Salvatore Iaconesi
Emotional Landmarks in Cities. The Emotional Life of Cities as Expressed on Social Networks

Emotional Landmarks in Cities

The Emotional Life of Cities as Expressed on Social Networks

by Salvatore Iaconesi

1. Arriving in Sao Paulo

When we first arrived in Sao Paulo for our project in 2012, we were immediately overwhelmed.

We had already been in the city before. But this time it was different. We were about to start a research project whose objective was to gain better understandings about the public spaces of the city, by using social media. Thus we were on the lookout, alert, in a state of constant aware observation.

As soon as we left the airport, the city presented itself to us through a massive traffic jam in which the smells of pollution and the expressions of agitation and anxiety were more than palpable: from the movement of the cars across the lanes of the highway connecting the Guarulhos airport to the city; to the facial expressions of drivers in the other vehicles.

When we reached the city, heading for our hotel, the city continued to assault us through its features. Extreme differences in wealth, pollution, the jungle of concrete, the vegetation that seemed to be pushing in real-time to grow out of the constraints of bushes and flower beds. People also performed a polyphonic and dissonant symphony, ranging from busy businessmen, homeless people, citizens minding their own daily routines, up to the dwellers of bars, relaxed and calm, chatting with their table neighbours, or simply watching people go by.

By the end of the journey from airport to hotel, we had changed our emotional state dozens of times, turning from curiosity, to fear, happiness, anxiety, sadness, surprise and more.

Some of these changes were due to the urban landscape. The alternating of skyscrapers, favelas, modern architectures, post-modern in-betweens, bars, worn-out buildings, parks, squares and their conditions suggested emotional voyages with their sequence and characteristics.

On the other hand, our emotional changes were prompted by city dwellers, their presence or absence, their behaviours, their activities and expressions: beautiful squares could become scary; awful street corners could turn into happy spaces for colourful bar conversations; highway underpasses could become places of joy or fear depending on the context, population and time of day; parks may seem shady or suspicious depending on who was there, what they seemed to be doing, or through the absence of people. Streets, skyscrapers, sidewalks and even sculptures, signs and shopping centres completely changed for us, according to how city dwellers occupied them, what they expressed.

After a few days, our perception of spaces in the city radically transformed. Progressively, we became able to read additional layers in the city's landscape, recognizing patterns, gestures, activities and interactions which were not readable in our first immersion in the urban environment. We started discovering places which, at certain times of the day or of the week, completely changed their characteristics, due to the presence of different mixes of people, dress-codes, styles of spatial appropriation, facial expressions and emotional character.

The emotional expression in places transformed the ways in which we experienced them, thus provoking different emotional responses on our side. It was an interesting feedback loop. It was an emotio-spatial hermeneutic:

> "Emotions are understandable – 'sensible' – only in the context of particular places. Likewise place must be *felt* to make sense." [Davidson and Milligan 2004, 524]

In some partially elusive ways – through representation and other modalities – emotions, and places, times and contexts are interconnected.

2.   Multi-Modal Emotional Expressions

> "Emotions are systemic and interact constantly with our conscious and unconscious selves, memories and environment; they enframe the rational and not vice versa." [Jones 2005, 205]

In his "*Ecology of Emotion, Memory, Self and Landscape*", Jones [*ibidem*] draws from Damasio [1994] in explaining the mechanisms according to which we feel and express emotions through an ecosystem of modalities which are contextual and only partially controllable, or part of ourselves. Memory, for example, is not just a retrieval of the past, but also something which is not controllable: we are not aware and we cannot really control how memories are mapped onto us. Memory is also spatial [Philo 2003], involuntary [Game 1991; 2001], embodied [Casey 1987].

All these types of memory are among the most fundamental constituents of our emotional expressions, their spatial characteristics allowing to describe what Philo [2003] calls "*geographical imagination.*" The term, derived by David Harvey [1973] from Mills' "*sociological imagination*" [1961], then expanded by Gregory [1994] to reach its currently most accepted formulation, is explained by Massey:

> "It is probably now well accepted, though it is still important to argue, that a lot of our 'geography' is in the mind. That is to say we carry around with us mental images of the world […] All of us carry such images, they may sometimes be in conflict or even be the cause of conflict, and digging these things up and talking about them is one good way in to beginning to examine what it means to think geographically." [2006, 48]

By recalling and recombining the characteristics of places, spaces, contexts and situations from our memories – from our mental maps of our current and previous locations which we have explored – and interweaving them with the current context and with our sensorial experience of place, signage, iconography, the visual representations of language, sounds, olfactory stimuli and other elements, we reconstruct the patterns which lead to our emotional condition and expression.

With mobile devices, such as smartphones and tablets, we have become able to produce and experience a continuously evolving *infoscape* – the layer of information which forms our experience of the world, together with the physical landscape. Through social networks and other services and tools, hundreds of millions of human beings from every part of the world have become able to express our emotions, points of view, desires, expectations and wishes in ways that are able to influence others' actions, decisions and emotions, by producing ubiquitously accessible and situated memories, images, texts.

