

Twitflick: visualizing the rhythm and narrative of micro-blogging activity

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ABSTRACT

Micro-blogging is a form of online communication by which users broadcast brief text updates, or *tweets*. This article explores the temporal component of micro-blogging activity by emphasizing its narrative nature: an individual tweet is an expression of personal online presence at a given time, yet it necessarily embodies the context of a broader developing story. We present Twitflick, a digital media platform that blends a continuous stream of real-time text updates from Twitter with related user-uploaded images hosted on Flickr. Twitflick acts as a space in which distributed, temporally-authentic personal narratives, in the form of photographs and text, reinforce, extend, and even misrepresent each other. The visualizations provided by Twitflick capture the quotidian rhythms of online social exchange and draw attention to the poetic potential of web 2.0.

Categories and Subject Descriptors

H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems

Keywords

Visualization, web 2.0, micro-blogging, digital narratives, everyday life, photography, multimedia, cross-platform systems, mash-ups

1. INTRODUCTION

One of the phenomena coupled with the ongoing proliferation of social networking websites and so-called web 2.0 platforms is an increase in user-generated personal information that is publicly shared on the web. The level and mode of user engagement is also changing, breaking the traditional paradigm of audiences as passive information consumers. Web 2.0 platforms enable users to be active, engaged (re)actors, (re)makers and (re)distributors of information — *networked publics* [13]. An increasingly popular communication channel that fits well into the paradigm of networked publics is micro-blogging, a web service by which

users publish and broadcast brief text updates, usually 140 characters in length or shorter. Users on these online communities employ micro-blogging services to share, publicly or semi-publicly, different types of information such as their personal activities, their political opinions, their current location, and their emotional status. Micro-blogging is currently offered both on dedicated platforms, such as Twitter¹, where micro-blog posts are known as *tweets*, and on many social networking websites in the form of status updates, e.g. on Facebook². Thanks to the brevity of these text updates, micro-blogging is fast becoming the platform of choice for highly-mobile communication that takes place via cellular phones and other portable devices.

Micro-blogging is not solely an instrument of communication, however. A closer look at micro-blogging communication patterns reveals a mosaic of uses that point to the expressiveness of the social web: the “practice and performance of technologically mediated sociality” [12]. In this article, we are interested in exploring the expressive nature of micro-blogging, in particular in relation to its rhythmic and narrative components. We argue that micro-blogs appropriately capture the quotidian and fast-paced rhythms of social exchange on the web. Also, despite their brevity, micro-blogs are expressions of subjective online presence. Whether micro-blogging is used as a record of personal activities, as a forum for public conversation, as a tool for political action, or as a broadcast tool for any banal detail of everyday life, it is the “sharing of subjectivity” that forms the basis of micro-bloggers’ social reality [4]. Expanding on this notion, micro-blogs can be regarded as short personal stories, and in turn, fragments of a broader developing narrative. With this notion in mind, in this article we introduce Twitflick, a digital media platform for the visual representation of distributed, temporally-authentic personal narratives. Twitflick is multi-modal, for it blends textual and visual content, and cross-platform, for it blends the data interfaces of two different services (Twitter and Flickr³) into one.

¹Twitter — <http://twitter.com/>

²Facebook — <http://www.facebook.com/>

³Flickr — <http://flickr.com>

2. RELATED WORK

Micro-blogging is a relatively recent form of communication. The launch of Twitter in October 2006 is responsible for the initial popularization of this simple, yet wide-reaching, feature. In a recent study, Java *et al.* [7] analyze topological properties of a large Twitter subscription network to find that users typically micro-blog for a) daily chatter, i.e. posting what they are currently doing or how they are feeling, b) conversations, i.e. directing their tweet to specific users in their community of followers, c) information sharing, i.e. by posting links to web pages, and d) news reporting, i.e. by commenting on news and current affairs. This list is by no means exhaustive, but it reveals the diversity of uses that have emerged on these social platforms.

In parallel with the increase in popularity and adoption of micro-blogging, a large body of research, from sociology to media studies, from computer science to political science, is increasingly focusing on this phenomenon. Many of these recent studies are empirical in nature and rely on the wealth of user-generated communication traces published via micro-blogging services to discern specific temporal, locative and social patterns. For example, Krishnamurthy *et al.* [9] perform a large-scale analysis of Twitter content to find out about its geographical distribution and user base. Barkhuus *et al.* [1] present and evaluate a phone-based application for location tagging and sharing. They find that continuous micro-blogging activity pushes use of the phone beyond a mere “awareness tool” to a device for users and groups to construct and endure a story of conversations.

