

An Exploration of the Creative Work Ontology for the Ontology Aggregation of Social Media

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ABSTRACT

In view of the great success of social media, this paper raises an interesting question about how we should strengthen the existing social media so that we can have an even better communication means for business, education, e-government, etc., as suggested by some scholars. This question further leads us to investigate the possibility of having a social media ontology to reveal the room for creativity and the fundamentals that must be preserved for these possible new designs. However, forging a social media ontology may require ontology aggregation of various ontologies of the popular social media platforms and therefore, trigger the data loss issue involved. This paper aims at providing a solution to this data loss issue, and proposes the use of the properties of the Creative Work Ontology for the ontology aggregation of social media. It also provides an example of the proposed solution regarding the partial ontologies of Facebook and Snapchat.

KEYWORDS: Creative Work Ontology, ontology aggregation, social media

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Introduction

In view of the successful stories of Facebook, Instagram, Snapchat, Line and other social media platforms (Miles, 2014; Salman, 2018; Wojdyski & Evans, 2016), how should we study social media collectively so that we can have a better understanding of them and get ready to strengthen them in order to offer an even better communication means? Garimella and his colleagues (2018) claim that many research methods of social media are domain-specific. There is no universal method yet that allows scholars to study them collectively. In fact, there is already an urge for a better understanding of social media to develop better communication means for business (Krishen, Berezan, Agarwal, & Kachroo, 2016), education (Lytras, Mathkour, Abdalla, Yáñez-Márquez, & De Pablos, 2014), and e-government (Alexopoulos, Zuiderwijk, Charapabidis, Loukis, & Janssen, 2014). A universal research or study method of social media is needed. Meanwhile, Hung (2017a, 2017b) states that ontology allows us to study new media including social media collectively. In this paper, we propose to have a social media ontology to study them and to explore how we can strengthen their existing communication designs. Such an ontology should be able to let us grasp the must-have properties of social media, their relations and possibilities for a better communication means. Generally speaking, an ontology reveals the fundamentals of a domain, informing its users of its stable core and changing appearance. Readers can refer to the literature review section for the details of an ontology.

Nevertheless, building a social media ontology is not an easy task. We not only need a lot of information about social media but also a method to deal with their high dimensions. Figures 1 and 2 show the partial ontologies of Facebook and Snapchat with each property being an individual dimension. One can easily imagine the myriad dimensions we need to handle when studying social media collectively.

Figure 1 A partial ontology of Facebook based on our latter discussions on its characteristics

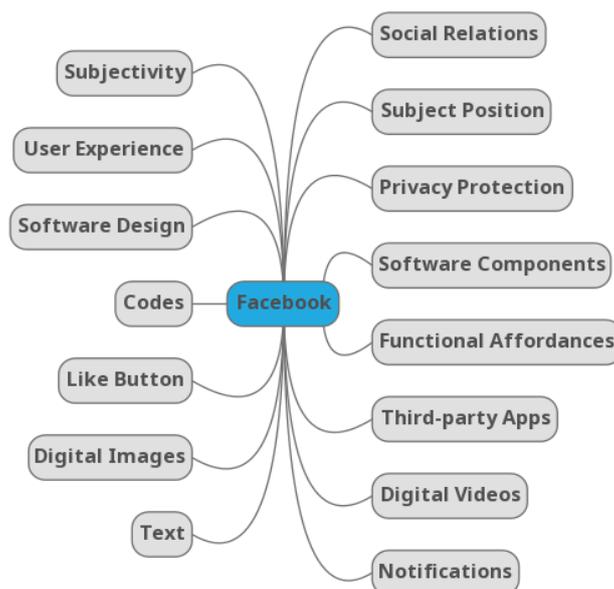
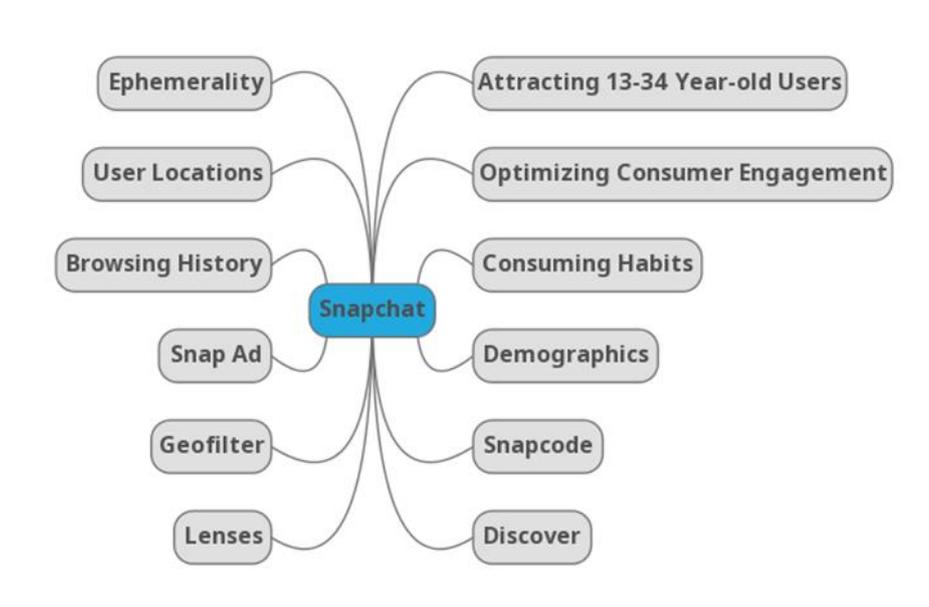