Through this production we have become a peculiar type of sculptors, transforming our ephemeral, transient, temporary perceptions and expressions into tangible artefacts, which are disseminated in the environment. While traversing public spaces, shopping centres, offices, schools and streets, social network users constantly publish images and texts which establish relations with these environments. When accessed, they form a new layer of reality. It's the *City of Bits* [Mitchell 1996], the *Di-*

gital Ground [McCullough 2005], *DigiPlace* [Zook and Graham 2007] and the many other definitions which are becoming popular in these years. These artefacts can now substantially contribute to the formation of our everyday experience of cities.

Thus, the physical, mental and digital layers of the city become interconnected and interweaved, each one influencing the experience of the other.

Social networking services – whether they are for personal relations, rating restaurants, tourism or other – constitute such opportunities. On the one hand to express emotions and opinions. On the other hand, to be experienced as outsourced memories and annotations of places in the city, thus influencing our experiences.

For example, as indicated by Kinkaid [2011] and Nielsen Wire [2010], the *Yelp* service has became a massive source of outsourced experiences for users of all kind, leading to dramatic changes in user behaviour, even in their radical forms of self-fulfilling prophecies [Hraba 2009], in which high-rated venues (such as restaurants) enter upward spirals, becoming progressively even better rated because of positive user bias and because people tend to go to these places, abandoning the unrated or poorly-rated ones.

Facebook – with its 1.35 billion users at the time of writing –, *Instagram* and *Twitter* – about 300 million users each –, and other social networking platforms – for example *Weibo* in China – have become very common ways for expressing thoughts, opinions, information, knowledge and emotions, creating a rich, constantly updating infoscape.

We might ask ourselves if, given the above analysis, it would be possible to use emotional expressions on social networking services to gain better understandings about the emotional expressions in urban spaces. And, if it is, what kind of insights would we be able to gather through this practice, and how could they be used?

3.   The Emotional Lives of Cities on Social Networks

We have, thus, set forth to capturing data from social networks being generated in various cities, to use it to grasp geographically locatable emotional expressions, looking for the possibility to identify patterns and recurrences across time, space and context.

Many models and approaches are available to evaluate emotional expressivity.

Desmet [2002] has described a basic model of emotions – on top of the work of Rosemann [2001], Ortony *et al.* [1998] and Lazarus [1991] – in which emotion is the result of an appraisal process fueled by stimuli and concerns. In this model, the concept of appraisal is defined as a non-intellectual, automatic evaluation of the sig-

nificance of a stimulus for one's personal well-being. The act of emotional appraisal leverages the presence of two different inputs: stimulus and concerns. According to Frijda [1986] a stimulus is any perceived change which has the potential to elicit an emotion. Every emotion hides a concern, that is, a more or less stable preference for certain states of the world. Thus concerns can be regarded as points of reference in the appraisal process. It is interesting to note concerns' relation to Maslow's [1970] hierarchy of needs: concerns can be placed at the different levels of the hierarchy to express their referring domains, their importance and priority. Some models directly deal with the possibility to interpret emotional expressions and responses in architectural contexts.

Ulrich [1983] and Berlyne [1971] have focused on complexity as a parameter for evaluation, referring to the number and the varieties of different units present in a setting/picture. Kaplan [1987] proposed a model on environmental preference in which predictors like complexity play an important role. According to Berlyne [1971] different levels of complexity can be associated to different levels of preference. According to Zajonc [1980] familiarity and prototipicality influence the emotional reaction to architectural spaces. Russell [1980], then, proposed the circumplex aesthetic model in which the affective appraisal of the environment can be summarized by two dimensions: pleasantness and arousal. This suggested Purcell's Discrepancy model [1986], in which the level of likeableness attributed to an external stimulus depends on how far is the appraised environment from the prototypical exemplar that an individual has in mind. If the incoming stimulus is too similar or too different from the prototype, it is very possible that the evaluation will be negative; on the contrary at a moderate level of discrepancy there are good chances that the stimulus will be appreciated. Some other methods focus on the possibility to directly capture the emotional expressions in the daily life of citizens. For example as in Christian Nold's *Biomapping* [2004] and *Emotional Cartography* [2007]; in Wilhelmer's, Von Bismarck's and Maus' *Fuehlometer* ("feel-o-meter") project [2010]; in the City of Vilnius happiness gauge [2013]; in Iaconesi's and Persico's *Consciousness of Streams* [2011]; in the *Mappiness* project [2011]; or in Mithru Vigneshwara's *Aleph of Emotions* [2013]. Our research team took inspiration from all of these approaches and, thus, focused on the possibility to evaluate emotional expressivity in urban/architectural contexts, by constructing ways in which people's expression in these contexts could be harvested and analysed.

