bottrop	11	Herne	13	Düsseldorf	13	Herne	21
10.	Herne	11	Hattingen	11	Baldeneysee	12	Hagen	13	Mülheim	16
11.	Recklinghausen	10	Witten	10	Hattingen	12	Halde	13	Bottrop	15
12.					Recklinghausen	12	Krefeld	13	Krefeld	13
13.					Krefeld	11	Recklinghausen	13	Witten	13
14.					Mülheim	11	Hattingen	12	Düsseldorf	12
15.					Herten	10	Herten	12	Hagen	10
16.					Witten	10	Mülheim	10	Moers	10

Table 5.8 Public space overview

	2008	%	2009	%	2010	%	2011	%	2012	%
Urban space	246	*39,6*	191	*33,3*	298	*39,4*	206	*26,6*	388	*34,6*
Natural space	71	*11,4*	72	*12,6*	108	*14,3*	125	*16,1*	126	*11,2*
Environment/ Ecology	193	*31,1*	233	*40,7*	269	*35,6*	352	*45,4*	402	*35,8*
Infrastructure and transport	111	*17,9*	77	*13,4*	81	*10,7*	92	*11,9*	206	*18,4*
Total	621		573		756		775		1.122	

Table 5.8 shows an overview of the category Public space. Tags on urban and environment/ecology are the most popular within the spatial element. In 2010 (also 2008) Urban space is the most used subcategory. The reason that Urban space was used the most in 2010 could be because most of the event took place in an urban setting. Overall the subcategory Environment/Ecology is the most used for this region.

Table 5.9 Cultural-history overview

	2008	%	2009	%	2010	%	2011	%	2012	%
Culture	0	-	10	*5,3*	47	*10,5*	22	*6,0*	52	*10,6*
Events	51	*26,2*	26	*13,7*	96	*21,5*	10	*2,7*	42	*8,5*
Monument/sight	91	*46,7*	109	*57,4*	223	*49,9*	272	*74,3*	280	*56,9*
Religion	35	*17,9*	21	*11,1*	35	*7,8*	32	*8,7*	39	*7,9*
Art	18	*9,2*	24	*12,6*	46	*10,3*	19	*5,2*	53	*10,8*
Public figures	0	-	0	-	0	-	0	-	26	*5,3*
Music	0	-	0	-	0	-	11	*3,0*	0	-
Total	195		190		447		366		492	

Table 5.9 shows that subcategory Monument/sight was by far the most popular, especially in 2011. This can indicate that people who visit or live in the Ruhr area primarily visit and tag monuments and sights.
Just by looking at the numbers of the subcategory Events one could say that the event is noticed, because 2010 shows the highest number, but when looking at the percentages it is 2008 where it is the highest. It is complicated to make any assumptions on the other subcategories while these numbers fluctuate (Culture, Religion, Art) or are only present in one particular year (Public figures, Music).

Table 5.10 looks at the subcategories Events and Monument/sight from Cultural-history. It shows that in every year Christmas (Weihnachten in German) is tagged. 2010 reveals that the event was noticed by the 'participants', the tag Ruhr.2010 was mentioned by 39 different users. Schachtzeichen (2010) was an event which showed the locations of mines that dominated the Ruhr mining region. It was about the visualization of (mostly) former coal pits in the Ruhr area with the aim to make structural changes visible and tangible. These locations were noticeable due to large yellow helium balloons that hung 80 meters above the ground (SchachtZeichen, 2010). Other events that took place during Ruhr.2010 are not collectively mentioned enough (ten times or more) or perhaps are tagged by people just as Ruhr.2010.

The subcategory Monument/sight shows that Zeche, Zollverein and Landschaftspark are tagged the most by users. Zeche and Zollverein most likely represent the site Zeche Zollverein, mentioned in section 4.2, but the numbers are not the same in any of the years and are therefore illustrated separately in the table. In 2010 three 'new' monuments/sights make their appearance (Hochofen, Kokerei and Gasometer). The tag Kokerei is also found in 2011 and 2012. Gasometer does show up in 2011, but in 2012 not anymore. Hochofen is not tagged at least ten times in 2011, but re-emerges in 2012.

Table 5.10 Tags and numbers subcategories Events and Monument/sight

	2008	N	2009	N	2010	N	2011	N	2012	N
	Events									
1.	Christmas	19	Christmas	15	Ruhr.2010	39	Christmas	10	Christmas	12
2.	Weihnachten	18	Weihnachten	11	Schachtzeichen	18			Kirmes	10
3.	Event	14			Weihnachten	15			Weihnachten	10
4.					Christmas	14			Weihnachtsmarkt	10
5.					Weihnachtsmarkt	10				
	Monument/sight									
1.	Landschaftspark	30	Zeche	29	Zeche	46	Zeche	51	Zollverein	47
2.	Zeche	23	Landschaftspark	23	Zollverein	45	Zollverein	41	Zeche	46
3.	Schloss	14	Zollverein	17	Landschaftspark	36	Landschaftspark	30	Landschaftspark	40
4.	Zollverein	14	Museum	16	Museum	31	Museum	30	Museum	34
5.	Zoom	10	Schloss	14	Innenhafen	17	Kokerei	18	Tiger & Turtle	17
6.			Innenhafen	10	Zoom	16	Innenhafen	16	Schloss	16
7.					Hochofen	11	Schloss	14	Zoom	16
8.					Kokerei	11	Gasometer	13	Kokerei	12
9.					Gasometer	10	Zoom	13	Dortmunder U	11
10.							Burg	12	Hochofen	11
11.							Castle	12	Denkmal	10
12.							Mine	12	Innenhafen	10
13.							Dortmunder U	10	Union	10

Table 5.11 Economics and technology overview

	2008	%	2009	%	2010	%	2011	%	2012	%
Facilities	33	8,1	46	11,2	55	11,0	46	5,5	87	6,6
Leisure and recreation	16	3,9	40	9,8	57	11,4	52	6,2	58	4,4
Sport	34	8,4	10	2,4	26	5,2	108	13,0	38	2,9
Education	0	-	10	2,4	0	-	0	-	0	-
Reside	27	6,7	14	3,4	23	4,6	26	3,1	20	1,5
Vigor	127	31,3	141	**34,4**	153	**30,8**	154	18,5	239	18,1
Employment	0	-	0	-	0	-	0	-	10	0,8
Developments and innovation	37	9,1	36	8,8	52	10,4	26	3,1	71	5,4
Telecommunications	132	**32,5**	113	27,6	134	26,8	421	**50,5**	801	**60,5**
Total	406		410		500		833		1.324	

Table 5.11 shows that the most used categories are Vigor and Telecommunications, in the first three years the two categories are not far apart. However, the category telecommunications in 2011 (50,5%) and in particular 2012 (60,5%) is used way more than the other categories. The major factor behind this is the 'revolution' of Instagram which provides way to share photos with others like friends and family (Instagram, 2013). The Tag Instagram first appears in 2011, when it is used by 51 different individuals. In 2012 this number already is 115, see Appendix I.

Table 5.12 Social overview

	2008	%	2009	%	2010	%	2011	%	2012	%
Attainability	23	**48,9**	0	-	41	38,7	0	-	0	-
Demographic composition	13	27,7	10	45,5	45	**42,5**	44	**71,0**	65	**67,7**
Private	11	23,4	12	**54,5**	20	18,9	18	29,0	31	32,3
Total	47		22		106		62		96	

As can be seen in table 5.12 and figure 5.1 the category Social was not used much, though the table shows that since 2010 the category demographic transition was used the most. Attainability was used in 2008 and 2010, but not in the others three years and 2009 shows a relatively large usage of the private category.