Figure 2 A partial ontology of Snapchat based on our latter discussions on its characteristics

One possible way to reduce the high dimensions of social media is to merge them ontologically. That is, we first define or identify the different ontologies of Facebook, Instagram, Snapchat, Pinterest and so on. Then, we merge them to reduce their dimensions so as to form a social media ontology. This process involves ontology aggregation regarding the use of a collective ontology to represent the information of the different social media ontologies (Porello & Endriss, 2011). Seddon and Srinivasan (2014) emphasize that there is always a data loss when aggregating ontologies. This is because different communities use different ways of organizing knowledge, impeding their communications and creation of new knowledge. Under these circumstances, tackling data loss during ontology aggregation can be the first task for studying social media collectively.

In this paper, we propose to use the properties of the Creative Work Ontology (Hung & Choy, 2013) – rules, structures, features, and biases – to categorize the information of social media so that they can have a common ground to perform ontology aggregation. Hung (2017a, 2017b) claims that new media inclusive of social media possess rules, structures, features, and biases. He and his colleagues (Hung, A. Chan, & R. Chan, 2018) further claim that the digital advertisements of social media also possess these four properties, and are representatives of social media (readers can refer to our latter discussions about the relations between the Creative Work Ontology and social media for more details). It is possible to use the Creative Work Ontology as a collective ontology for the ontology aggregation of social media. In this way, all the different social media can have appropriate channels to identify, examine, exchange, and combine information, reducing the chances of data loss during ontology aggregation. Then, we are closer to having a social media ontology.

The rest of the paper is organized as follows: The next section is about our research method followed by the literature review section regarding ontology, ontology aggregation, a brief

overview of social media, the Creative Work Ontology and its relations with social media. Then, we present our solution to tackling the data loss issue during ontology aggregation of social media. Lastly, we present our discussions and conclusion.

Literature Review

Ontology

Since a possible social media ontology aims to let us be aware of the fundamentals of social media and to alert us to their possibilities that contribute to an even better communication means, such an ontology should be able to guide us to strengthen the existing social media platforms. Under these circumstances, we refer to the definition of an ontology by Schreiber and colleagues (1995) that an ontology describes the theories of a domain regarding the modular design, redesign, and reuse of knowledge-intensive system components at a Meta level. In the context of social media, an ontology allows us to understand the modular design, redesign, and reuse of the current social media components for various purposes, such as social networking, at a Meta level. Then, our proposed solution to ontology aggregation of social media is to preserve as much data as possible during ontology aggregation so as to attain a reliable modular design, redesign, and reuse of these social media components for the designing of an even better communication means for business, education, e-government, etc.