We set forth in the capture of geo-located user generated content from major social networks (*Facebook*, *Twitter*, *Instagram*, *Foursquare*, *Yelp*) in a number of cities (Rome, Milan, Turin, Berlin, Sao Paulo, Montreal, Toronto, New York, New Haven, Hong Kong, Cairo and Istanbul) using the technique described in Iaconesi

and Persico [2012; 2014], processing them using the LSA (*Latent Semantic Analysis*) to understand the emotions expressed by the messages, in different parts, times and contexts in the cities. The technique which was used is derived from Strapparava and Valitutti [2004], and from Valitutti, Strapparava and Stock [2004], and is described in technical detail in Iaconesi and Persico [2012; 2014]. It draws from the availability of large semantic datasets, such as *WordNet*, and from the possibility to annotate the emotional valence of the *synsets* (synonym rings, sets of synonym words or phrases which are semantically interchangeable, also defined *cognitive synonyms*). In the analysis, texts, words, synsets and phrases can be split and represented in the Latent Semantic Space exploiting a variation of the pseudo-document methodology [Berry 1992]: these text elements are represented as vectors along three axes (Comfort/Discomfort, Arousal, Energy)[1] according to how much they are relevant to the axis itself (for example: the word "fear" will be high in Discomfort, medium in Arousal and medium in Energy; the word "terror" will be high along all the three axes). All of the words/synsets/phrases constituting the sentences in the text can, thus, be composed as a sum of vectors in this space, by performing vectorial addition. Using this technique, each sentence can be represented as the sum of its vectors, ending up in a certain area of the Comfort/Arousal/Energy space. These areas can be directly mapped to correspond to the model of emotions described in Gardner [1983] and, later, in Mayer and Salovey [1997] which can, thus, be used as a reference for emotional appraisal. According to this model, the space can be divided in areas, corresponding to various emotional states. In the analysis of text, the contributions of the different words, phrases and synsets can position each sentence in this space and, thus, give probabilistic appraisals of the emotion which the sentence itself expresses. This process can be done in any language, given the initial availability of an annotated synset database of this kind (or the effort to build one). In our research, we have started from the availability of the WordNet database (currently available in sixteen languages) and of its *WordNet-Affect* extension (currently available or being developed in six languages). We then constructed a method for the computational, human-assisted extension of these semantic databases and of their annotations, to expand both the support for the different languages and, within each of them, the number of recognized words, phrases and phrase templates. To achieve this goal, words, phrases and

---

[1] As explained in the following sections and notes, the circumplex model used to assess emotional expressions includes many more dimensions (axes) than these three. We have chosen to operate on these, first of all, to match what can be understood using the Latent Semantic Analysis method for natural language analysis and, then, taking into account the nature of the other expressions, which find their manifestations at levels which are more physical than linguistic (for example sleepiness, or relaxation).

synsets, in any language, which had not been yet annotated in this way were constantly measured, in all of the text found online, for their recurrence in contexts of highly probable emotional expression (probability larger than 0.95, over a maximum of 1). Each of these recurrences would augment a counter for the single textual element, increasing its relevance to a certain emotion. When, eventually, the counter would reach a threshold (established in 500, meaning that the element appeared 500 times in a highly characterised emotional context) it would be added to the annotated ones, with its relevance along the axes initialised accordingly. In this way we have extended the original support for different languages, reaching the number of twenty-nine, with more than 200 million annotations. We used this technique to create the first result of our research process: a large database of geo-located, timestamped user generated emotional expressions in twenty-nine languages. The quantities and reference time-frames of the database can be seen in Table 1.[2]

TAB. 1. *The Contents of the Database, and the Reference Dates*

City	From Date	To Date	N. of UGC
Milan	Jan. 1st 2012	March 1st 2012	6,521,594
Rome	Aug. 15th 2013	March. 31St 2014	18,284,743
Turin	Aug. 1st 2011	Sept. 20th 2011	240,982
Berlin	Jan. 4th 2012	Jan. 20th 2012	1,699,240
Sao Paulo	April 1st 2014	Oct. 31st 2014	9,725,368
Montreal	Jan. 1st 2014	Feb. 15th 2014	1,683,624
Toronto	Jan. 1st 2014	Feb. 15th 2014	2,001,635
New York	Sept. 1st 2014	Nov. 1st 2014	4,572,432
New Haven	Sept. 1st 2014	Nov. 1st 2014	762,734
Hong Kong	May 1st 2012	Jul. 1st 2012	5,732,487
Cairo	Jul. 27th 2013	Sept. 2nd 2013	3,466,388
Istanbul	May 30th 2013	June 30th 2013	6,825,734

Source: Author's Elaboration

[2] For ethical reasons, the harvested contents are rendered anonymous, including the possibility to reach them through their original links. The database is available for inspection upon request for research purposes at http://human-ecosystems.com/ , by writing to info@human-ecosystems.com with a formal request.

The timeframes shown in Table 1 were chosen for various reasons.

First of all because they were the times in which the *Human Ecosystems Project*[3] was starting in those cities, having been invited by the city administrations and by research institutes for this purpose.

Second, because in some cases, such as the one in Sao Paulo, Rome, Berlin, Cairo and Istanbul, specific scenarios manifested themselves in those cities: the water drought in Sao Paulo; the political unrest in Rome due to the scandals in the city administration; arts and cinema festivals in Berlin; political unrest in Cairo and Istanbul.

We used the information produced in this way to try to identify recurring patterns, across time and space, which could provide evidence of peculiar, recurring and/or systematic emotional expressions.

According to the model, we started from a selection of possible stimuli. These could be the participation to events, visits to a new city or location, the daily office commute, and other situations which belonged to users' daily routine or to exceptional situations such as holidays, anniversaries, situations of high intensity stimulation, such as danger or fear.