Table 5.13 Atmosphere overview

	2008	%	2009	%	2010	%	2011	%	2012	%
Positive experience	33	*5,5*	42	*6,2*	42	*4,6*	74	*10,6*	122	*9,9*
Negative experience	23	*3,8*	10	*1,5*	22	*2,4*	13	*1,9*	32	*2,6*
Reputation	72	*12,0*	33	*4,9*	118	*13,0*	83	*11,9*	139	*11,3*
Atmosphere	298	***49,7***	387	***56,9***	456	***50,1***	337	***48,3***	574	***46,8***
Color	174	*29,0*	208	*30,6*	273	*30,0*	191	*27,4*	360	*29,3*
Total	600		680		911		698		1.227	

Table 5.13 shows that subcategory Atmosphere was the most popular, being used around 50% of the time in every single year. However Atmosphere did not increase constantly, showing a decrease from 2010 till 2012. Color was also used quit a lot by people, however it is not easy to assess the intention of a tag that is a color. The tag Yellow for example could mean the yellow balloons of the event Schachtzeichen, but also a sunset.

The percentage of users who found the Ruhr area a positive experience is fluctuating. It does show that the percentage is smallest in the year of the event. The reason behind this is unclear, but the table shows that after 2010 the percentage of this subcategory increased in 2011 and decreased a little in the following year. Compared to 2008, the positive experience percentage in 2012 is higher, so throughout the years people experienced the Ruhr area more positive. The table also shows that the area was experienced most negative in 2008. Looking at 2010, the table shows that the percentage is higher than in the surrounding years. A reason for this may be uncontrolled overcrowding of facilities that might have occurred during the event. The percentage of subcategory Reputation is highest in 2010, so it was strongest during the event.

Table 5.14 shows the tags ascribed to the subcategory Reputation. In 2010 the tags Kulturhauptstadt (capital of culture) and Capital became visible. This means that the region not only was cultural capital in 2010, but more important was also seen by the users as cultural capital of Europe.

The tags that are used the most are Industriekultur (industrial culture/heritage) and Industrial. Sights like Zeche Zollverein and Landschaftspark Nord probably contribute to this. Besides the attendance of 'new' tags like Bergbau (mining) and Vintage all of the tags found in 2008 also appeared in 2012, so the reputation did seem to change only a little. Though the numbers of the tags do change over the years, so there is still a change noticeable.

Table 5.14 Tags and numbers subcategory Reputation

	2008	N	2009	N	2010	N	2011	N	2012	N
1.	Industriekultur	17	Industriekultur	17	Industriekultur	34	Industriekultur	22	Industriekultur	31
2.	Industrial	15	Industrial	16	Kulturhauptstadt	28	Industrial	21	Industrial	29
3.	Old	15			Urban	18	Old	16	Urban	23
4.	Alt	14			Industrial	16	Alt	13	Old	21
5.	Urban	11			Bergbau	12	Urban	11	Bergbau	14
6.					Capital	10			Alt	11
7.									Vintage	10

5.4 Visual content results: Hot spot analysis and representative images

This section shows the visualization of the information revealed by the collective behavior of Flickr users. The following results are based on the Hot spot analysis of section 4.5 and representative image selecting from section 4.6. If many people have taken photos at a given location, they are photographing some common area of interest, in the case a landmark.

Table 5.15 shows that a total of 246 significant hot spots (landmarks) were identified using the Hot Spot Analysis in ArcGIS of which 76 (31%) had at least ten or more different users. The 76 landmarks contained a total of 2047 photos which makes it roughly 27 photos per landmark.

Table 5.15 Hot Spot Analysis Results

	2008	**2009**	**2010**	**2011**	**2012**	Total
Significant Hot Spots	38	55	52	50	51	246
Hot Spots with ≥ 10 different users	6	14	14	20	22	76
Total amount of photos to be downloaded	181	332	349	533	652	2.047

The amount of hot spots is increasing from 2008 until 2012, so the number of landmarks which can have an impact in the image of the region is growing. Did the event played a role in this change? When comparing 2010 with 2009 the number of hot spot remains the same. After 2010 this number is increasing, so it seems that the popularity of the Ruhr area is increasing, but not necessarily due to Ruhr.2010. Though, the impacts of the event can become noticeable after the event took place. Hot spots in 2012 that were not present in 2011 can therefore still be a result of Ruhr.2010. To compare the results of 5.15 each year is visualized. Figure 5.3 until figure 5.7 show the locations of the significant hot spots with the associated representative image. The results are analyzed further on.