Pushing the conversational aspect further, some argue that micro-blogging is fast becoming a major alternative to professional journalism, especially in repressive regimes where censorship exists. The coordinated action of micro-bloggers results in distributed citizen-driven news networks that enable open information production and consumption [11]. Recent and notable cases in which blogging and micro-blogging technology played a major role in bringing about political collective action are Burma’s Saffron revolution [3], Ukraine’s Orange revolution [6], and the Iranian unrest after the 2009 presidential elections [2]. In these cases, individual tweets can be regarded as fragments of personal lived experience — *lifestreams* — that, aggregated along specific temporal and spatial components, embed the narratives of struggle and protest of entire communities.

3. MOTIVATION AND SYSTEM DESIGN

As explained above, we were motivated to create this visualization project as a way to represent the expressive nature of social exchange on the web. Taking a cue from Erving Goffman’s notion of self-representation, where he argues that individuals actively represent different forms of themselves based on their anticipation of what is considered appropriate behavior [5], we sought to look at the ways in which digital selves shift across various contexts and settings. Working within this framework, we identified three particular areas to interrogate this notion of web 2.0 culture: forms of entertainment; the relationship between temporal and social components; and multiple roles of narrative in digital representation.

Our focus on multiple forms of entertainment and the web

2.0 underscores the importance of the larger ecology of media in which these applications are embedded. As such, assuming that web applications are situated within overarching structures of communication and digital exchange, we can begin to explore the multi-modal capacities of contemporary social interaction. The importance of cross platform dynamics in this web 2.0 media ecology is binary: on one hand, television coverage of web-based content and the digital phenomenon is booming [10]; on the other hand, there is an ever increasing online provision of televisual content (e.g., Joost⁴ and Hulu⁵). This kind of hybrid, multi-modal and cross-platform structure is an important dimension of a *convergence culture*, “where old and new media intersect, where grassroots and corporate media collide, where the power of the media producer and the media consumer interact in unpredictable ways.” [8]. This kind of contemporary digital culture can be seen in new light by looking at the micro level forms of social interaction and day-to-day communication across multiple platforms. As such, for our project, we focused on mashing up two sources — Twitter texts and Flickr images — as a way to explore a micro-level instantiation of larger macro-level characteristics.

Through our integration of Twitter and Flickr content, we intended to depict the temporal dynamics of social exchange. Thus, the second focus of our project considers the interactions between time and social relations in the day-to-day rhythms of web 2.0 culture. The rhythms of exchange and interaction in social web environments appear to be predicated on highly narrow windows of time: the immediate past, the immediate present, and the immediate future. Such temporal components are especially evident in micro-blog posts. Tweets are temporally fixed (they have a timestamp) and are limited to brief text-only content. Yet single tweets can expose rich temporal dynamics of social exchange. Their meaning is best demonstrated by analyzing the broader social and cultural context in which their producers and their intended readers interact. By taking a closer look at these highly compressed time increments and matching them with visual content, we were able to see how digital collectives in social web environments are instantiated through a “continual now”, with an “ongoing self” in the present.

The third theme, that of narrative, operates at several levels of this project. First, the notion of narrative functions conceptually as our phenomenon of inquiry. As discussed in the Introduction, we conceptualize Twitter texts and Flickr photos as specific narrative accounts; that is, these micro-blogs and pictures are specific forms of social exchange: conversation, communication, banal details of the everyday, and any story that individuals present to the world. In this way, these narratives function as forms of digital self-presentation. In addition, the notion of narrative informs methodological considerations that guide our thinking on how to visually represent these narratives. The concept of narrative brings about explicit insights into representation, challenging traditional techniques of data visualization. Subsequently, our project explores the ways in which our narrative voices intermingle with the voices of the users and participants on the social web, and how, through the amal-

⁴Joost — www.joost.com

⁵Hulu — www.hulu.com

gamation of these voices, synthesized across their various platforms, new forms of narrative emerge as a result.

With these three areas of interrogation in mind, we decided to create Twitflick, a web-based visualization platform that blends, in real-time, textual and photographic content generated by two communities of users.

4. DATA AND METHODS

The web-based platform presented in this article is called Twitflick. It harvests real-time tweets from Twitter and associates them with user-uploaded images on Flickr. In a nutshell, the system workflow for Twitflick (depicted in Figure 1) consists of the following steps: 1) harvest public tweets from Twitter, in real-time; 2) construct a Twitter public timeline; 3) filter the public timeline by searching for narrative and activity bigrams; 4) filter tweet content by removing non-narrative and stop words; 5) search for 12 most related Flickr images based on tweets that match word and bigram filter limits; 6) combine text and visual content into a “Twitflick”, a visual representation of the original tweet.