Then we paired them to possible expression of concerns. These were chosen in order to represent the points of reference in the emotional appraisal process, placed at different levels of the Maslow's hierarchy of human needs.

To collect them, we searched for the expression of "emotional objectives" throughout users' content timelines (e.g.: the expression "I will be going to the Muse concert tonight... it should be fun!" would constitute a "pleasure" and "excitement" concern, which would be searched for in later posts on the same timeline, to evaluate the emotional expression).

Table 2 shows the stimuli and concerns observed in each city.

This process was possible by using the information produced during the previous stage, using Natural Language Processing to provide us with the topics and emotions expressed in the messages, and their sequences and geographical locations (the technical details of the technique used for this are explained in Iaconesi and Persico [2012]).

---

[3] The *Human Ecosystems Project* is the main technology used in this research for harvesting information from major social networks, for integrating it into a usable database, for visualizing it in meaningful ways; the *Human Ecosystems Project* was started from the authors at the end of 2012, and followed the *ConnectiCity* and *VersuS* research efforts. More information can be found at: http://human-ecosystems.com/

TAB. 2. *The Stimuli and Concerns Observed in Each City*

City	Stimuli	Concerns[4]
Milan	• cultural events • mobility • safety • racism • crisis	• pleasure • excitement • arousal • distress • displeasure • depression • sleepiness/boredom • relaxation
Rome	• cultural events • mobility • safety	
Turin	• cultural events • citizen needs	
Berlin	• cultural events	
Sao Paulo	• cultural events • safety • water drought	
Montreal	• cultural events	
Toronto	• cultural events	
New York	• cultural events • safety	
New Haven	• cultural events • mobility	
Hong Kong	• mobility	
Cairo	• political unrest • safety	
Istanbul	• political unrest • safety	

Source: Author's Elaboration

At this stage we classified these patterns according to the circumplex model,[5] along two initial axes, describing the state of pleasantness and arousal described by each element belonging to the element, as well as the ones resulting from their aggregations (implemented through k-means clustering techniques, to group informations into clusters along the axes). As a result, we obtained a series of {time, location, topic, emotion, weight} tuples (with the "weight" variable being a normalized measure of the strength of the emotional expression in the specific time/location/topic context), grouped within patterns, which we could use for some initial visualizations. For example Figure 1 shows a heat map of the patterns of the *hate* emotion in part of the city of New Haven for the stimulus of mobility, across the whole period of time shown in Table 1.
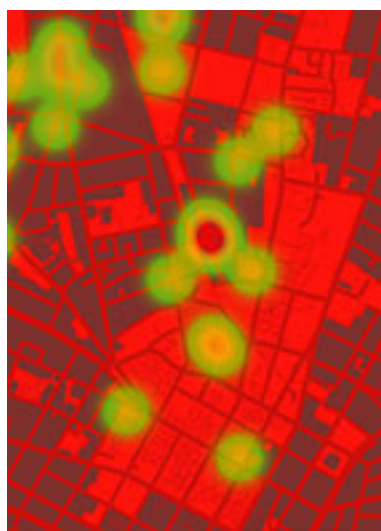

Fig. 1. New Haven: heat map showing patterns of the hate emotion on mobility related topics

Source: Author's elaboration

In the image, the red spots of the heat map show the locations in which 200 or more of the pattern instances are found, degrading along a color gradient in which

---

[5] The circumplex model of affect [Russell, 1980] describes, from a cognitive point of view, the structure of affect and emotional experiences. In the basic theory of emotions, affective states are shown as being characterized by sets of dimensions such as displeasure, distress, excitement, with each dimension varying independently of the others. Other evidence shows that these dimensions are interrelated in highly systematic fashions, according to a circular (and thus, circumplex) model. The circumplex model is used to represent (and understand) affective experiences with the dimensions (axis) arranged in a circular fashion, according to the sequence highlighted by the neurological evidence: pleasure, excitement, arousal, distress, displeasure, depression, sleepiness/boredom and relaxation. In the case of this research, only four of these axes are used to show the structure of the emotional experience (pleasure, excitement, arousal, displeasure), matched to the different modalities of the three dimensions of the Latent Semantic Analysis (Comfort-Discomfort/Arousal/Energy).

full green represents the spots in which between 20 and 30 of the pattern instances have been reported.

This shows how coherent areas can be recognized, and analyzed. If a concentration of 200 may initially seem as a small number (especially when compared with the high number of analysed content), a brief, practical reflection will provide evidence of the opposite: each single red area in the map shows, in fact, that more than 200 people, in that location, in that specific time pattern (a recurring pattern, such as "Monday mornings, from 8am to 9:30am") have systematically expressed a certain specific emotion in regards to a specific topic. This systematicity provides with a valuable insight for a situation which could deserve further inspection (in this case by the road authorities, city administrations, etc.).

Another example, always in New Haven, shown in Figure 2, uses the same technique and timeframes to show expressions of *love*[6] for the theme of education, as inferred by the cultural events stimulus by taking into account all of the captured contents mentioning schools, universities, education projects, professors, teachers and a number of their variants, as well as the conversations which spawned from them.