Figure 5.3 Overview of 2008 landmarks

Landschaftspark Nord, Duisburg

Landschaftspark Nord, Duisburg

Landschaftspark Nord, Duisburg

St. Reinoldi Church, Dortmund

Theater, Duisburg

Zeche Zollverein, Essen

Figure 5.4 Overview of 2009 landmarks

Zeche Zollverein, Essen

Veltins Arena, Gelsenkirchen

Building demolition, Dortmund

Inner city, Dortmund

Central station, Dortmund

Landschaftspark Nord, Duisburg

Landschaftspark Nord, Duisburg

Landschaftspark Nord, Duisburg

Krüger-Haus, Dortmund

Limbecker Platz, Essen

Dom, Essen

Inner city, Bochum

Florianturm, Dortmund

Florianturm, Dortmund
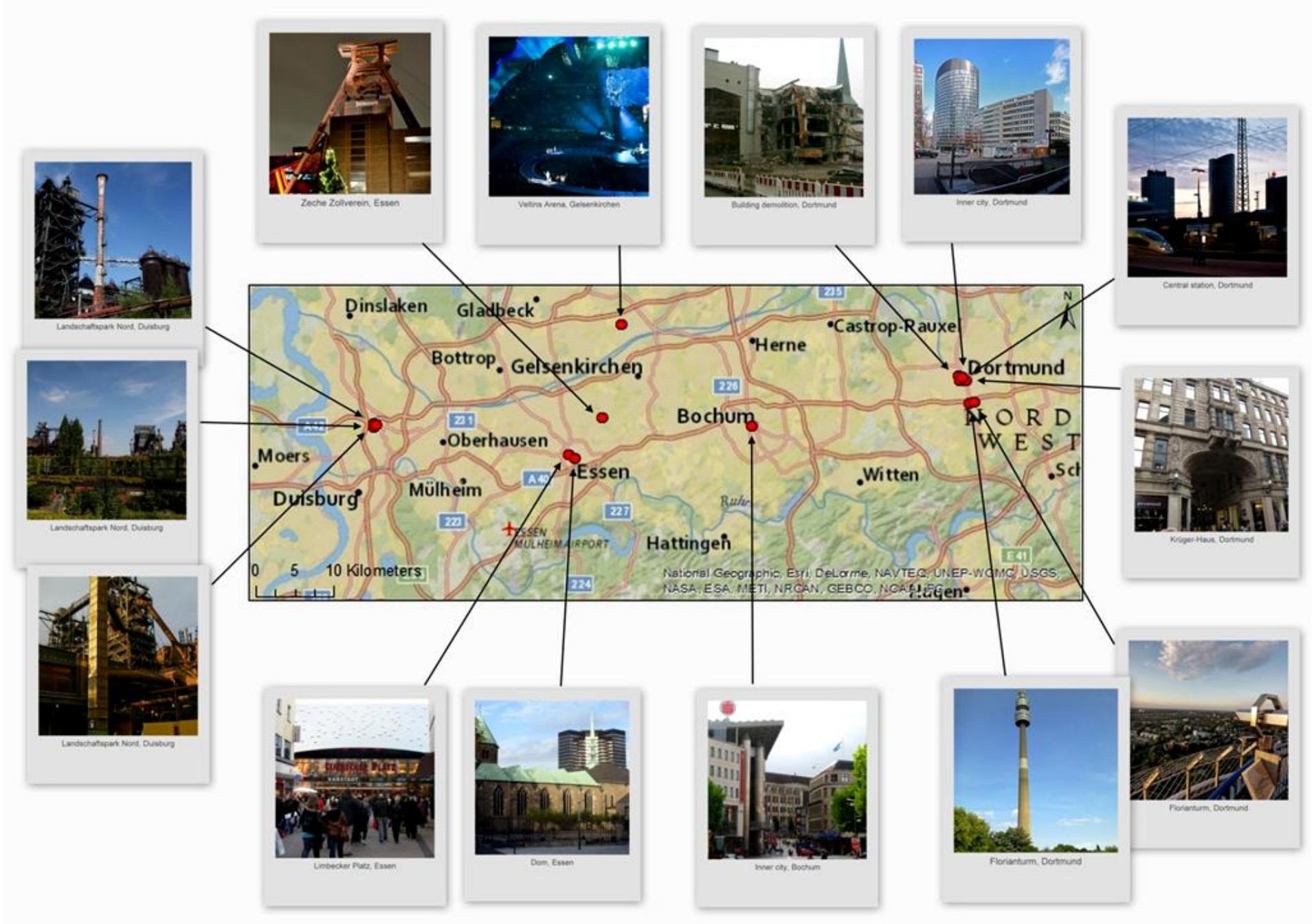
Figure 5.5 Overview of 2010 landmarks
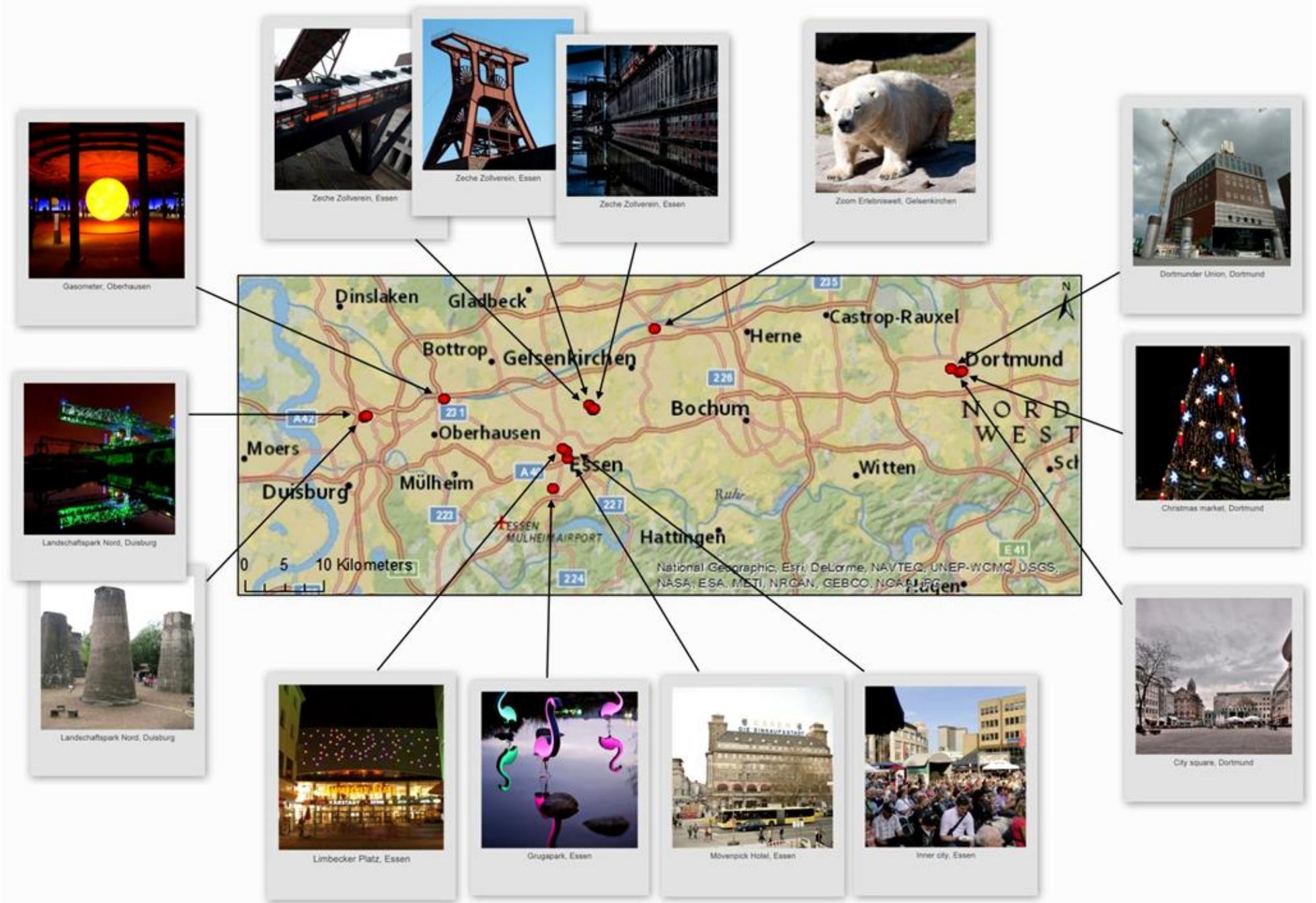
Figure 5.6 Overview of 2011 landmarks

Figure 5.7 Overview of 2012 landmarks
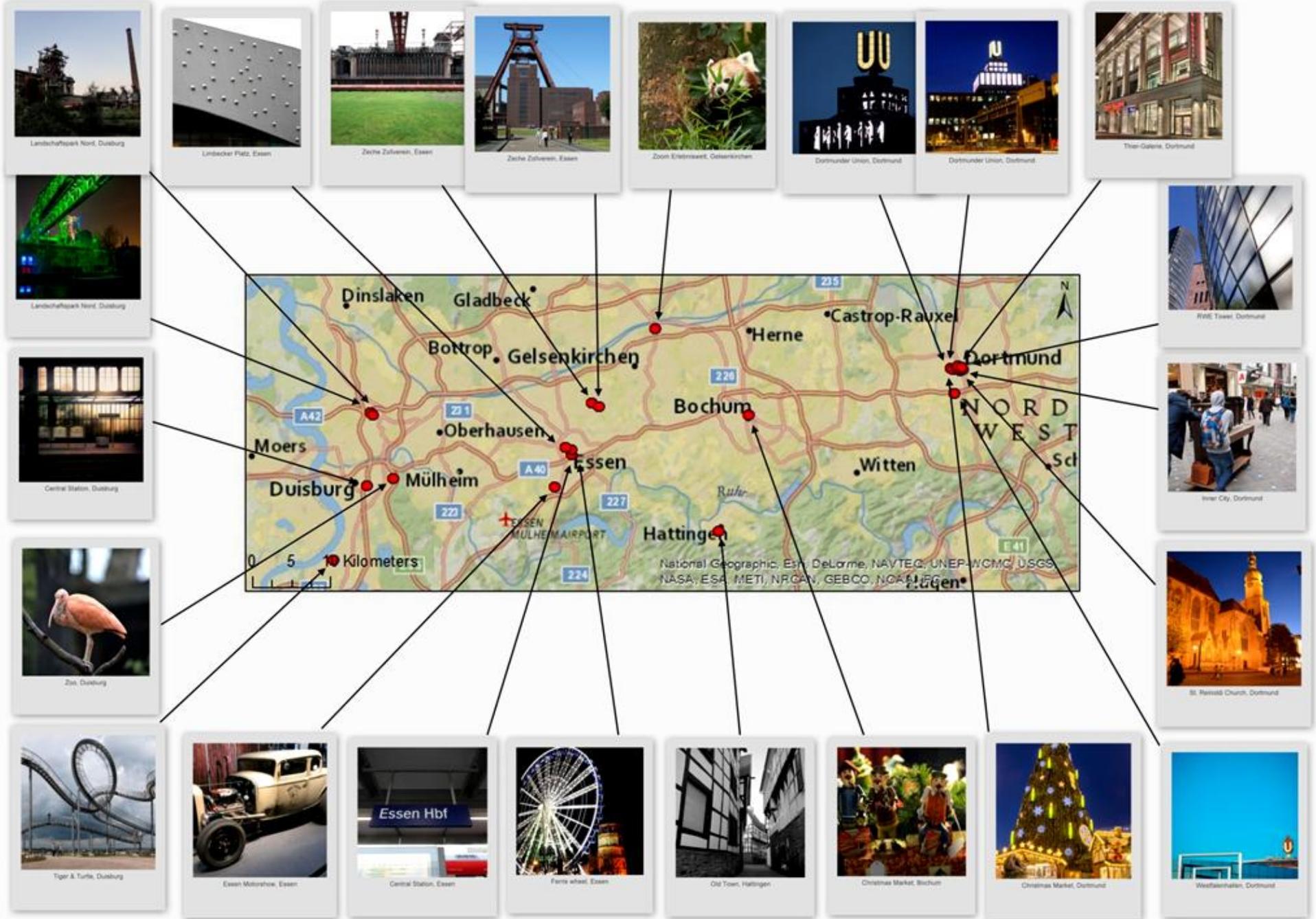
When comparing 2008 (figure 5.3) with 2012 (figure 5.7) there can be seen that only the hot spot in Duisburg, Theater, is not present in 2012 anymore. So, the hot spots that had an impact on the image of the region in 2008 still had an impact in 2012, be it that 'new' hot spots also contribute to the image. The former figures, summarized in table 5.16 and 5.17, show that eight cities were identified of having one ore multiple hot spots. Of the 76 found hot spots 67 (88%) clustered around the cities of Dortmund, Duisburg and Essen. These three cities are therefore expected to dominate the region its image, especially in 2008. 2012 shows hot spots in six different cities, but still the majority is focused on Dortmund, Essen and Duisburg. 2010 does not show a big difference compared to the other years. The only thing that stands out is the high percentage of Essen. As mentioned earlier, this might be due to the fact that Essen got the most attention of all the places in the area while it was seen as the hosting city. The only new city that makes its appearance in 2010 is Oberhausen with the landmark, Gasometer. 2011 shows that Oberhausen was still noticed and that Gasometer still could be seen as a landmark, but in 2012 it did not return as a significant hot spot. Table 5.10 showed the same for the collective tag Gasometer, it also was first seen in 2010, remained visible in 2011 and disappeared in 2012.