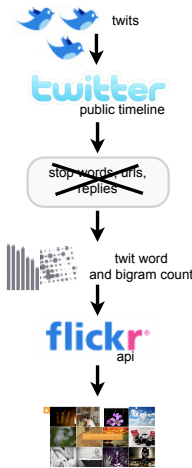


Figure 1: System workflow of Twitflick

The first step of the aforementioned workflow consists of harvesting publicly broadcasted Twitter data. We use Twitter’s API to collect real-time tweets published in English language. Collected information includes (a) username, (b) user location, (c) the timestamp of the tweet, and (d) the content of the tweet.

In the second step, we store collected tweet information and assemble it into a public timeline. The public timeline contains all Twitter tweets, displayed in chronological order, posted by users in real-time and publicly broadcasted.

In the third step, we perform some data filtering. We are particularly interested in visualizing Twitter content that is highly narrative in nature. For this purpose, we have created a database of activity bigrams, i.e., groups of two words that represent an action. We find that tweets containing bigrams are particularly expressive and thus useful for visual representation. We ranked a large sample of tweets based on bigram recurrence, finding leading activity bigrams such as “listening to”, “watching”, “getting ready”, “back from”,

“off to”, “i am” and “just got”. From the initial pool of real-time tweets obtained in step two, we give higher priority to tweets containing these leading activity bigrams.

In the fourth step, we perform some additional tweet-based selection and filtering. First, we discard tweets that contain URLs, tweets that are extremely short in length, and conversational tweets⁶. Second, we filter out “stop words” from each single tweet in our pool of candidates. Stop words are highly-recurring words in the English language (such as “a”, “are”, “from”, “in”, “this”, “what”, “when”) that do not particularly contribute to the expressiveness of a tweet. The collection of all filtered text in the pool of tweets is used to compute a word frequency vector.

In the fifth step, we query the Flickr image database via its search API. The aim of this step is to associate each tweet with 12 images from Flickr whose textual description best matches the content of the tweet. Images on Flickr are associated with a number of descriptive textual elements, such as image title, caption, tags, and annotations. Using the tweet-based word frequency vector computed in the previous step, we construct a query that we use to search the Flickr image database and retrieve the 12 most relevant images.

In the last step, we combine the original (unfiltered) microblog post from Twitter with the 12 user-uploaded images from Flickr. The resulting “mash-up” constitutes a visual building block of the broader collective ecology of lifestreams on the web at a given time.

5. DISCUSSION

We developed Twitflick as an exercise/experiment to visually represent the quotidian rhythms of online social exchange. We were specifically interested in three notions related to the nature of web 2.0: forms of entertainment; the relationship between temporal and social components; and multiple roles of narrative in digital representation. We decided to employ tweets for their brief, temporally-authentic, almost ephemeral nature. We treated Twitter tweets as microscopic instantiations of a broader developing story. We treated the Flickr image collection as the macroscopic environment in which these narrative fragments could be depicted, i.e. the photographic archive of all possible stories. With the modal interface of Twitflick, we replicate the temporal dynamics of micro-blogging: we present the user with a continual flow of real-time tweets and associated images which stay on the screen for a few seconds and then disappear.

Twitflick is currently available via a motion graphic visualization engine developed and hosted by Digital Kitchen⁷. Twitflick mash-ups are computed in real-time and continuously visualized at the Twitflick website⁸. Given the timelines of micro-blogging and the dynamic nature of our visualization project, we find it arduous to present and discuss

⁶Twitter users employ the @ symbol followed by a username for conversation. Although it would be extremely interesting to reconstruct multi-tweet conversations into a single visual narrative, we do not perform this analysis in the work presented here.

⁷Digital Kitchen — www.d-kitchen.com/

⁸Twitflick — <http://tinyurl.com/twitflick>

specific results here. We limit ourselves to presenting (at the end of this document) the snapshots of six Twitflicks that we had the chance to capture and store recently. These are by no means a representative sample of typical Twitflick results, yet they are sufficiently different from each other that by inspecting their visual and textual content, one can get an idea of the nature and level of amalgamation provided by our system. For example, let us have a closer look at the mash-ups of Figures 2 and 3.

Figure 2 depicts a tweet in which a number of narrative, locative and social components are defined. The tweet describes an action (“making sand castles”) taking place in a given environment (“the volley ball ct [court]”) in a specific social setting (“with the youngest”). The visual representation of the tweet generated by Twitflick reflects and reinforces all these components (the beach, the sand, a beach volley court, kids playing at the beach and building sand castles). Two of the images, however, are spurious results: an actual castle and a faded image of an Iranian flag. Yet, the overall visual representation of the tweet is quite accurate and faithful to the original message.