FIG. 2. New Haven: heat map showing patterns of the love emotion on education related topics

Source: Author's elaboration

In the example it is easy to note how the strongest red spot on the image (and, thus, the highest intensity of *love* expressed towards the topic of education) sits right

---

[6] Love, according to Mayer and Salovey [1997], defined as an expression of high pleasantness and low-medium energy (the high energy corresponding to passion).

above the location of the Southern Connecticut State University – and, specifically, on the Schwartz Hall, one of its residential colleges –, surrounded by parks, centres for performing arts and more, which could be an interesting matter to explore in more detail.

Similar results have been found in all of the cities we explored.

Whether we look at specific timeframes (like definite times of the day or of the week, or specific events, or the days immediately after some new event) or by aggregating longer ones, some places in cities result as systematic epicentres of different kinds of emotional expression.

We call these epicentres "Emotional Landmarks."

4.   Emotional Landmarks

We can describe Emotional Landmarks as geographical locations in which multiple people consistently and systematically express specific emotions (eventually more than one) about certain topics at specific times of day/week/season/year. Here, the notion of "systematicity" takes into account several parameters, such as the total number of observed expressions, their density, their subdivision among different emotions, the observed time-frame, human networks which agree on a certain appraisal of a certain emotional expression in the given state.[7]

Emotional Landmarks are places which constitute stimuli for people's emotional appraisal which are particularly strong.

They can (and usually are) temporary (but, eventually, recurrent), and depend on time (they might be different in office hours or on week-ends, for example, or in different seasons or weather conditions) and of the cultural background (i.e.: in the city of Florence different locations are the sites for very different emotional expression of tourists, compared to the ones of citizens).[8]

---

[7] For example, a certain consistent, persistent network of citizens (which could be loosely described as a "community") could express systematically in a certain emotional fashion, while another one may express in a different one, or not show any systematicity at all. This type notion can provide useful insights about the evaluation of the community life of the city, of its conflicts, agreements, differences, co-existences, clashes.

[8] There is a simple way in which we distinguish tourists from citizens. Tourists are the ones whose presence in the selected geographical area is only temporary. This distinction can be easily performed while analysing users' public social network timelines, as it is possible to discern where they are most of the times of the year, through the locations associated to the content they produce: if a certain user is in New York 350 days of the year and 15 days in Florence, that user is a citizen of New York and a tourist in Florence, according to our definition.

They might be positive or negative. This happens, for example, in the Schuster Park in Rome. The park is a beautiful natural area, right in the middle of downtown Rome, with the St. Paul's Basilica sitting majestically at one of its sides. During the day, it is used as a place for tourism, and as a space in which to walk dogs, catch some sun, chat or eat a sandwich: a simple search on major social networks will provide extensive pictorial and textual evidence of this. The park is also used by many people as a shortcut from the bus station to the houses which are on the other side of it. At night, especially during winter, the park transforms, becoming dark and unfriendly, and is sometimes the place in which events of violence happen, and even homicides, like the one of Renato Biagetti, killed by fascists in 2006 right in the middle of the park.[9] The evidence of the anxiety in the park at dark hours is also evident on social media. For example, dog-owners, which are the main regulars at the park at evening/night, are among the most explicit in this: "se non mi uccidono vado al Parco Schuster a portare giù il cane,"[10] says one of them on *Twitter*, echoed multiple times, by multiple subjects.

Emotional Landmarks can be observed and measured in their emotional appraisal across time, to gain better understandings about the emotional dynamics that go on in these places, as well as their evolution across time. This is a qualitative analysis, whose focus is not on how much these phenomena happen in a certain place/time, but on how systematically it happens, and for what kind of people and reasons. It is about understanding that for certain types/networks of people, at certain recurring, predictable, systematic times, these places can bear a specific emotional valence, and that these appraisals can co-exist with one another, simultaneously or over time, giving rise to the possibility to better understand the emotional dynamics of place, and also enabling the opportunity to intervene on it, or to use it for certain purposes, ranging from public policies, to tourism, social inclusion, commerce, and more.

Given this, we might revise the initial research question, to include in its formulation if it can be at all possible to use the observation of Emotional Landmarks to understand how to make interventions in places, to promote the more positive, inclusive emotional expressions and, thus, turning them into more positive places.

---

[9] A peculiar evidence of this fact also comes from the music festival, organized once a year, in the park, to reclaim this public space from violence, at night. The festival is called "*Renoize,*" and is widely documented on social media, through images, texts and explicit reference to the desire to reclaim the park from the violence.

[10] "If nobody kills me, I'm going to walk my dog at Schuster Park"

5.   Some Additional Evidence

To confront with the revised research question, some more evidence is required, both in qualitative and quantitative terms. For this we will concentrate, as a meaningful example, on Sao Paulo's current and upcoming water crisis.[11] In the city, an extended dry season and the ever-increasing demand of water have been leading, during the second semester of 2014, to a draught. At the apex of the water crisis the political elections were taking place, in October, finding the political forces unwilling to confront with this issue, to avoid loosing consensus. On top of that, the private water companies – using the crisis at their political advantage to make claims and releasing limited and contradictory information –, the pollution of the rivers, the needs of the industry and the marked inequalities which are present in the area all contributed to a chain reaction, whose effect was the sudden emergence of the crisis across entire areas of the federal state of Sao Paulo which were practically left with no water. We were able to observe the city of Sao Paulo during most of the crisis. A visualization of the feeling of anxiety[12] for the water crisis, as expressed on social networks, can be seen in Figure 3.