Ontology Aggregation

Seddon and Srinivasan (2014) claim that it is difficult to aggregate information from “differing ontologies as experienced socially, culturally, and contextually by diverse communities” (p. 1128). The main reason is that different communities use different ontologies to organize knowledge, thereby missing a common ground for aggregating information (Gulić, Vrdoljak, & Banek, 2016). Seddon and Srinivasan especially emphasize that “[a]lthough the ontologies may be dynamic and fluid within a given discipline, the differences between and across ontologies may also serve to impede communication and the creation of new knowledge” (p. 1128). As a result, there is a high chance of data loss when these ontologies are aggregated.

Seddon and Srinivasan further propose four sociotechnical approaches to tackle the data loss issue. The first is about flexible data categories that involve the use of a large-scale structured database categorizing information from different ontologies into a single ontology, replacing the predetermined relationships in the information and therefore reducing their complexities and facilitating communication among them. The second is collaborative ontologies that happen “via a knowledge bank that speaks to themes of commonality” (p. 1131). It is the collaborative ontologies that has inspired us to explore the potential of the Creative Work Ontology – a weak ontology – as discussed in the next section. The third is named “From Platforms to Streams” that encourages real-time communication to mitigate the data loss issue. The fourth is about decentralizing decision-making by reducing our reliance on information aggregated across a number of ontologies.

From our perspective, the four sociotechnical approaches are rather hypothetical. However, there is light shed by Seddon and Srinivasan regarding the potential of a weak ontology. Indeed, they state that, “diverse local ontologies can be created around a common large-scale collection of information” (p. 1130). A compact representation of such a common large-scale collection of information can be a weak ontology.

Creative Work Ontology

Hung and Choy (2013) invented the Creative Work Ontology for cultural product creation as shown in Figure 3. They claim that the Creative Work Ontology has structures and features as its ontological properties, rules as its axioms, and biases as the functions of the features specifying the manifestation of a cultural product. Table 1 originally from their work shows the different properties of the different cultural products that can be described by the Creative Work Ontology. We take narrative as an example. Narratology as a rule defines three-act structure, actors, and events. Meanwhile, a three-act structure supports the existence of actors and events in different plays. Lastly, genre shapes actors and events.

In fact, the Creative Work Ontology is a weak ontology that allows different relevant domain ontologies such as clothing fashion, narrative, and popular music to develop from it. In other words, a weak ontology defines the ontological properties shared among different relevant domain ontologies. A weak ontology is more conceptual or abstract than the relevant domain ontologies.

Figure 3 The Creative Work Ontology by Hung and Choy (2013).

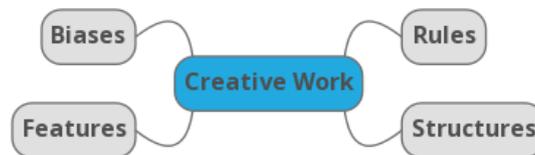


Table 1 Examples of Cultural Product Properties Described by the Creative Work Ontology (Hung and Choy, 2013, p.3)

Cultural Products	Rules	Structures	Features	Biases
Clothing fashion	Fashion theory	Fabric combination, cutting	Color, weight, texture	The age group, social class, and occupation of a target market.
Narrative	Narratology	Three-act structure	Actors, events	Genre
Popular music	Tonal music theory	Harmonic and rhythmic structures	Melody	Musical style

