

# Smiley Ontology

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**Abstract.** This paper is about notion of smileys (emoticons), and their usage on the Internet. We identify problems emerging with their use on the Social Web and propose ideas for possible improvements of their usage. We present the Smiley Ontology (SO) together with the benefits such ontology could bring. Finally, we outline some directions for future work on this matter of emerging importance.

**Keywords:** Emoticon, Smiley, Ontology, Social Web

## 1 Introduction

Emoticons are very useful in everyday communication, but the fact is that unlike people, machines (applications) cannot understand their meaning – their semantics remain captured in their visual appearance. Also, different systems use different sets of emoticons, resulting in hard or impossible mapping between them. When we exchange emoticons between different systems, their semantics is often misinterpreted or even not interpreted at all. Therefore, applications miss their chance for better utilization of user generated content which results in poor user experience and broken communication.

No matter how much people like to use them, it seems that today's fairly plain usage of emoticons does not bring about most of what they could offer. Considering the proliferation of different Social Networks (SNs) and IMs, and their wide usage, we must acknowledge emotions as omnipresent on the Internet, either in the form of text or increasingly as emoticons. Different SNs, IMs and other communication systems use different sets of emoticons that are often visually different, but they are semantically the same, presenting the same emotion, state or action. As humans, we can easily perceive the meaning of emoticons and understand them, but the fact that their semantics remain captured in the pictures disables machines from understanding their true meaning. Therefore, the exchange of emoticons between different systems is not possible without a loss of their semantics.

The following scenario illustrates a common interoperability problem between different communication services. Harry and Sally exchanged a few emoticons, but the pictured emoticons that Sally sent are no more than a set of characters on the Harry's side. The result is a poor and broken communication. This is also a common problem of multi-platform chat systems e.g. Meebo<sup>1</sup>.

In a nutshell, we believe that the semantics of emoticons, if explicitly presented, can be beneficial for human computer interaction. However, the fact is that machines cannot understand emoticons because their semantics remain captured in the pictures they are represented by, thus those benefits are largely unused.

In this paper we introduce Smiley Ontology (SO), the ontology for representing the structure and semantics of a smiley. This ontology should allow applications to better 'understand' the meaning of any smiley, so it could properly represent it, exchange it and utilize it, with the final aim of providing users with better online experience.

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<sup>1</sup> Meebo official website: <http://www.meebo.com/>

In the next section we introduce the Smiley Layer Cake which identifies different semantic layers of an emoticon. We also present the Smiley Ontology and emphasize the benefits of using this. Related work is given in Section 3, whereas Section 4 is reserved for conclusions and plans for future work.

## 2 The Semantics of an Emoticon

In order to challenge all these problems, we have carefully examined the structure of emoticons, and created a model that enables its semantic representation. The model was formalized into Smiley Ontology, described in this section together with Smiley Layer Cake.

### 2.1 Smiley Layer Cake

Emoticons often represent various emotions or activities. The meaning of an emoticon and its structure can be very deep, and by looking through the prism of Smiley Layer Cake [1], we have observed its structural elements and semantics.

Smiley Layer Cake<sup>2</sup> makes explicit the semantic elements of an emoticon. The *Underlying Emotion* represents the meaning of an emoticon - the message that the sender wants to pass, and the receiving party should get. It can have different meanings, all depending on the user and the context. The next layer, the *Structure* of the emoticon, tells us what it consists of – faces, objects, text etc. The top layer, *Visual Appearance*, describes what the emoticon looks like, its color and whether it is animated or not. The Layer Cake suggests that we can have different visual appearances for the same structure, which is often the case.

As a materialization of an instance of the Layer Cake, there is a concrete emoticon from a particular system. It is a picture (e.g., jpg or gif) that encapsulates all the layers and is connected to the emoticon system of a specific SN, IM or some other online communication system (e.g., gTalk, Facebook etc.)

### 2.2 Ontology Design

In modeling of SO, we have used Ontology Design Patterns [2], most notably Componency and Information-realization patterns that we have adapted to our domain. Design of the Smiley Ontology is based upon Smiley Layer Cake. The core class of the Smiley Ontology (Fig. 1) is the *Emoticon* class, which formally represents the concept of an emoticon. Each emoticon can be visually represented (*VisualRepresentation*) as a sequence of characters (*CharacterRepresentation*), a picture (*Picture*) or both. Additionally, an emoticon, can be animated or static and still carry the same meaning, thus the property *isAnimated* of the *VisualRepresentation* class is introduced.

As each IM, SN, Internet Relay Chat (IRC) client and any other social software tool uses its predefined set of emoticons which are available for its users, we have defined the *EmoticonSystem* class as an assembly of emoticon instances originating from a specific social software tool. Each emoticon system uses its own set of pictures for depicting emoticons and therefore each *Picture* is related to the *EmoticonSystem* it originates from (via the *belongsToSystem* property).