FIG. 3.   Sao Paulo: the emotion of anxiety for the water crisis, as expressed on social networks, from the beginning of April to the end of November 2014, showing 387,173 user generated contents

Source: Author's elaboration

---

[11] For example as seen on BBC: http://www.bbc.com/news/world-latin-america-29947965

[12] According to the previous descriptions (the Latent Semantic Analysis used to perform Emotional Analysis), "anxiety" is characterised as a "state of low energy, high discomfort, high arousal" and, thus, it can be detected by all of the sentences whose Latent Vectors end up in the corresponding area of the Comfort-Discomfort/Energy/Arousal space.

The visualization in Figure 3 shows where, in the city and its surrounding areas, people expressed feelings of anxiousness[13] due to the water crisis. The colors show the locations of the maximum concentrations of these expressions: red indicates that, over the period of observation, more than 1,000 people expressed in this way;[14] green indicates 20-70 people; quantities less than 20 are not shown on the map.

During the observation we focused on the possibility to identify the places in which negative emotions (such as anxiety, fear, unrest, sadness, and more) would show up, also differentiating them according to their sub-topic. We were particularly interested in understanding if it was possible to determine the areas in which people were actually experiencing the effects of the crisis.

While we were able to identify these emotional expressions in Itu, Gaurulhos and São Mateus (among others), obtaining insights about the draconian measures which were put in place and their effects on citizens of these neighbourhoods, we also understood how several additional considerations must be addressed.

Among the most interesting of these is the possibility of understanding how representative and inclusive this data is.

For this, we confronted our findings with the statistics and geographical distributions of internet access and social media usage in Brazil. With 53% of the population on the Internet, and 45% active on social networks,[15] the situation can be described as partially representative and inclusive, also taking into account the disparities in the distribution of wealth, divides and literacy, both in absolute terms and in relative ones, across geography, status, cultures.

To address this issue processes and actions should be designed to reach substantial parts of the remaining part of the population.

Some of the other issues which we have encountered are technical in nature.

For example, the possibility to deal with irony using the algorithmic approaches typical of Natural Language Processing. Irony and humour have an extraordinary presence on social media. While there are partially successful approaches in dealing with these expressive modalities – as shown in Bermingham and Smeaton [2010] and in Carvalho *et al.* [2009], among the others – this remains an open issue, and can be mitigated by adopting multiple approaches and by analysing content in-context.

---

[13] According to our method: high unpleasantness, medium energy.
[14] With a peak of 13,169 in Parque Ibirapuera, with citizens lamenting that the drought has decimated some of the park's flora; these are people, not content; for example in the park alone about 60 thousand content items were generated.
[15] Source: ComScore MediaMetrix: Brazil, Digital Future in Focus, Feb. 2014. Available at: https://www.comscore.com/Insights/Presentations-and-Whitepapers/2014/2014-Brazil-Digital-Future-in-Focus-Webinar

Other technical and context-based issues come from the wide presence, on social networks, of *bots* and other automatic/automated content production and distribution processes. While it is quite easy to understand what content is generated automatically,[16] it is not clear and defined how these contents should be handled: it is mainly context-dependent and no single approach works all the time.[17]

6.   Unstable Conclusions

Given all of the methods and evidence exposed in the previous sections, we can say that, while not being a solve-it-all solution, the research on Emotional Landmarks, if applied with critical care, can contribute to gaining better understandings of the emotional dynamics of places, and as a support and strategic tool to learn more about the possible modalities (time, geography, relations, themes, languages, aesthetics, and more) to make interventions, in order to transform places so that they become locations for more positive, constructive emotional expression.

Areas for research which are still open for discussion regard the ways in which more inclusion can be created with these modalities, reducing divides, augmenting literacy and figuring out ways in which also the non-connected population's emotional expressions can be included in this kind of observation. It's a design problem, dealing with the desire to interweave even more the digital and physical realms.

Another open area for research concerns the development of systematic ways in which these sources of data can be weighted by using other sources of data and information which regard census, energy use, demographics and others, and which are more inclusive by design, often being produced through administrations, bureaucracies, utilities, telecommunications. This is a Linked Open Data type of issue.

And, finally, we still have to gain better understandings about how to deal with irony, humour and other linguistic, psychological, anthropologic and cultural issues which still cannot be confronted with using algorithmic methods.

What is clear in this type of research is what we described in the beginning. Ubiquitous technologies have radically entered our daily lives, so much that we are

---

[16]   One very common strategy, for example, is to identify those users which systematically share, forward or express appreciation for the content generated by a certain other user. If this happens systematically, then we are facing some form of automation, and the relative content can be discarded or marked as such. Technically, this means setting up cross-monitoring processes which can be very resource consuming in terms of processing power.