Table 5.16 Cities containing hot spots

City	Frequency	Year(s)
Dortmund	25	2008, 2009, 2010, 2011, 2012
Essen	23	2008, 2009, 2010, 2011, 2012
Duisburg	19	2008, 2009, 2010, 2011, 2012
Gelsenkirchen	3	2009, 2010, 2012
Bochum	2	2009, 2012
Oberhausen	2	2010, 2011
Hattingen	1	2012
Hörde	1	2011

Table 5.17 Cities and their influence in percentages

2008	%	2009	%	2010	%	2011	%	2012	%
Duisburg	66,7	Dortmund	42,9	Essen	50,0	Dortmund	35,0	Dortmund	36,4
Essen	16,7	Essen	21,4	Dortmund	21,4	Essen	30,0	Essen	27,3
Dortmund	16,7	Duisburg	21,4						
		Gelsenkirchen	7,1	Duisburg	14,2	Duisburg	25,0	Duisburg	22,7
		Bochum	7,1						
				Oberhausen	7,1	Oberhausen	5,0	Gelsenkirchen	4,5
				Gelsenkirchen	7,1	Hörde	5,0	Bochum	4,5
								Hattingen	4,5

Table 5.18 List of the found hot spots

Landmark	City	Year(s)	Freq.
Landschaftspark Nord	Duisburg	2008 (3); 2009 (3); 2010 (2); 2011 (2); 2012 (2)	12
Zeche Zollverein	Essen	2008; 2009; 2010 (3); 2011 (2); 2012 (2)	9
Limbecker Platz	Essen	2009; 2010; 2011; 2012	4
Dortmunder U	Dortmund	2010; 2011; 2012 (2)	4
Florianturm	Dortmund	2009 (2); 2011	3
St. Reinoldi Church	Dortmund	2008; 2012	2
Central Station	Dortmund	2009; 2011	2
Inner City	Dortmund	2009; 2012	2
Gasometer	Oberhausen	2010; 2011	2
Mövenpick Hotel	Essen	2010; 2011	2
Christmas Market	Dortmund	2010; 2012	2
Zoom Erlebniswelt	Gelsenkirchen	2010; 2012	2
Inner Harbor	Duisburg	2011 (2)	2
Ferris Wheel	Essen	2011; 2012	2
Westfalenhallen	Dortmund	2011; 2012	2
Zoo	Duisburg	2011; 2012	2
Theater	Duisburg	2008	1
Building Demolition	Dortmund	2009	1
Dom	Essen	2009	1
Inner City	Bochum	2009	1
Krüger-Haus	Dortmund	2009	1
Veltins Arena	Gelsenkirchen	2009	1
City Square	Dortmund	2010	1
Grugapark	Essen	2010	1
Inner City	Essen	2010	1
Borussia Dortmund	Dortmund	2011	1
Christmas Market	Essen	2011	1
Hörder Burg	Hörde	2011	1
Old Stadthaus	Dortmund	2011	1
Signal Iduna Park	Dortmund	2011	1
Central Station	Duisburg	2012	1
Central Station	Essen	2012	1
Christmas Market	Bochum	2012	1
Essen Motorshow	Essen	2012	1
RWE Tower	Dortmund	2012	1
Old Town	Hattingen	2012	1
Tiger & Turtle	Duisburg	2012	1
Thier-Galerie	Dortmund	2012	1

Table 5.18 shows a list of the landmarks found with the hot spot analysis and their occurrence during the investigated period. A total of 38 different landmarks were found of which 16 (42,1%) occurred more than once. The most popular landmark in the Ruhr area is Landschaftspark Nord located in Duisburg. It was collectively 'voted' 12 times by the users during the five year period. In this research photos within 100 meters of each other were chosen to snap to the same location. The reason that Landschaftspark Nord, but also others landmarks, could occur several times in one year is because of the size of the landmark and the geographical location from which people chose to photograph it. Landschaftspark Nord extends is an area of about 180 hectares where *"nature, industrial heritage and a fascinating light installation combine to create a park landscape unlike any other in the world"* (Landschaftspark Duisburg-Nord, 2010). The centre of the park is a disused ironworks whose old industrial facilities are used in many ways. It for example accommodates a diving centre, gardens in ore storage bunkers and viewing towers. Figure 5.8 shows the 12 representative images of Landschaftspark Nord. The industrial elements play a big role in the image of this particular landmark, but also lighting seems to play a big role in the photos. This could be a reason why the subcategory Color is so large in table 5.13.

Figure 5.8 Representative image of Landschaftspark Nord
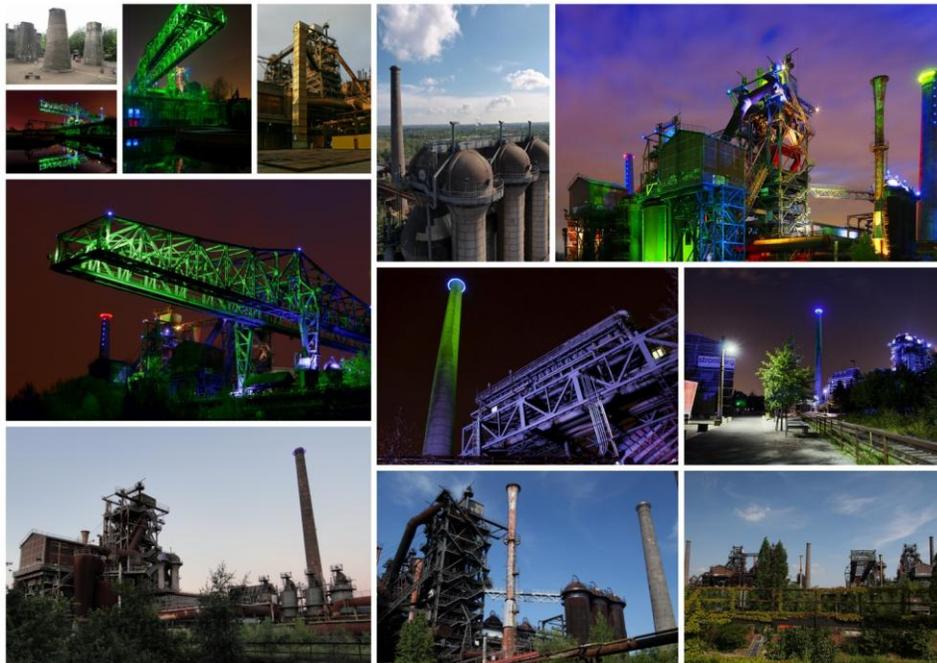
The landmark chosen by the planners of Ruhr.2010 to exemplify the transformation of the Ruhr area, Zeche Zollverein, is also 'voted' by the users as an important landmark. The different representative images, see figure 5.9, of the landmark show the industrial side of the landmark, but modernist architecture as well.