Figure 3 depicts a tweet which also describes an action (“gettin ready to cook down some apples”) in preparation for a specific event (“freez[ing] for this winter”). Thus, there are two specific narrative components at hand for visual representation: the act of cooking apples and its setting, a cold, freezing winter. However, as Figure 3 shows, Twitflick deftly blends these two components into one, displaying mostly images of frozen apples on icy trees. This is an example in which the meaning of the original tweet gets slightly distorted by the Twitflick visualization. However, we argue that distortions of this kind have the potential to elicit parallel narratives, that eventually enrich the visual imaginary of the original message.

For reasons of space, we choose not to discuss here the other four Twitflicks. Instead, we invite readers to visit the Twitflick website and to create their own interpretations of real-time mash-ups.

In future work, we plan to perform a large-scale qualitative study of the generated multi-modal content with the aim of evaluating and possibly improving upon the presented text-to-image matching mechanism. Our intent is to explore and combine different, yet interrelated, forms of participation in social web environments, combining the media formats in which they are manifested (text and images, as well as audio and video). Moreover, beside the temporal analysis of micro-blogging activity, we envision introducing a spatial component, by which these streams of lived experience, or lifestreams, can be aggregated and visualized based on geographical location, unveiling patterns of narrative that are temporally as well as locally authentic. Finally, we intend to reconsider privacy and ethical implications of our project. We are aware that constructing associations among scattered, seemingly unrelated pieces on the web might yield uncomfortable, questionable, and highly distorted metaphors. Yet we argue that only by experimenting/playing with these associations, can one explore the poetic potential of the web 2.0.

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7. REFERENCES

- [1] L. Barkhuus, B. Brown, M. Bell, S. Sherwood, M. Hall, and M. Chalmers. From awareness to repartee: sharing location within social groups. In *Proceedings of SIGCHI conference on Human factors in computing systems*, pages 497–506, New York, NY, USA, 2008. ACM.
- [2] A. Berman. Iran’s twitter revolution. *The Nation Blog*, June 15 2009.
- [3] M. Chowdhury. The Role of the Internet in Burma’s Saffron Revolution. Technical Report 2008-08, Berkman Center for Internet and Society, 2008.
- [4] K. Crawford. These foolish things: On intimacy and insignificance in mobile media. In G. Goggin and L. Hjorth, editors, *Mobile Technologies: From Telecommunications to Media*. Routledge, New York, NY, 10001, 2008.
- [5] E. Goffman. *The Presentation of Self in Everyday Life*. Garden City: Doubleday, 1959.
- [6] J. Goldstein. The Role of Digital Networked Technologies in the Ukrainian Orange Revolution. Technical Report 2007-14, Berkman Center for Internet and Society, 2007.
- [7] A. Java, X. Song, T. Finin, and B. Tseng. Why we twitter: understanding microblogging usage and communities. In *Proceedings of WebKDD Workshop on Web mining and Social Network Analysis*, pages 56–65, New York, NY, USA, 2007. ACM.
- [8] H. Jenkins. *Convergence Culture: where old and new media collide*. New York University Press, 2008.
- [9] B. Krishnamurthy, P. Gill, and M. Arlitt. A few chirps about twitter. In *Proceedings of the First Workshop on Online Social Networks*, pages 19–24, New York, NY, USA, 2008. ACM.
- [10] L. Lloyd, P. Kaulgud, and S. Skiena. Newspapers vs. blogs: Who gets the scoop? In *AAAI 2006 Spring Symposium on Computational Approaches to Analysing Weblogs*, 2006.
- [11] C. Shirky. *Here comes everybody*. Penguin Press, New York, 2008.
- [12] Z. Tufekci. Grooming, gossip, facebook and myspace: What can we learn about social networking sites from non-users. *Information, Communication and Society*, 11(4):544–564, 2008.
- [13] K. Varnelis. *Networked Publics*. The MIT Press, 2008.