[17]   For example, some users could decide on purpose to include some level of automation on their social networking profiles, to participate to certain campaigns, thus explicitly expressing the will to take part in expressing that specific emotional expression for that specific topic. And this is just one of the possible scenarios.

using them progressively more to express our emotions. This opens up the possibility to gather and use this ubiquitous data and information to understand more about human beings, and how they live and use places and spaces, how they interact and relate, and how they express emotions.

The concept of the Emotional Landmarks is fundamental for gaining these types of understandings, and it was virtually impossible (or at least incredibly hard) to enact before the emergence of wide usage patterns of ubiquitous technologies.

In this sense, it must be highlighted how these research and strategic practices currently hide entire new sets of ethical issues, which have not yet been confronted with the larger part of society. They deal with privacy, surveillance and with the opacity produced by the fact that data and information are processed by innumerable numbers of different, intersecting, interfering algorithms, and that it is virtually impossible, in the current state of things, to understand just how the data we produce is being used, and for which purposes. Also, it is virtually impossible for people to express their desires on such matters, deciding how they want their data to be used in this sense.

For this and more reasons, our research team and our collaborators adhere to the *Ubiquitous Commons*[18] international initiative, dedicated at establishing open protocols, legal and technical tools according to which users are able to express how they wish their data to be used, in simple, accessible, understandable ways.

References

Berlyne, D.E.

1971   *Aesthetics and Psychobiology*. New York: Appleton-Century-Crofts.

Bermingham, A., Smeaton, A.F.

2010   "Classifying Sentiment in Microblogs: is Brevity an Advantage?" Pp. 1833-1836 in *CIKM '10 Proceedings of the 19th ACM International Conference on Information and Knowledge Management.* Toronto, Canada, 26-30 October 2010.

Berry, M.

1992   "Large-Scale Sparse Singular Value Computations." *International Journal of Supercomputer Applications* 6: 13-49.

Carvalho, P., Sarmento, L., Silva, M.J., de Oliveira, E.

2009   "Clues for Detecting Irony in User-Generated Contents: Oh...!! It's 'so Easy' ;-)." Pp. 53-56 in *TSA '09 Proceedings, CIKM Workshop on Topic-Sentiment Analysis for Mass Opinion.* Hong Kong, China, 2-6 November 2009.

---

[18] Ubiquitous Commons: http://www.ubiquitouscommons.org/

Casey, E.

1987   "Remembering: A Phenomenological Study." Bloomington: Indiana University Press.

City of Vilnius

2013   *The Happy Barometer*. available at: http://happybarometer.com/

Damasio, A.

1994   "Descartes' Error and the Future of Human Life." *Scientific American* 271: 144.

Davidson, J., and Milligan, C.

2004   "Embodying Emotion Sensing Space: Introducing Emotional Geographies." *Social & Cultural Geography* 5(4): 523-532.

Desmet, P.

2002   *Designing Emotions*. Ph.D Thesis. Delft University, Netherlands.

Frijda, N.H.

1986   *The Emotions*. Cambridge: Cambridge University Press.

Game, A.

1991   *Undoing the Social: Towards a Deconstructive Sociology*. Buckingham: Open University Press.

2001   "Belonging: Experience in Sacred Time and Space." Pp. 226-239 in *Timespace: Geographies of Temporality,* edited by J. May and N. Thrift. London: Routledge.

Gardner, H.

1983   F*rames of Mind: The Theory of Multiple Intelligences*. New York: Basic Books.

Gregory, D.

1994   *Geographical Imaginations*. Malden, MA: Wiley-Blackwell.

Harvey, D.

1973   *Social Justice and the City*. Baltimore, MD: The Johns Hopkins University Press.

Hraba, M.

2009   *Self Fulfilling Prophecies and User Generated GroupThink*. Available at: http://www.hrabaconsulting.com/2009/02/18/self-fulfilling-prophecies-and-user-generated-groupthink/

Jones, O.

2005   "An Ecology of Emotion, Memory, Self and Landscape." Pp. 205-218 in *Emotional Geographies,* edited by J. Davidson, L. Bondi, M. Smith. London: Ashgate Publishing.

Kaplan, S.

1987   "Aesthetic, Affect and Cognition: Environmental Preference from an Evolutionary Perspective." *Environment and Behaviour* 19(1): 3-32.

Kinkaid, J.

2011   *Yelp Now Drawing 50 Million Users a Month to its 17 Million Reviews*. Available at: http://techcrunch.com/2011/04/04/yelp-now-drawing-50-million-users-a-month-to-its-17-million-reviews/

Iaconesi, S., Persico, O.

2011   *Consciousness of Streams*. Available at: http://www.artisopensource.net/2011/01/12/cos-consciousness-of-streams/ and http://cos.artisopensource.net/

2012   "ConnectiCity: Real-Time Observation and Interaction for Cities Using Information Harvested from Social Networks." *International Journal of Art, Culture and Design Technologies* 2(2): 14-29.

2014   "Visualising Emotional Landmarks in Cities." Pp. 408-413 in *Proceedings of 18th International Conference on Information Visualization.* Paris, 16-18 July 2014.

Lazarus, R.S.

1991   *Emotions and Adaptation*. Oxford: Oxford University Press.