A Brief Overview of Social Media

Starting from the 90s, there were many social networking sites for people to interact on. Six Degrees, Black Planet, Asian Avenue, and MoveOn are some of the examples (Edosomwan, Prakasan, Kouame, Watson, & Seymour, 2011). Meanwhile, Geocities was a very popular web hosting company (Madden & Fox, 2006). From 2000 onwards, there was a new wave of social media. According to Edosomwan and others (2011), LunarStorm – the first European digital online community – was launched in 2000 followed by Friendster in 2001, MySpace and LinkedIn in 2003, Facebook Harvard in 2004, Yahoo! 360 and YouTube in 2005, Twitter in 2006, and Google buzz and Instagram in 2010, among others. In 2011 Snapchat joined the competition (Cavalcanti, Pinto, Brubaker, & Dombrowski, 2017). In the past 18 years, MySpace was once the most popular social networking website in the US. Its successor, Facebook, is now the most popular social networking site worldwide, while Instagram and Snapchat rank right after it. In the meantime, YouTube is the most popular online video community in the world. Only a few from the 90s like Yahoo are still standing in 2018. Since we would like to emphasize the importance of ontology aggregation of social media in our current and future societies, we prefer using the most popular social media to demonstrate our proposed solution. As Instagram is owned by and highly influenced by Facebook, we use Snapchat and Facebook for the demonstration.

Treem and Leonardi (2013) stress that we should seriously consider the affordances of visibility (our effort in locating information), persistence (the reviewability, recordability, etc. of social media), editability (rehearsability), and association (our social ties and connections with information) when studying organizational communication processes in social media. In a way, these affordances do shed light on our exploration of the Creative Work Ontology in this study. That is, visibility requires something like the features of the Creative Work Ontology to guide users to locate information; persistence requires support from both the features and structures to offer reviewability and recordability; editability is similar to the functions of the features (biases) that allow users to rehearse before posting; association is in response to the rules that

define what social media are supposed to do. We will further illustrate the relations between the Creative Work Ontology and social media in the next section.

Creative Work Ontology and Social Media

Hung (2017a, 2017b) contends that new media also possess the four properties of the Creative Work Ontology. Hung and colleagues (2018) further carried out a study on Pinterest, Snapchat, Instagram, and Facebook to investigate whether their digital advertisements also possess the four properties of the Creative Work Ontology. As a result, their positive findings provide the below definitions of the rules, structures, features, and biases of the digital advertisements of these popular social media:

Table 2 The Definitions of Rules, Structures, Features, and Biases of the Digital Advertisements on Social Media (Hung et al., 2018, p.92)

Digital Ads on Social Media	Definitions
Rules	The methods a social media platform adopts to offer the best user experience in its digital advertisements.
Structures	The reasons) e.g. targeting (why an advertisement appears in an individual's social media account.
Features	The types and characteristics of the digital advertisements a social media platform displays that make it different from other social media platforms.
Biases	The advertising tactics a social media platform adopts that affect the manifestations of its digital advertisements.

In this paper, we assume that the availability of the properties of the Creative Work Ontology in the digital advertisements of popular social media also implies their existence and importance in the overall operations of these popular social media. In fact, Hung and colleagues already state that these digital advertisements are the representations of their social media counterparts. However, we suggest that the structures of social media should be further interpreted as the systemic support for the features. This definition is more appropriate for the overall operations of social media.

In the next section, we will use the four properties of the Creative Work Ontology to classify the properties of the partial ontologies of Facebook and Snapchat as shown in Figures 1 and 2. Then, we will perform ontology aggregation of these two partial ontologies to present our proposed solution to the data loss issue.

Using the Properties of the Creative Work Ontology for the Ontology Aggregation of Social Media

This section uses the properties of the Creative Work Ontology as the common ground for the ontology aggregation of social media so that the data loss issue during ontology aggregation can be minimized if not completely removed.