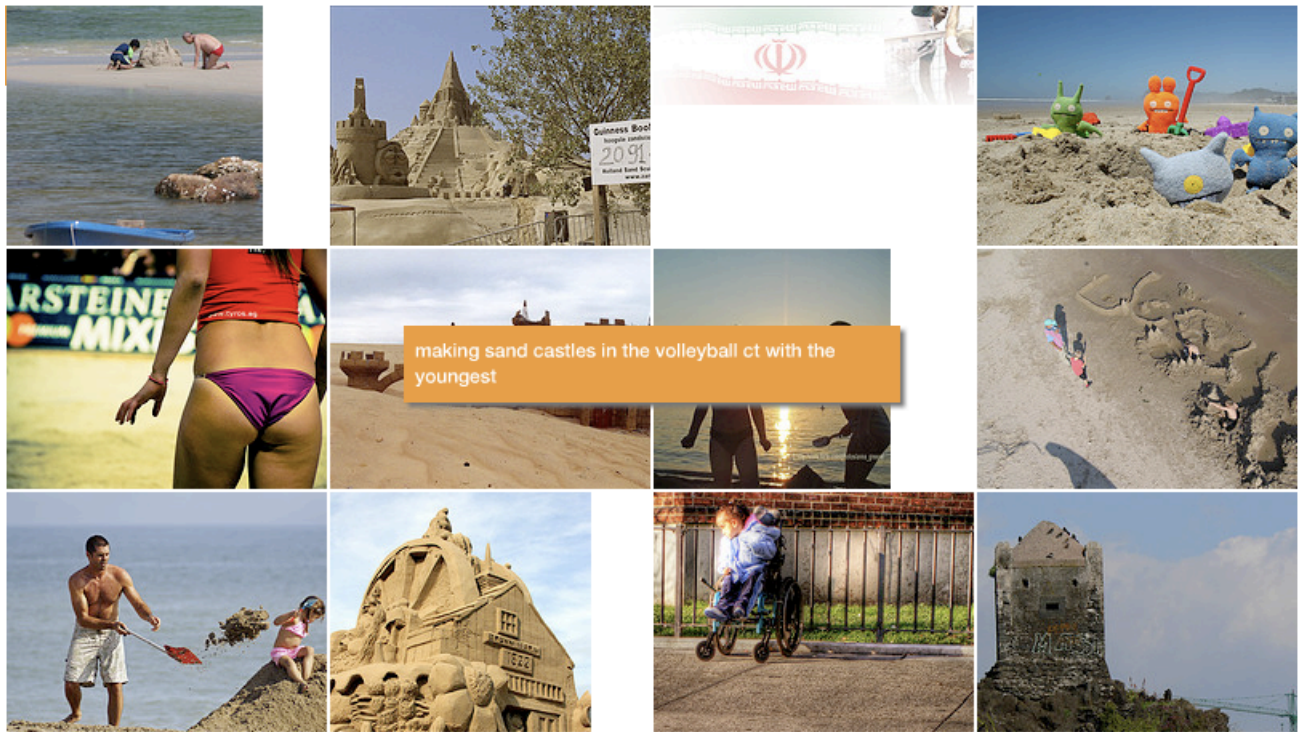


Figure 2: Twitflick of tweet: “making sand castles in the volleyball ct with the youngest”