London School of Economics,

2011   *Mappiness*. Available at: http://www.mappiness.org.uk/

Maslow, A.H.

1970   *Motivation and Personality*. New York: Harper and Row.

Massey, D.

2006   "The Geographical Mind." Pp. 46-51 in *Secondary Geography Handbook,* edited by D. Balderston. Sheffield: Geographical Association.

Mayer, J.D., and Salovey, P.

1997   "What is Emotional Intelligence?" Pp. 3-31 in *Emotional Development and Emotional Intelligence,* edited by P. Salovey, and D.J. Sluyter. New York: Basic Books.

McCullough, M.

2005   *Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing.* Cambridge: MIT Press.

Mills, C.W.

1961   *The Sociological Imagination*. New York: Oxford University Press.

Mitchell, W.J.

1996   *City of Bits: Space, Place, and the Infobahn*. Cambridge: MIT Press.

Nielsen Wire

2010   *What Americans Do Online: Social Media and Games Dominate Activity.* Available at: http://www.nielsen.com/us/en/insights/news/2010/what-americans-do-online-social-media-and-games-dominate-activity.html

Nold, C.

2004   *Biomapping*. Available at: http://biomapping.net/

2007   *Emotional Cartography*. Available at: http://emotionalcartography.net/

Ortony, A., Clore, G.l., Collins, A.

1988   *Cognitive Structures of Emotions*. Cambridge: Cambridge University Press.

Philo, C.

2003   "To Go Back up the Side Hill: Memories, Imagination and Reveries of Childhood." *Children's Geographies* 1(1): 7-24.

Purcell, A.T.

1986   "Environment Perception and Affect. A Schema Discrepancy." i*Environment and Planning B: Planning and Design* 13: 67-92.

Rosemann, I.J.

2001   "A Model for Appraisal in the Emotion System: Integrating Theory, Research and Applications." Pp. 68-91 in *Appraisal Processes in Emotion: Theory, Methods, Research,* edited by K.R. Scherer, A. Schorr, and T. Johnstone. Oxford: Oxford University Press.

Russell, J.A.

1980   "A Circumplex Model of Affect." *Journal of Personality and So* 39: 1161-1178.

Strapparava, C., Valitutti, A.

2004   "WordNet-Affect: an Affective Extension of WordNet." Pp. 1083-1086 in *Proceedings of the 4th International Conference on Language Resources and Evaluation.* Lisbon, Portugal, 26-28 May 2004.

Ulrich, R.S.

1983   "Aesthetic and Affective Response to Natural Environment." Pp. 85-125 in *Human Behavior and Environment*, edited by I. Altman, and J.F. Wohlwill. New York: Plenum Press.

Valitutti, A., Strapparava, C., Stock, O.

2004   "Developing Affective Lexical Resources." PsychNology Journal 2(1): 61-83.

Vigneshwara, M.

2013   *Aleph of Emotions*. Available at: http://www.mithru.com/projects/aleph.html

Wilhelmer, R., Von Bismarck, J., Maus, B.

2010   *Fuehlometer*. Available at: http://richardwilhelmer.com/projects/fuhl-o-meter

Zajonc, R.B.

1980   "Feeling and Thinking. Preferences Need no Inferences." *American Psychologist* 35: 151-175.

Zook, M.A., Graham, M.

2007   "Mapping DigiPlace: Geocoded Internet Data and the Representation of Place." *Environment and Planning B: Planning and Design* 34(3): 466-482.

Emotional Landmarks in Cities

The Emotional Life of Cities as Expressed on Social Networks

Abstract: How is it possible to use social networks to gain better understandings about the emotional life of cities? Is it possible to use data generated by city dwellers on social networks to understand whether certain spaces and places in the city are the object of systematic emotional expressions, in certain times of the day, week, month or year, and across different contexts? City dwellers have radically transformed the ways in which they relate, work, entertain themselves, consume, produce and express themselves and their emotions. This is due to multiple reasons, across the transformation of the dimensions of time, of the new forms of labor and of production, of the new structures and organizational models in society, and with the emergence of novel modalities and tools for communication, interaction, information, knowledge. In our research we have gathered large amounts of content generated on social networks by city dwellers of different kinds (citizens, tourists, from different communities and speaking one of the observed 29 languages) in the cities of Rome, Milan, Turin, Berlin, Sao Paulo, Montreal, Toronto, New York, New Haven, Hong Kong, Cairo and Istanbul. We analyzed this data through Natural Language Processing to highlight, wherever possible, the emotions expressed in each public message, and its relation to a geographical location within the city. Results indicate how, in certain cases, it is possible to describe what we have called "Emotional Landmarks": dynamic landmark locations which temporarily or recurrently host systematic emotional expressions, in large quantities and in recurrent, sometimes predictable ways.

Salvatore Iaconesi is founder at *Art is Open Source*, CEO of *Human Ecosystems* and Principal Investigator at *Ubiquitous Commons*. He teaches Near Future Design at ISIA Design Florence and at "La Sapienza" University in Rome. He is TED Fellow (2012), Eisenhower Fellow (2013) and Yale World Fellow (2014). He is a robotic engineer, an hacker, artist and interaction designer.