Figure 5.9 Representative image of Zeche Zollverein
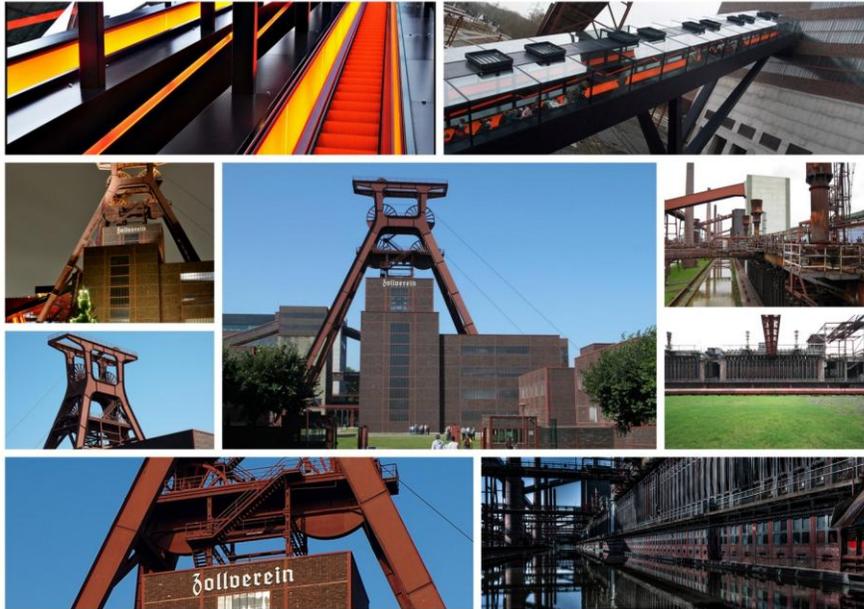
Table 5.18 shows that eight landmarks made their first appearance in the year the event took place, so the event did seem to change the cognitive image, based on landmarks, of the region in 2010. However, of these eight landmarks four occurred in one of the following years and only one landmark appeared in both years after 2010 and that was the Dortmunder U, a centre for arts and creative industries, located in Dortmund. According to Dortmund does the Dortmunder U, see figure 5.10, symbolizes architectural renewal. *"The "U" fills the role of powerhouse and catalyst at the interface between architecture, art, culture, education and the creative industry"* (Dortmund, 2010). Just like Zech Zollverein, the Dortmunder U is not only promoted by the Ruhr planners to represent a landmark, it is also 'voted' by 'participants' as a landmark.

Figure 5.10 Representative image of Dortmunder U

Chapter 6. Conclusions and discussion

The main question for this research, posed in chapter one, was: *'How can social media be used to describe a changing image of a region?'* This study showed a method in which this was possible, by looking at Flickr. It gives an indication how one kind of social media can be used to describe a changing image of a region.

The Ruhr.2010 case was carried out to show a method how a large collection of, in this research nearly 91 thousand, geo-tagged photographs taken from Flickr can be analyzed. Filtering collected data proved to be a good option to get suitable results for further analyzing. With the Ruhr.2010 case filtering prevented imbalances in the final results, while the aim of the study was to make the input of every individual of equal importance. A user providing one case was just as important as a user providing multiple cases. Another attribute of filtering is that the procedure can save the researcher time and costs, nevertheless it has to be done with care, while it can lead to the loss of valuable information. Before filtering the researcher has to make clear what he/she wants to achieve. A firm phased and transparent plan, which later on may also be used by other researchers, can be of use with this.

This study presents a tag based approach for measuring a regional image and a technique that is more focused on visual analysis, the hot spot analysis, which identifies places that people find interesting to photograph, showing results for locations at a regional scale. Measuring regional image, a mix of cognitive and affective elements related to location, public space, cultural-history, economics and technology, social, political and atmospheric dimensions, is a good reference point for evaluating the perception of the visitors and residents of the region. Comparing the percentages of the dimensions (categories and including subcategories) over the years makes it possible to see if the collective image based on these dimensions is changing. The collective tags found in this research are mainly grouped in the dimensions location, public space, economics and technology and atmosphere. Figure 5.2 showed changes in the dimensions for the Ruhr area from 2008 until 2012. Thus, although a regional image can be persistent, it is susceptible to change. These changes might have long lasting effects and therefore only looking at five years might be too short. Doing the same research again in five or ten years could show very different results. Yet, the outcomes can give an insight into collective tagging behavior. The results of the tag analysis on the Ruhr area for example showed that since Ruhr.2010 users are tagging on a local level, which could indicate that more cities and towns are mentioned by users of Flickr. The change in image based on tags in this research was not tested on significance, however it might be interesting to run statistical tests on the collective tags. Is there a significant change noticeable between years?

With the hot spot analysis geo-tagged images were clustered into significant hot spots (landmarks), after which the representative images for each geo-tagged landmark was selected. The results show that this method is helpful to find places of interest. The visual analysis showed that the focus of the users is mainly on the three big cities of Dortmund, Essen and Duisburg. The image of the region is therefore most likely largely dependent on these cities and this could be used for example by planners. In trying to change the image of the region they can decide to focus on the big cities of the

region, since they dominate the region its image. Just by trying to modify the image of the three big cities the regional image could also change. A complete different way in which the planners could change the image is not by focusing on the big cities, but by focusing on the lesser known or unknown cities and towns. These lesser known towns can be influential in the eventual regional image, so promoting these towns might be a better option than promoting the well known big cities. Table 5.7 showed that since the year of the event, the amount of collective tagged places increased from 11 to 16, so since 2010 more places are 'consumed' by people. The image of these 'new discovered' places can affect the overall image of the region. The results from the tags and the hot spot analysis for example could be used by planners as an online travel guidebook, while it identifies the most popular sites of the region, as voted by users. They can possible build a recommendation system based on the representative tags and images found in this research.

Like most studies, this research has its limitations. Flickr is also just one kind of social media and therefore is not representative for social media. According to Lee et al. (2011), the biggest limitation of Flickr, and thus also social media, is that it is not likely to be representative for the general population. Flickr attracts a particular type of person who is willing to share his/her photos and while this group is rapidly increasing it still does not represent the general population as a whole. For example, few Asians use Flickr (Lee et al., 2011).

This research focuses just on one region, the Ruhr area. As mentioned before, the coordinates for the bounding box were set by the researcher, possible leading to missed data. Also only geo-tagged data were used and therefore photos without these data (which could be hundreds or even thousands) were missed.

The dilemma with tags used on Flickr is that they are freely entered and are not associated with an ontology or any type of categorization. Tags for that reason were sometimes inaccurate, wrong or vague. This research shows that it is easier to make assumptions on cognitive elements than on affective ones. Because of personal factors people tag in other ways. A tag describing a landmark like the Dortmunder Union is easy to understand, but a tag like Old can be interpreted in various ways. Some people see Old, for example regarding to an industrial sight, as a positive thing, while others might see it as something that is negative. To really understand the meaning behind tags further investigation is an option. This perhaps could include analyzing titles or captions of the photos and responses to these photos. Maybe questioning the users of the photos could be an option to better understand the elements. It is also recommended to be somewhat familiar with the area that is being researched. Visiting the Ruhr area for this study made it easier to ascribe some of the collective tags to a particular (sub)category.