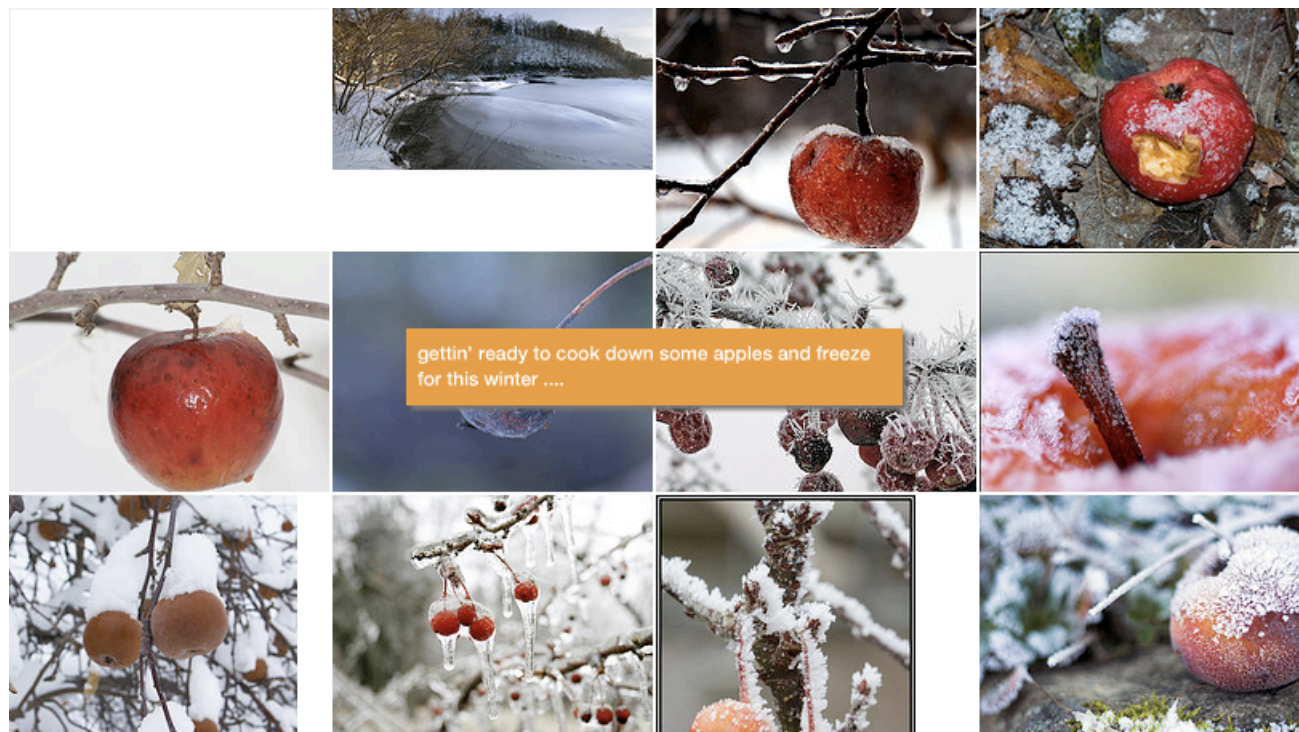


Figure 3: Twitflick of tweet: “gettin ready to cook down some apples and freeze for this winter”

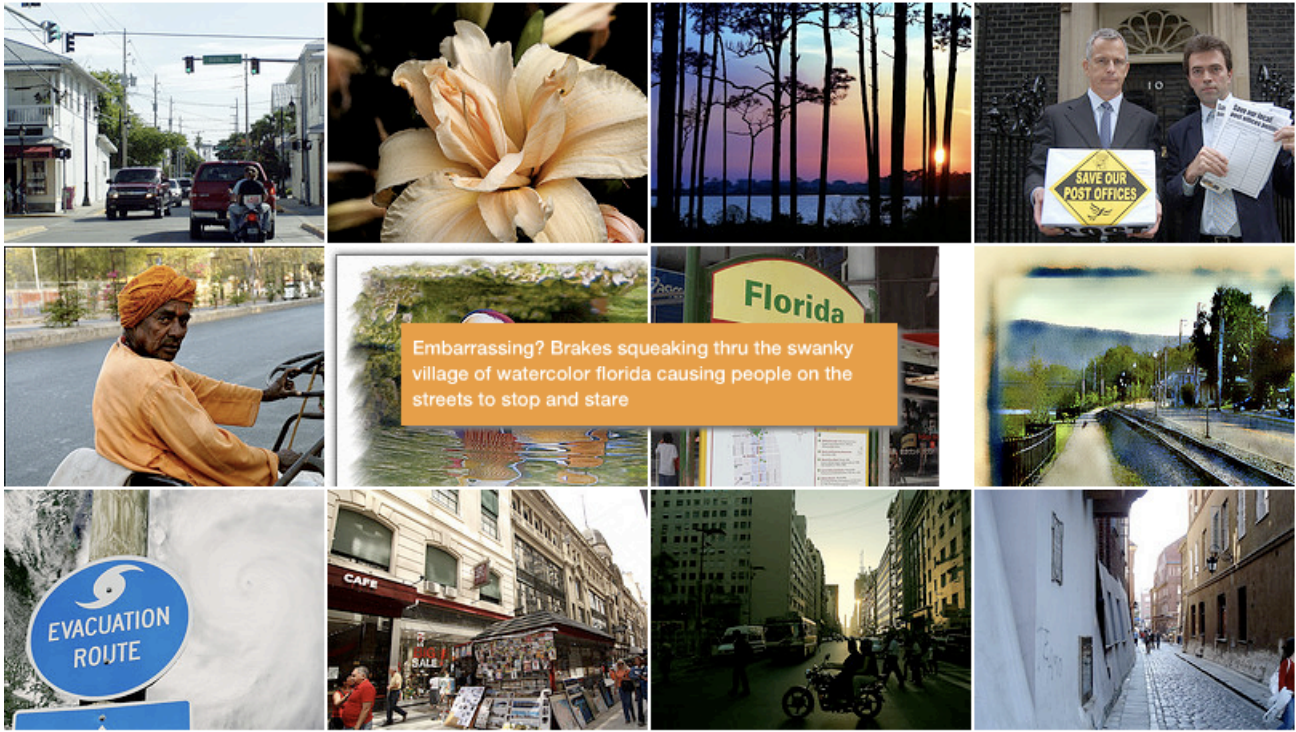


Figure 4: Twitflick of tweet: “Embarrassing? Brakes squeaking thru the swanky village of watercolor florida causing people on the streets to stop and stare”