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<sup>2</sup> Graphical representation of Smiley Layer Cake is available at <http://www.smileyontology.com/index.php?title=Ontology>

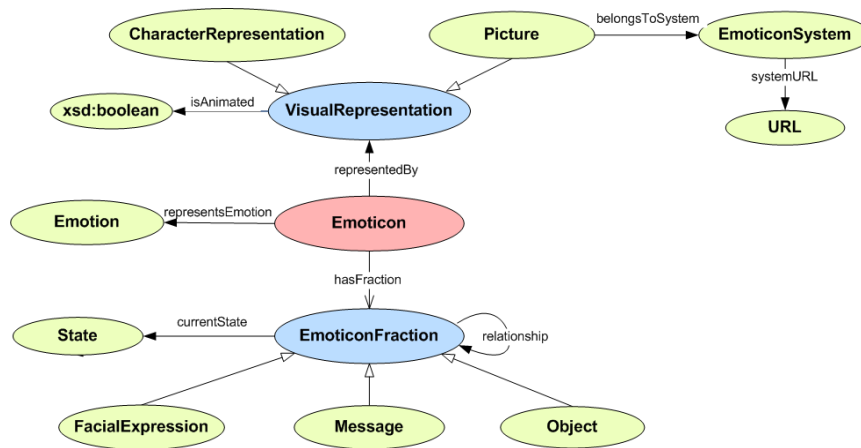


Fig. 1. Concepts and relationships of SO

One of the most typical and important connotations that an emoticon can carry is emotion, represented with the *Emotion* class. Emoticon is often used to accentuate the emotional context of the piece of text it is attached to. What is more, it is not a rare occasion that an emoticon even replaces the text entirely and does that not only without the loss of emotional semantic, but it often makes the emotion clearer to the recipient (e.g. setting just “:-)” as a status message clearly means being sad).

An emoticon does not need to be a single item (or just a face expression). It can consist of many fractions, that we call *EmoticonFraction*, where each of them can have its own meaning. As we identified, a fraction can appear in one of three forms:

- *FacialExpression* - depicts a human's face expression (e.g. happy face),
- *Message* - represents a sequence of characters or a text (e.g. “I love you”)
- *Object* - represents a physical item (e.g. ball, clock) that an emoticon can contain.

Regardless the fact that the meaning of these fractions can vary significantly, in general each fraction can have a *State* which further describes its meaning (e.g. ringing, sleeping). In addition, each fraction can be in some sort of relationship(s) with another one (e.g. smiley wearing sunglasses).

Smiley Ontology is available at <http://www.smileyontology.com/ns#>.

Possible use case scenarios that this ontology provides are listed at <http://www.smileyontology.com/index.php?title=Scenarios>.

### 3 Related Work

Emotions are an important part of peoples’ everyday life and the experiences they have on the Web. In most cases an emoticon describes a user’s emotion. Therefore, those two concepts are tightly connected, and there is a need for modeling emotions.

One of the examples of the related work is Emotion Markup Language (EML) [3], developed by W3C Incubator Group. EML is a general-purpose emotion annotation and representation language. The models of emotions, such as EML, are extremely important for SO, and it would be particularly useful to connect SO with those models because they can be used for modeling emotional states of emoticons. And since affective computing,

as a part of interactive technological systems, is gaining importance, SO could facilitate better customization and personalization of future user interfaces.

Having in mind that smileys are widely used in SN communication and online communities, SO can be an interesting complement to SIOC [4], which tends to enable integration of online community information and is becoming more and more adopted by Social Web applications. SO can be used for describing emoticons used in forum posts, comments, and other user-generated content which SIOC<sup>3</sup> describes. Integration of SO and SIOC would allow for richer description of the exchanged information.

Another interesting example of related work is Online Presence Ontology (OPO) [5] which describes users' presence online. Emotional states are important part of users' online presence, and emoticons are capable of expressing those states. By integrating SO and OPO<sup>4</sup> one can allow for including user's emotional state in his online portraits. SO can be used to glue a user's context with user generated content (e.g. (micro) blogs posts) which uses smileys, where OPO is just one of the models that describes that context.

#### 4 Conclusions and Future Work

The benefits of Smiley Ontology are numerous. First of all, it allows for preserving the semantics of emoticons and thus enables interoperability between different emoticon systems which eventually results in a better communication between users. The ability of machines to understand the meaning of emoticons enables them to adapt to users' needs and moods and provide them with much richer user experience not only on Internet, but in all spheres of life (as shown in the use case scenarios).

Our present efforts primarily include modeling of various concrete smileys so that we can determine the suitability of the current ontology structure for modeling emoticons. This will serve us in our future work as a good basis for the development of some of the scenarios we have defined. Also, there is a need for modeling emotions that smiley carries, most probably in the form of ontology. In combination with Smiley Ontology, it will bring much richer user experience, enabling advanced scenarios, such as emotional search and emotional experience adaptation. To test the feasibility of these propositions we plan to implement a demo application on top of an open-source IM, or a mailing client which will enable searching throughout chat/ mailing history but including smileys' elements and meaning, as well as emotional filtering of messages.

#### References

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<sup>3</sup> SIOC Core Ontology Specification, <http://rdfs.org/sioc/spec/>

<sup>4</sup> Online Presence Ontology Specification, <http://www.milanstankovic.org/opo/specs/2009/OPO-20090501/>