Facebook Ontology with the Properties of the Creative Work Ontology

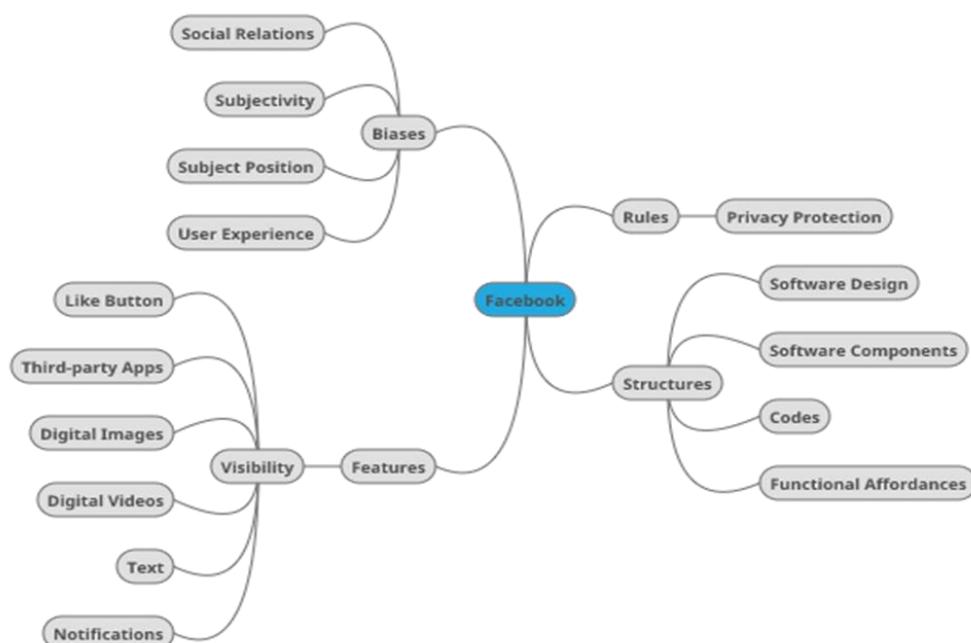
Facebook possesses all the necessary technical structures of a website to have high traffic. Its characteristics always make it a unique social media platform for participant involvement. These characteristics include the ways it organizes digital images, digital videos, text information, and notifications (Alhabash & Ma, 2017). From our perspective, one of its preferences that shape these characteristics is the need to organize multimedia information in a user-friendly manner. One of its golden rules is the protection of privacy and therefore, only accepted friends can view a person’s profile.

Bucher (2012) stresses that Facebook has directed software designers to consider visibility when designing software. Herein, visibility embraces the audiovisual elements on Facebook. The new modalities of visibility on Facebook caused by the EdgeRank algorithm have put “the medium specificity of the architectural organization of visibility, i.e. what can be seen and heard, to a large extent a question of software” (p. 1166). Bucher further states that:

[H]ow do the ‘Open Graph protocol’, ‘Like Button’ and third-party apps figure into the articulation of different modes of becoming visible or invisible? How and to what extent different software components and code interact and cooperate in the production of social relations and subjectivity become critical questions for further research into Web 2.0 platforms (p. 1178).

Figure 1 summarizes our discussions on the characteristics of Facebook in a partial ontology. Figure 4 shows the revised partial Facebook ontology after using the four properties of the Creative Work Ontology to classify its characteristics.

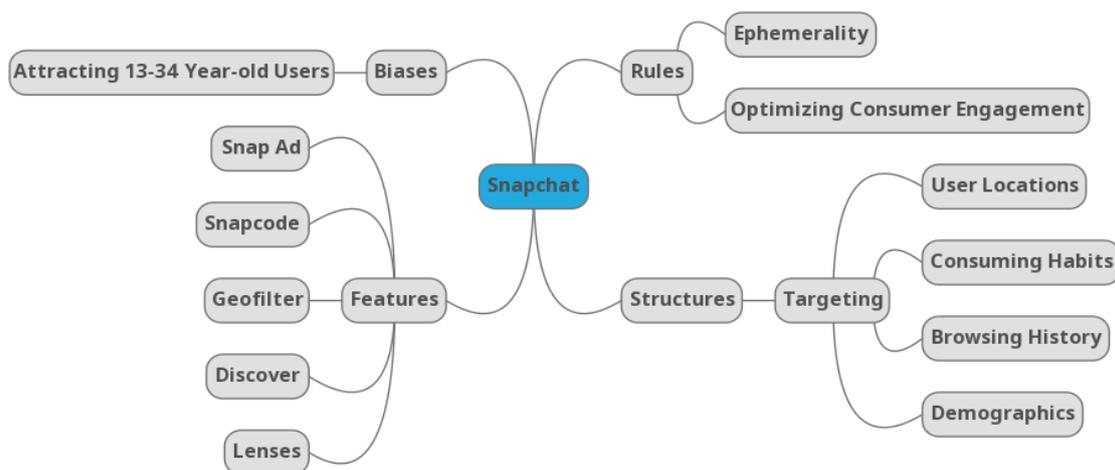
Figure 4 A revised partial Facebook ontology with the four properties of the Creative Work Ontology for property classifications.