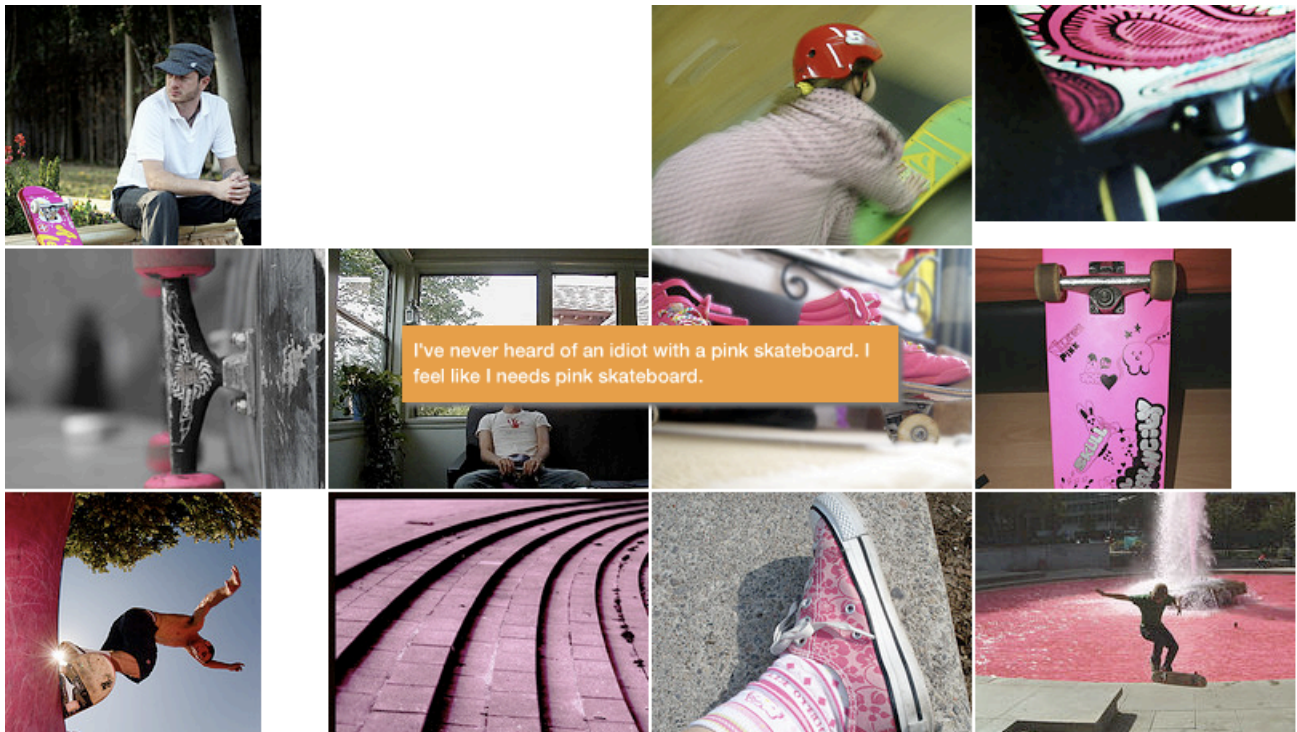


Figure 5: Twitflick of tweet: “i’ve never heard of an idiot with a pink skateboard. i feel like i needs pink skateboard.”