Some 'irrelevant' tags had a relatively large impact on the results, for example the tag Instagram. This tag and associated tags (e.g. Earlybird, App, Pro, Uploaded) caused a large change in the category Economics and technology, but are not really important regarding the image of the Ruhr region. Some tags, categories and/or subcategories thus might have better been left out after the coding process was finished, though the risk of it is that too much is left out. Also, by removing categories, subcategories and/or tags the researcher might adjust the final outcomes in his/her favor. For these reasons every collective tag that was found is used in this research.

In the research process a firm phased plan was made and even as every effort was made to ensure that the tag categories developed for the classification remained exclusive and independent of one

another, some tags could lie between categories or equally well in multiple categories. For example the tag graffiti in this research is placed under the subcategory Negative experience from the category Atmosphere. However some people would argue that is art and therefore should be placed under the subcategory Art from the category Cultural-history. Also with ascribing photos to subsets some problems occurred, because not all the photos were easy to understand and therefore to place among possible subsets. In those cases the lines ultimately drawn were subjective.

The ways of collecting and analyzing metadata are relatively new and therefore some questions can be raised regarding this study. In this research the tag based analysis and the visual analysis were done separate of each other, but it might be interesting to perform the tag based analysis after the hot spot analysis is finished. Only tags and hot spots with a least ten different users, based on the threshold of previous studies, were selected in this research. This approach to select collective tags and representative images is believed to be done correctly, but it is not clear how many photos are needed of a given region and from how many photographers, before meaningful results are available. This study also does not take personal factors into account and does not make distinctions between the 'participants'. It combines residents with tourist for instance, but maybe it is also interesting to compare these two groups. Do their images differ greatly?

The results from this research show that social media has the potential to be used as an academic resource, be it that it might be more suitable for some academic disciplines and objectives than others. It depends on the subject and goals of the researcher. At this time there simply is not an approach that can explain and analyze the broad concept of social media. Though, the usage of social media most likely further will increase in the coming years, as more and more people from all over the world gain access to it. This ensures a growing amount of data available for researchers to use and analyze. The great advantage of social media is the time and cost it takes to get information. Increasing daily, social media can provide billons of cases, but it also offers the possibility to access data in retrospect. Information for research over longer periods and sometimes from years ago can easily be downloaded in a short amount of time. In addition time, costs and subjectivity with regard to interviews and surveys can be avoided. The lack of intervention of the researcher in this approach ensures that the 'participants' are not steered towards subjects, which ensures 'objective' results. Still, as said before, there is always some kind of subjectivity involved in this way of researching, for example with coding and categorizing, though this subjectivity might decrease in the future because the more research is done, the stronger the scientific foundation regarding social media research will become. In the end it might be possible to combine the results of different kinds of social media.

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Appendix I. Categorizing and coding

On providing a transparent research, the categories and subcategories are shown in which the dimensions of an image are classified. Where necessary a code is complemented with examples. The categories and subcategories are a combination of own interpretation combined with the prior work of Luque-Martinez et al. (2007) and Beerli & Martin (2005).

Location

Subcategory	Examples
Global	World
Continental	Europe, Asia
National	Germany, France
Regional	Ruhr area, Tuscany, Côte d'Azur
Local	Essen, Amsterdam

Public Space

Subcategory	Examples
Urban space	Squares, buildings / architecture (other than religious buildings, port, station, concert building)
Natural space	Parks, (public) green
Environment/Ecology	Flora and fauna, air quality, beach, lakes, mountains
Infrastructure and transport	(public and private) transport, infrastructure, parking, accessibility

Cultural-history

Subcategory	Examples
Culture	Folklore
Events	Festivals, events
Monument/sight	Historic buildings, monuments, sights
Religion	Religious buildings or persons
Art	Paintings, street art
Public figures	
Music	

Economics and technology

Subcategory	Examples
Facilities	Health centers, supermarkets, municipal facilities, tourist information centres, station
Leisure and recreation	Café, restaurant, hotels, casinos, terrace, concert, traveling
Sport	Sporting(activities)
Education	School, University, education level
Reside	Houses, dwelling
Vigor	Offices, shops (retail), harbor, brand names,
Employment	Jobs
Developments and innovation	Risks, innovation
Telecommunications	Instagram, phone

Social

Subcategory	Examples
Attainability	Meetings with population (polite, modern/old-fashioned, (in)active), friends, family
Demographic composition	Gender, multicultural
Private	Portrait, birthday, hobby

Atmosphere

Subcategory	Examples
Positive experience	Attractive, fun, pride, satisfaction
Negative experience	Boring, dissatisfied, stressful
Reputation	Stylish, modern, historical, international, (un)safe, beautiful, unattractive
Atmosphere	Luxurious, exotic, mystical, relaxed, climate, weather, seasons
Color	

Appendix II. Collective tags

Category Location with subcategories

2008		
Tag	**Users**	**Location**
europe	12	Continental
europa	10	
germany	143	National
deutschland	86	
deu	14	
nrw	69	Regional
ruhrgebiet	55	
westfalen	51	
nordrhein	43	
ruhr	38	
rhine	31	
ruhrpott	29	
westphalia	28	
north	23	
nord	16	
rhein	15	
dortmund	83	Local
duisburg	72	
essen	62	
bochum	44	
oberhausen	27	
mülheim	15	
gelsenkirchen	14	
hattingen	13	
bottrop	12	
herne	11	
recklinghausen	10	

2009		
Tag	**Users**	**Location**
world	10	Global
europe	17	Continental
europa	11	
germany	144	National
deutschland	98	
deu	12	
ruhrgebiet	79	Regional
nrw	74	
westfalen	48	
ruhr	47	
nordrhein	44	
ruhrpott	27	
rhine	25	
north	20	
westphalia	20	
rhein	14	
nord	14	
dortmund	93	Local
essen	79	
duisburg	78	
bochum	46	
oberhausen	30	
gelsenkirchen	22	
recklinghausen	14	
mülheim	12	
bottrop	11	
hattingen	11	
witten	10	

2010		
Tag	**Users**	**Location**
world	11	Global
europe	21	Continental
europa	19	
germany	174	National
deutschland	124	
deu	16	
duitsland	12	
ruhrgebiet	95	Regional
nrw	85	
westfalen	64	
ruhr	61	
nordrhein	59	
nord	31	
ruhrpott	31	
rhine	20	
north	17	
rhein	16	
westphalia	16	
essen	114	Local
duisburg	108	
dortmund	89	
bochum	39	
oberhausen	34	
gelsenkirchen	23	
halde	20	
bottrop	15	
herne	13	
baldeneysee	12	
hattingen	12	
recklinghausen	12	
krefeld	11	
mülheim	11	
herten	10	
witten	10	

2011		
Tag	**Users**	**Location**
world	14	Global
europe	18	Continental
europa	11	
germany	149	National
deutschland	118	
duitsland	13	
deu	12	
nrw	85	Regional
ruhrgebiet	78	
westfalen	70	
ruhr	52	
ruhrpott	36	
rhein	26	
nord	21	
rhine	20	
west	15	
north	13	
westphalia	13	
niederrhein	11	
dortmund	129	Local
duisburg	109	
essen	92	
bochum	49	
oberhausen	43	
gelsenkirchen	39	
herne	20	
bottrop	15	
düsseldorf	13	
hagen	13	
halde	13	
krefeld	13	
recklinghausen	13	
hattingen	12	
herten	12	
mülheim	10	

2012		
Tag	**Users**	**Location**
world	16	Global
europe	22	Continental
europa	16	
germany	158	National
deutschland	130	
duitsland	11	
ruhrgebiet	111	Regional
nrw	86	
westfalen	82	
ruhr	75	
nordrhein	73	
ruhrpott	53	
rhein	25	
nord	24	
rhine	23	
westphalia	20	
north	18	
west	10	
dortmund	114	Local
essen	114	
duisburg	111	
bochum	56	
oberhausen	35	
gelsenkirchen	27	
halde	25	
hattingen	21	
herne	21	
mülheim	16	
bottrop	15	
krefeld	13	
witten	13	
düsseldorf	12	
hagen	10	
moers	10	