Snapchat Ontology with the Properties of the Creative Work Ontology

Snapchat is a popular social media platform for teenagers and young adults aged between 13 and 34, focusing on time-sensitive mobile photos and videos that expire upon viewing them (Alhabash & Ma, 2017; Cavalcanti et al., 2017). Some scholars refer to this nature of Snapchat as ephemerality – sharing without co-ownership that highlights the affordance of default deletion (Bayer, Ellison, Schoenebeck, & Falk, 2016; Xu, Chang, Welker, Bazarova, & Cosley, 2016). Its major characteristics include Stories (or Discover) that allow “users to create a personal sequence of snaps from the last 24 hours” (Cavalcanti et al., 2017, p. 1935), Snap Ad a 10-second (maximum) video, Snapcode akin to QR code that provides coupons and deals, Geofilter about event marketing, and Lenses regarding promotions through visual effects on photos and videos (Hung et al., 2018). The rules of Snapchat include ephemerality (Alhabash & Ma, 2017; Bayer et al., 2016; Cavalcanti et al., 2017; Xu et al., 2016) and consumer engagement (Hung et al., 2018). Its partial structures relate to targeting that covers user locations, consuming habits, browsing history, and demographics, while its biases include the acquisition of young users aged between 13 and 34 (Cavalcanti et al., 2017; Hung et al., 2018). Figure 2 summarizes our discussions on the characteristics of Snapchat in a partial ontology. Figure 5 shows the revised partial Snapchat ontology with the four properties of the Creative Work Ontology in place.

Figure 5 A revised partial Snapchat ontology with the four properties of the Creative Work Ontology for property classifications.