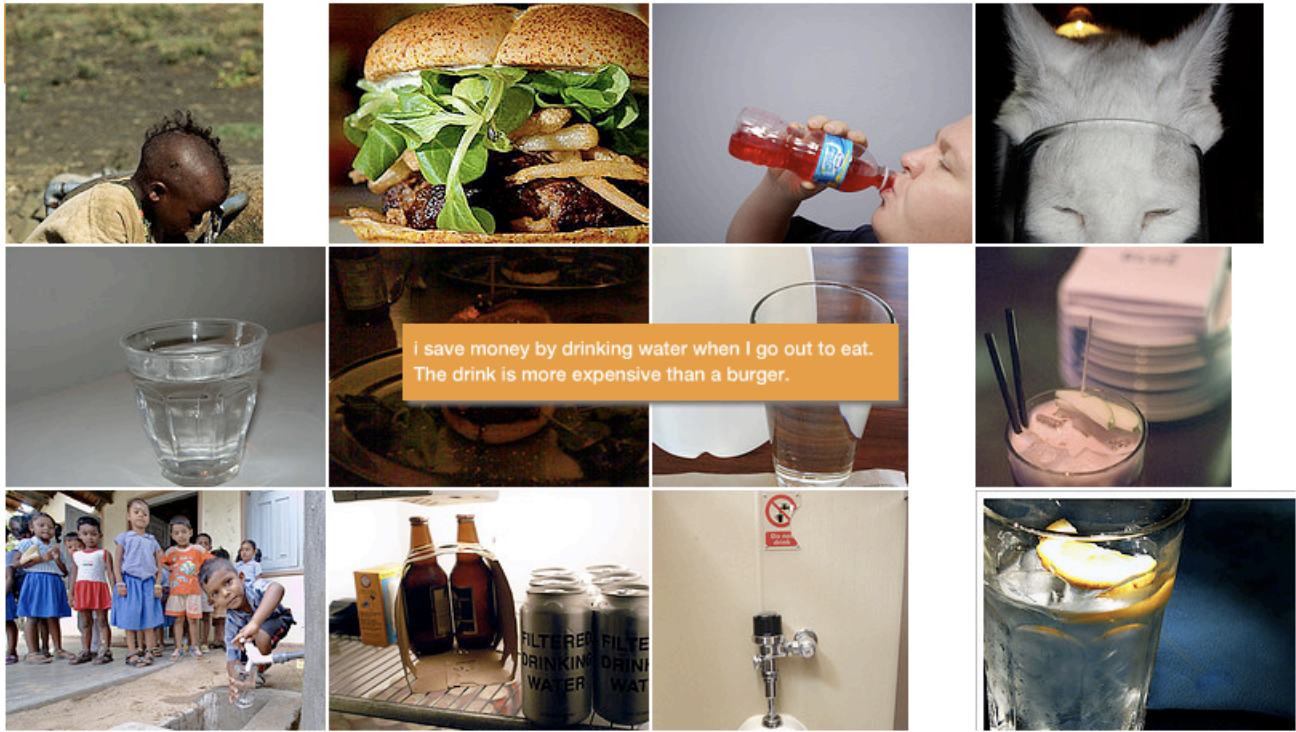


Figure 6: Twitflick of tweet: “i save money by drinking water when i go out to eat. The drink is more expensive than a burger”

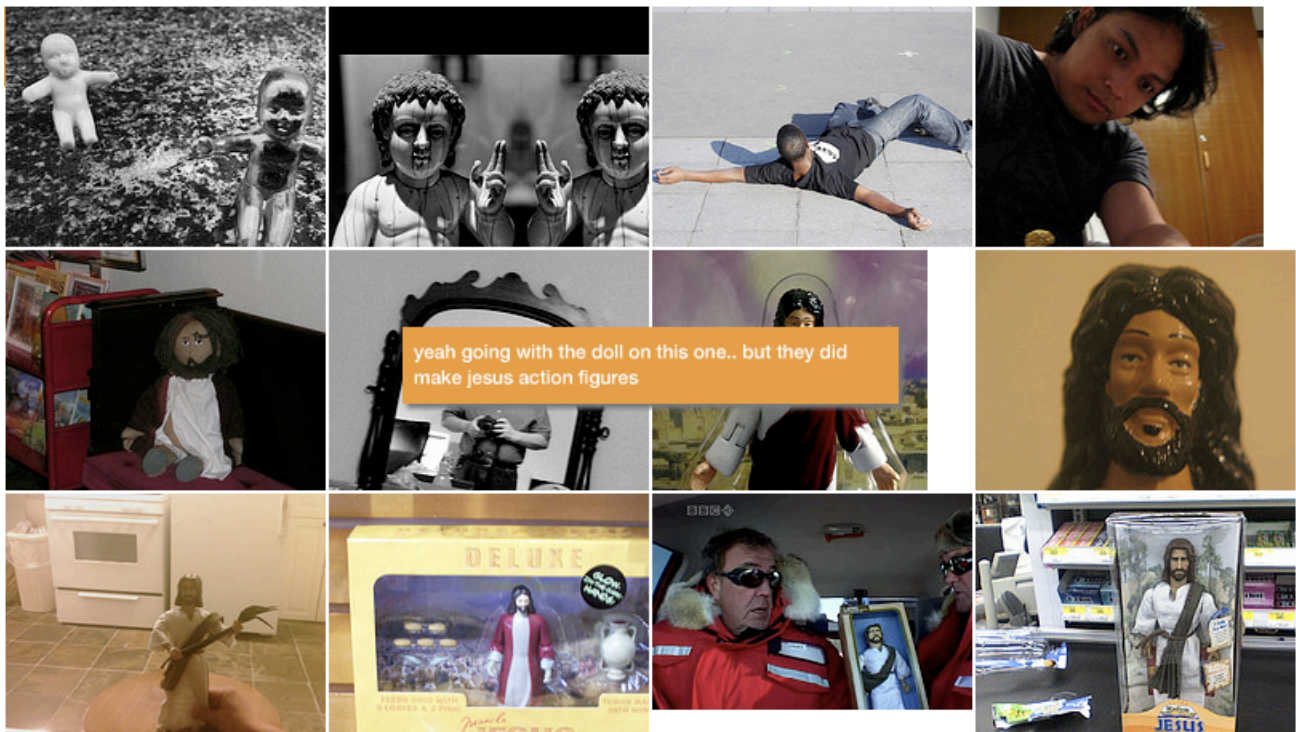


Figure 7: Twitflick of tweet: “yeah going with the doll on this one.. but they did make jesus action figures”