Category Public Space with subcategories

2008		
Tag	**Users**	**Public Space**
city	26	Urban space
architecture	23	
brücke	17	
wall	16	
street	16	
tower	16	
bridge	15	
building	14	
rathaus	14	
strasse	13	
stairs	12	
gebäude	12	
turm	11	
fenster	11	
treppe	10	
platz	10	
architektur	10	
park	22	Natural space
panorama	17	
landscape	11	
area	11	
kanal	10	

2008		
Tag	**Users**	**Public Space**
wasser	24	Environment/Ecology
water	21	
nature	19	
baum	17	
plant	16	
tree	16	
see	15	
flowers	15	
natur	14	
river	13	
blume	12	
flower	11	
bahn	22	Infrastructure and transport
train	18	
car	15	
mercedes	12	
zug	12	
eisenbahn	11	
benz	11	
auto	10	

2009		
Tag	**Users**	**Public Space**
architecture	21	Urban space
architektur	20	
city	18	
brücke	16	
fenster	16	
strasse	16	
tower	16	
street	15	
bridge	13	
gebäude	10	
stadt	10	
stairs	10	
wall	10	
park	21	Natural space
panorama	17	
area	12	
westfalenpark	12	
landscape	10	

2009		
Tag	**Users**	**Public Space**
nature	21	Environment/Ecology
wasser	20	
natur	18	
water	18	
see	17	
tree	17	
flowers	14	
trees	13	
hund	12	
lake	12	
baum	11	
animal	10	
bird	10	
blumen	10	
flower	10	
tiere	10	
vogel	10	
bahn	18	Infrastructure and transport
auto	17	
car	16	
train	16	
eisenbahn	10	

2010		
Tag	**Users**	**Public Space**
architecture	31	Urban space
street	26	
architektur	26	
city	25	
bridge	18	
brücke	17	
strasse	17	
tower	15	
platz	14	
stairs	14	
treppe	14	
animal	13	
building	13	
window	13	
innenstadt	11	
wall	11	
gebäude	10	
turm	10	
park	33	Natural space
garten	16	
panorama	16	
landscape	12	
area	11	
kanal	10	
landschaft	10	

2010		
Tag	**Users**	**Public Space**
wasser	28	Environment/Ecology
water	25	
baum	24	
natur	23	
tree	22	
flower	21	
nature	19	
see	16	
trees	15	
blumen	13	
animals	11	
flowers	11	
river	11	
bäume	10	
lake	10	
wald	10	
train	18	Infrastructure and transport
car	15	
bahn	14	
autobahn	12	
auto	11	
railway	11	

2011		
Tag	**Users**	**Public Space**
architecture	26	Urban space
city	23	
brücke	22	
street	22	
architektur	19	
strasse	16	
bridge	13	
building	12	
window	12	
stadt	11	
gebäude	10	
rathaus	10	
tower	10	
park	26	Natural space
landscape	17	
garten	16	
westfalenpark	15	
landschaft	14	
panorama	14	
kanal	12	
garden	11	

2011		
Tag	**Users**	**Public Space**
tree	27	Environment/Ecology
wasser	25	
water	25	
baum	24	
nature	21	
see	20	
natur	18	
trees	17	
bäume	14	
bird	14	
flower	14	
tiere	14	
vogel	14	
blumen	13	
river	13	
wald	13	
animal	12	
blume	12	
flowers	12	
lake	10	
tier	10	
vögel	10	
train	22	Infrastructure and transport
bahn	20	
zug	14	
eisenbahn	13	
car	12	
bus	11	

2012		
Tag	**Users**	**Public Space**
street	34	Urban space
city	32	
architecture	31	
brücke	22	
stadt	22	
strasse	22	
bridge	21	
window	18	
architektur	18	
tower	17	
building	14	
gebäude	14	
fenster	13	
stairs	13	
wall	13	
tunnel	12	
rathaus	11	
turm	11	
door	10	
fassade	10	
glass	10	
platz	10	
schaufenster	10	
park	33	Natural space
landscape	24	
kanal	22	
landschaft	17	
garten	15	
panorama	15	

2012		
Tag	**Users**	**Public Space**
tree	34	Environment/Ecology
nature	31	
natur	30	
baum	29	
wasser	29	
water	27	
see	25	
wald	22	
trees	19	
animal	15	
forest	15	
river	15	
tier	15	
tiere	15	
bäume	13	
blume	12	
vogel	12	
wood	12	
flower	11	
flowers	11	
blumen	10	
car	25	Infrastructure and transport
bahn	24	
auto	17	
hudson	17	
train	16	
oldtimer	14	
zug	14	
eisenbahn	13	
railway	13	
route	13	
cars	10	
fahrrad	10	
schiff	10	
tram	10	

Category Cultural-history with with subcategories

2008		
Tag	**Users**	**Cultural-history**
christmas	19	Events
weihnachten	18	
event	14	
landschaftspark	30	Monument/sight
zeche	23	
schloss	14	
zollverein	14	
zoom	10	
kirche	21	Religion
church	14	
art	18	Art

2009		
Tag	**Users**	**Cultural-history**
kultur	10	Culture
christmas	15	Events
weihnachten	11	
zeche	29	Monument/sight
landschaftspark	23	
zollverein	17	
museum	16	
schloss	14	
innenhafen	10	
kirche	11	Religion
church	10	
art	12	Art
kunst	12	

2010		
Tag	**Users**	**Cultural-history**
culture	14	Culture
kultur	13	
heritage	10	
weltkulturerbe	10	
ruhr2010	39	Events
schachtzeichen	18	
weihnachten	15	
christmas	14	
weihnachtsmarkt	10	
zeche	46	Monument/sight
zollverein	45	
landschaftspark	36	
museum	31	
innenhafen	17	
zoom	16	
hochofen	11	
kokerei	11	
gasometer	10	
kirche	19	Religion
church	16	
art	25	Art
kunst	21	

2011		
Tag	**Users**	**Cultural-history**
heritage	12	Culture
weltkulturerbe	10	
christmas	10	Events
zeche	51	Monument/sight
zollverein	41	
landschaftspark	30	
museum	30	
kokerei	18	
innenhafen	16	
schloss	14	
gasometer	13	
zoom	13	
burg	12	
castle	12	
mine	12	
dortmunder u	10	
kirche	18	Religion
church	14	
art	19	Art
musik	11	Music

2012

Tag	Users		Cultural-history
kultur		15	Culture
culture		13	
heritage		12	
weltkulturerbe		12	
christmas		12	Events
kirmes		10	
weihnachten		10	
weihnachtsmarkt		10	
zollverein		47	Monument/sight
zeche		46	
landschaftspark		40	
museum		34	
tiger & turtle		17	
schloss		16	
zoom		16	
kokerei		12	
dortmunder u		11	
hochofen		11	
denkmal		10	
innenhafen		10	
union		10	
kirche		21	Religion
church		18	
art		30	Art
kunst		23	
krupp		14	Public figures
lord kelvin		12	

Category Economics and technology with subcategories

2008		
Tag	**Users**	**Economics and tech.**
bahnhof	12	Facilities
station	11	
lights	10	
zoo	16	Leisure and recreation
fussball	13	Sport
football	11	
soccer	10	
haus	17	Reside
house	10	
industrie	31	Vigor
industry	26	
canon	25	
nikon	21	
iphone	13	
hafen	11	
steel	16	Developments and innovation
stahl	11	
coal	10	
geotagged	52	Telecommunications
hdr	30	
eos	17	
100	11	
camera	11	
exposure	11	