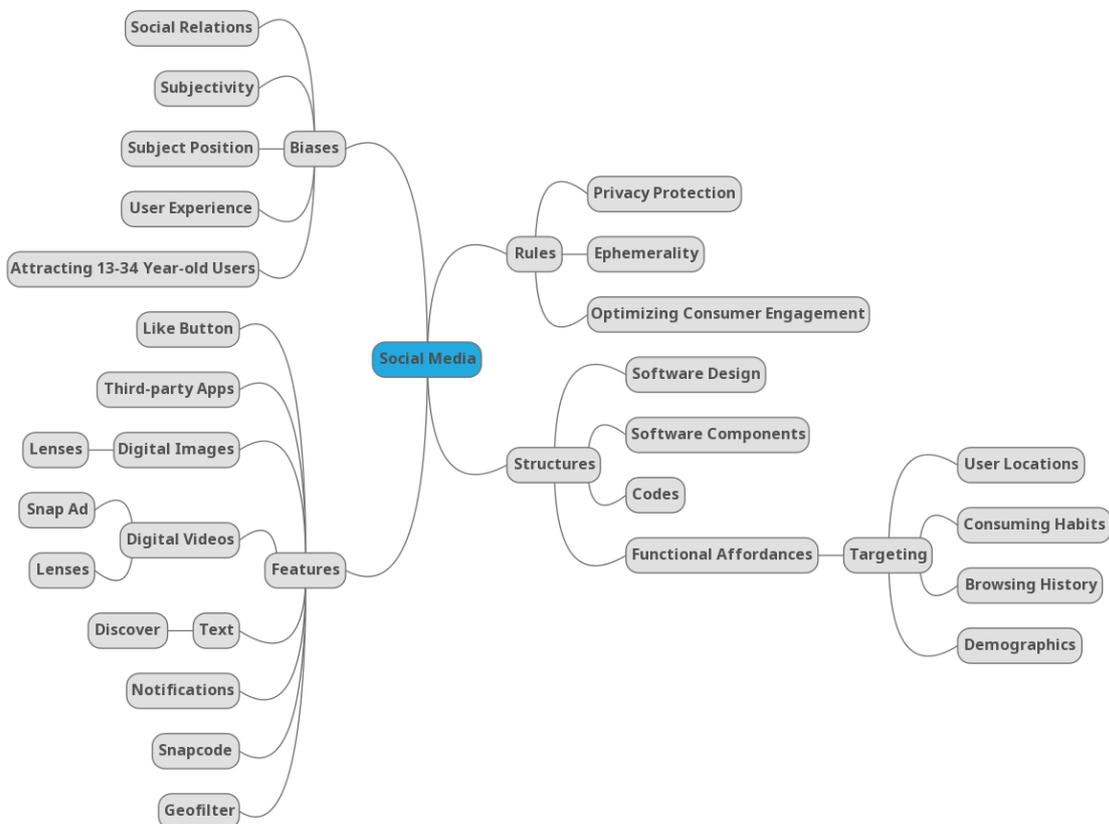


An Ontology Aggregation of Social Media

When compared to Figures 1 and 2, Figures 4 and 5 not only provide a clearer presentation of the characteristics of Facebook and Snapchat but also show the relations between them. For instance, software design is a structure that supports the like button of Facebook and the various features of Snapchat. Any of these features are affected by the biases such as social relations and market segmentation (attracting 13-34-year-old users). Most importantly, Figures 4 and 5

show the common ground, in the form of the properties of the Creative Work Ontology, for Facebook and Snapchat to aggregate information contributing to a possible social media ontology. In Figure 6, the targeting of Snapchat is now under the functional affordances and structures of Facebook. The lenses of Snapchat are now under both the digital images and digital videos or in general, the features of Facebook. The Snap Ad of Snapchat is also under the digital videos of Facebook, while its Discover is now under the text of Facebook. When a system of ontology aggregation of social media is in place, the different ontologies of Facebook, Snapchat, and even other popular social media can merge through proper channels mitigating the issue of data loss, albeit they are developed in different communities.

Figure 6 A possible partial social media ontology using the four properties of the Creative Work Ontology to aggregate the various properties of Facebook and Snapchat.



Research Methodology

This paper adopts a prescriptive model of design to firstly observe the current operations of the popular social media and identify the research problem, which is about data loss during ontology aggregation as discussed in the introduction. Then, it allows us to suggest using the properties of the Creative Work Ontology as the common ground for the different ontologies of social media to be aggregated so that we can study social media collectively and prepare for the development of a social media ontology.

Conclusion

In this paper, we propose to use the properties of the Creative Work Ontology – rules, structures, features, and biases – as the common ground for the ontology aggregation of social media, especially when there is already a study about the relations between them and the digital advertisements of social media. Through our examples, the partial ontologies of Facebook and Snapchat can categorize their properties according to the four properties of the Creative Work Ontology. Then, they can further aggregate in accordance with them. Interestingly, there are parent-child relationships found in the aggregation. For example, the “Discover” of Snapchat is grouped under the “Text” of Facebook. These relationships solidify the system of ontology aggregation of social media, minimize the data loss issue, and contribute to the development of a social media ontology. When such an ontology is formed, it is possible to divide an existing social media platform into the parts that must be preserved (e.g. rules and structures) and the parts that can be changed (i.e., features and biases), facilitating the design of an even better communication means. For instance, there may be offspring of the current social media that regard robots as friends of a human user especially as chatbot is becoming more and more popular. These robots may help answer user queries or moderate user discussions for businesses and e-governments. Another example can be about a possible social media platform taking our brain waves as inputs in order to assist disabled students in asynchronous learning. Both examples ride on the existing rules and structures of social media while trying to be different from the current ones by improving the features and biases.

On the other hand, the key limitation of the Creative Work Ontology is that it is not an ontology of new media and therefore, is not able to include all the fundamentals and shared properties of new media. An example is its omission of the power of new media. However, the previous studies about its relations with new media and the digital advertisements of social media (Hung, 2017a, 2017b; Hung et al., 2018) do shed light on our study and are worthy of our investigation. In the future, we will further explore the possibility of using the properties of the Creative Work Ontology for the ontology aggregation of other popular social media and the development of the social media ontology.

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