# Towards Identifying Concepts in Persuasive Social Networks: Case Study TikTok

Bochra Larbi[a], Nadia Elouali[b] and Nadir Mahammed[c]
*LabRI-SBA Lab., Ecole Superieure en Informatique Sidi Bel Abbes, Algeria*

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Abstract: Persuasive technology assists users in decision making by influencing their behaviors. It has seen major evolution in recent years, due to the rapid rate at which persuasive design has been integrated in a variety of technologies. This substantial involvement in several fields increased the influence and impact of persuasive technology. Since persuasion delivers an important amount of services, it is recognized as one of the key factors deployed by the human-computer interaction community in the design and development phases; yet, persuasive design has been accused of having problematic aspects. Social networking sites are no exception, they rely heavily on persuasion in their interfaces. Which has led to the emergence of new, diverse concepts exploited by these sites, with the primary goal of maximizing users' time spent in order to collect data and gain money from ads. Our research idea is to identify these concepts deployed by social networking sites, examine their degree of persuasion, then propose a set of new, moderate ones to preserve as much as possible the user's autonomy. In this paper, we present the first step of our research that consists of identifying the concepts deployed by TikTok which is the fastest growing social media in 2022.

## 1 INTRODUCTION

According to Fogg (Fogg, 2002) persuasive technology aims to intentionally change a person's attitude through influence. The first occurrence of using persuasive technology was in the 1970s to increase employee's productivity in the workplace, however the power of persuasive technologies truly emerged in the 1990s, with the rise of successful e-commerce sites (Némery et al., 2011). As persuasive design became increasingly intertwined with social media platforms in the 2000s, public opinion became more impactful on users' perspectives (Albarracín and Mitchell, 2004). Over the last decade, social media platforms have grown in scope, impacting user's opinions more quickly (Wang et al., 2021).

Several studies have been carried out in order to examine the potential outcomes of persuasive technologies. Persuasive technology has been established that it is beneficial in fostering different health and wellness-related behaviors (Orji and Moffatt, 2016). It eventually broadens its branches to mobile applications that are being developed to integrate various persuasive design features in order to alter user's behavior, such as encouraging physical activity ; these applications are constantly improving and are being used daily (Matthews et al., 2016). Some research, on the other hand, focused on the use of persuasive technology in the workplace to improve productivity and provide feedback (Wenker, 2022). Not to forget that persuasive technology has also been employed for educational purposes, as study (Mohamed Yusoff et al., 2022) highlights how persuasive technology allows for monitoring of students' attitudes and activities during the online learning process.

However, the majority of these studies fail to highlight the obstacles that arise from influencing users' behavior. In recent years, researchers investigating the dark side of persuasive technology have conducted studies to examine the complicated issue of persuading users to perform actions they may or may not be aware of. It has been revealed that persuasive technology may lead to addiction, particularly in the context of social networks (Chen, 2021). More than half of the world's population today uses social media (58.4%) (Greenwood, 2022), therefore they are exposed to dubious persuasive concepts, such as advertisers exploiting these concepts to influence cus-

[a] https://orcid.org/0000-0001-6517-1693
[b] https://orcid.org/0000-0002-3427-3766
[c] https://orcid.org/0000-0001-7865-5937



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tomer views and purchasing behavior toward their brands (Alalwan, 2018). This also leads to the question of how problematic persuasive concepts are when it comes to adversely affecting user's time spent on social networking sites (Bedjaoui et al., 2018). As a result, experts in this field are undertaking research on ways to detect and prevent deceitful persuasive aspects in technology. Nonetheless, the topic of striking a balance between user's well-being and persuasive technologies corporations' profit has remained elusive.

The objective of our research is to generate a meta model that encompasses and gives an overview of all the concepts used in social networks. Then, investigate the persuasiveness of these different concepts, uncover which are problematic, and substitute them with appropriate ones. The goal of establishing this meta model is to fully grasp what makes persuasive concepts inappropriate and how to combat them. We believe that this research will assist in developing new concepts that will result in a brand-new generation of social networks. TikTok is the fastest growing social media platform in 2022; hence, in this paper, we will start by identifying TikTok's concepts using a conceptual model. The results of the study will help construct the future meta model.