2009		
Tag	**Users**	**Economics and tech.**
station	20	Facilities
bahnhof	14	
hauptbahnhof	12	
zoo	18	Leisure and recreation
tour	12	
konzert	10	
fussball	10	Sport
universität	10	Education
haus	14	Reside
canon	33	Vigor
industrie	33	
nikon	33	
industry	21	
iphone	21	
steel	15	Developments and innovation
stahl	11	
coal	10	
geotagged	36	Telecommunications
hdr	24	
eos	17	
50mm	13	
macro	12	
bokeh	11	

2010		
Tag	**Users**	**Economics and tech.**
station	18	Facilities
bahnhof	14	
lights	13	
hauptbahnhof	10	
zoo	23	Leisure
film	12	and recreation
hotel	12	
restaurant	10	
fussball	15	Sport
iduna	11	
haus	13	Reside
house	10	
canon	43	Vigor
industry	34	
industrie	31	
nikon	27	
iphone	18	
steel	17	Developments
coal	14	and innovation
stahl	11	
kohle	10	
eos	23	Telecommunications
hdr	23	
geotagged	22	
photography	13	
50mm	11	
a40	11	
photo	11	
camera	10	
pentax	10	

2011		
Tag	**Users**	**Eco. and tech.**
station	13	Facilities
bahnhof	12	
lights	11	
gear	10	
zoo	34	Leisure
film	18	and recreation
bvb	23	Sport
fussball	22	
bundesliga	15	
soccer	15	
borussia	12	
football	11	
sport	10	
house	13	Reside
haus	13	
canon	46	Vigor
industrie	28	
nikon	25	
industry	23	
iphone	20	
hafen	12	
steel	16	Developments
coal	10	and innovation
iphoneography	52	Telecommunications
instagram	51	
uploaded	49	
app	48	
hdr	34	
eos	25	
pro	25	
lomo	23	
geotagged	16	
hefe	15	
macro	15	
50mm	14	
hipstamatic	13	
analog	11	
camera	10	
nikkor	10	
photo	10	

2012		
Tag	**Users**	**Economics and tech.**
station	21	Facilities
bahnhof	20	
hauptbahnhof	14	
gear	12	
lights	10	
hbf	10	
zoo	38	Leisure and recreation
film	20	
bvb	15	Sport
fussball	12	
sport	11	
haus	20	Reside
industrie	44	Vigor
canon	38	
industry	29	
nikon	28	
flickr	27	
iphone	22	
hafen	16	
mine	14	
sony	11	
bank	10	
model	10	Employment
steel	22	Developments and innovation
coal	14	
stahl	14	
fluss	11	
beton	10	

2012		
Tag	**Users**	**Economics and tech.**
uploaded	130	Telecommunications
instagram	115	
iphoneography	113	
app	110	
pro	35	
hdr	33	
flickrandroidapp	22	
mobile	21	
amaro	20	
earlybird	20	
eos	20	
hefe	20	
flickriosapp	19	
rise	19	
photo	18	
exposure	17	
photography	15	
hipstamatic	12	
50mm	11	
bokeh	11	
35mm	10	
sierra	10	

Category Social with subcategories

2008

Tag	Users	Social
sign	13	Attainability
schild	10	
people	13	Demographic composition
portrait	11	Private

2009

Tag	Users	Social
people	10	Demographic composition
portrait	12	Private

2010

Tag	Users	Social
signal	16	Attainability
schild	13	
sign	12	
people	21	Demographic composition
european	12	
man	12	
portrait	20	Private

2011

Tag	Users	Social
german	12	Demographic composition
fans	11	
people	11	
man	10	
portrait	18	Private

2012

Tag	Users	Social
people	17	Demographic composition
girl	13	
german	12	
man	12	
woman	11	
portrait	19	Private
brannan	12	

Category Atmosphere with subcategories

2008 Tag	Users	Atmosphere
sonnenuntergang	12	Positive experience
sunset	11	
power	10	
decay	12	Negative experience
rust	11	
industriekultur	17	Reputation
industrial	15	
old	15	
alt	14	
urban	11	
night	37	Atmosphere
light	25	
nacht	22	
sky	20	
himmel	19	
herbst	18	
licht	17	
clouds	16	
wolken	16	
sonne	14	
dark	13	
reflection	13	
long	13	
sun	12	
winter	12	
autumn	11	
schnee	10	
regen	10	
blue	30	Color
white	26	
black	22	
red	22	
green	17	
yellow	13	
weiss	12	
blau	12	
schwarz	10	
orange	10	

2009 Tag	Users	Atmosphere
sonnenuntergang	19	Positive experience
sunset	12	
live	11	
graffiti	10	Negative experience
industriekultur	17	Reputation
industrial	16	
winter	37	Atmosphere
light	31	
snow	31	
night	30	
schnee	28	
nacht	24	
sky	22	
himmel	21	
licht	20	
spring	17	
herbst	15	
sonne	15	
wolken	15	
sun	14	
clouds	13	
autumn	12	
ice	11	
frühling	11	
sommer	10	
spiegelung	10	
blue	30	Color
red	23	
white	22	
black	21	
blau	21	
green	20	
rot	19	
weiss	15	
schwarz	13	
grün	12	
orange	12	

2010		
Tag	**Users**	**Atmosphere**
sonnenuntergang	16	Positive experience
sunset	15	
schatten	11	
graffiti	12	Negative experience
cold	10	
industriekultur	34	Reputation
kulturhauptstadt	28	
urban	18	
industrial	16	
bergbau	12	
capital	10	
white	46	Color
black	40	
blue	25	
red	23	
weiss	22	
green	19	
schwarz	19	
rot	15	
grün	14	
orange	14	
blau	13	
yellow	12	
grey	11	

2010		
Tag	**Users**	**Atmosphere**
winter	54	Atmosphere
schnee	44	
night	41	
snow	40	
light	31	
nacht	31	
sun	23	
licht	21	
sonne	18	
sky	16	
dark	14	
himmel	14	
spring	13	
sommer	12	
ice	11	
frühling	11	
reflection	11	
summer	11	
eis	10	
clouds	10	
herbst	10	
spiegelung	10	

2011		
Tag	**Users**	**Atmosphere**
sonnenuntergang	23	Positive experience
sunset	17	
live	12	
nachtaufnahme	12	
sunrise	10	
graffiti	13	Negative experience
industriekultur	22	Reputation
industrial	21	
old	16	
alt	13	
urban	11	
white	32	Color
black	30	
blue	21	
yellow	17	
green	16	
gelb	14	
schwarz	14	
weiss	14	
grün	12	
color	11	
blau	10	

2011		
Tag	**Users**	**Atmosphere**
night	32	Atmosphere
herbst	25	
light	25	
sky	25	
sun	21	
clouds	20	
autumn	19	
himmel	19	
red	19	
wolken	19	
licht	17	
nacht	16	
sonne	16	
reflection	12	
frühling	11	
winter	11	
nebel	10	
spiegelung	10	
summer	10	

2012		
Tag	**Users**	**Atmosphere**
sunset	18	Positive experience
sonnenuntergang	17	
normal	13	
love	11	
nachtaufnahme	11	
schatten	11	
sunrise	11	
magic	10	
messe	10	
sonnenaufgang	10	
graffiti	20	Negative experience
abandoned	12	
industriekultur	31	Reputation
industrial	29	
urban	23	
old	21	
bergbau	14	
alt	11	
vintage	10	
white	46	Color
black	45	
red	37	
blue	31	
weiss	29	
green	25	
rot	21	
schwarz	21	
blau	20	
yellow	19	
gelb	16	
schwarzweiss	15	
grün	14	
color	11	
gold	10	

2012		
Tag	**Users**	**Atmosphere**
light	42	Atmosphere
night	42	
licht	29	
nacht	29	
herbst	28	
himmel	26	
sky	26	
wolken	26	
clouds	23	
sonne	23	
autumn	20	
winter	20	
sommer	18	
summer	17	
frühling	16	
spring	15	
sun	15	
fog	14	
schnee	14	
eis	12	
reflection	12	
shadow	12	
spiegelung	12	
dark	11	
fall	11	
silhouette	11	
ice	10	
design	10	
high	10	
morning	10	
nebel	10	