The remainder of the paper is structured as follows. Section 2 discusses related work. Section 3 presents details on our approach, while section 4 covers the results. Section 5 discusses the results achieved. Finally, section 6 concludes with some observations and anticipated future research.

## 2 RELATED WORK

We classified existing related work into two categories. The first category presents research that uncovers the main core concepts of social networks according to specific topics while the second category presents studies that focus on defining the persuasive concepts of social networks.

The first category presents research such as those of Assaad's in (Assaad and Shi, 2017), (Assaad and Mäkelä, 2017) and (Assaad et al., 2018), which worked on determining common features in popular learning social networks before assessing these fundamental concepts to see how they may serve an educational learning model; these concepts were later examined in terms of their features and functionalities. These fundamental concepts are as follows:

- **User Profile:** A graphical representation of personal data linked with a particular user on a platform. Permitting users to add personal details and regulate the profile's display and privacy.
- **Status Update:** A concise post sent by users to their connections in order to share their ideas.
- **Social Feedback:** This concept enables users to provide feedback on the quality the information, it allows users to establish social networks and interact with other users.
- **Activity Stream:** It offers users an overview of recent actions and data.
- **Social Messaging:** This concept provides for more extensive conversations and engagement via chats.
- **Community:** It allows users to interact on their own specific forums.
- **Discussion Forum:** It facilitates collaboration through discussion in distinct forums.

Whereas Md Dawot's work in (Dawot and Ibrahim, 2014) reviewed the features and functional components of social networks with a special emphasis on their usage in marketing, education, and governance. The study created a map connecting functionalities and features to assist social media users to choose the functions that are most applicable to their field. It noted that social network's functionalities relied on the features of the social network itself. Overall the user profile, online relationships, and online community are the core features of a social network, whereas the functionality of a social network is built from the features directly, determined by the users' knowledge and how they utilize it. For example Self-identification features (personal profile, content, activity) are associated with functionalities that include identifying a participant and displaying his presence.

Nevertheless, their research was restricted to specific topics and didn't cover the majority of social networks in detail. The first research was based on concepts that enhance educational learning, whereas the second paper just examined current features and linked them with existing functionalities in an attempt to provide a reference in certain fields. Therefore, it doesn't provide a complete overview of all social networks' concepts and hence, it doesn't enable for the identification of potentially dangerous concepts that need to be regulated.

On the other hand, the second group includes studies that define the persuasive concepts of social networks, such as Bedjaoui's work in (Bedjaoui et al., 2018) and (Bedjaoui et al., 2022), which proposed five patterns in online social networks that have a substantial influence on the user's time spent on media by persuading him to invest as much time as possible. After that his research focused on the suggestion

pattern to examine its intensity. The patterns are composed of:

- **Suggestion Pattern:** Offering relevant content to the user based on his preferences in order to attract his focus.
- **Reminder Pattern:** Push notifications that divert the user's attention away from his current activity.
- **Reward Pattern:** Rewarding the user's first interactions to motivate him to remain involved.
- **Interaction Pattern:** Having certain activities harder to accomplish so that the user resists them, yet having other actions easier to execute so that they are desirable to users.
- **Social Influence Pattern:** Persuading users to get socially attached to the acts of others.

Whereas Adaji's work (Adaji and Vassileva, 2016) highlighted the persuasion concepts employed by a Q&A social network, adopting Stack Overflow as a case study, by using the Persuasive Systems Design model (PSD) (Torning and Oinas-Kukkonen, 2009), which is a framework for designing and evaluating persuasive systems. The aim of this work is to investigate the network's persuasive concepts. As a result, all concepts of the PSD model were integrated in Stack Overflow, except for four concepts which are:

- **Tunneling:** It states that persuasive systems guide users through a process and offer options for them to be persuaded.
- **Rehearsal:** It states that persuasive systems allow users to rehearse a desired behavior.
- **Reminders:** It states that persuasive systems incorporate a reminder technique.
- **Similarity:** It states that users are more likely to be persuaded by systems that resemble them.

Each integrated principle encourages user interaction. According to the findings, persuasion in a common Q&A social network follows familiar patterns. However, it was difficult to analyze the PSD model's category, the support of system credibility since the category is heavily reliant on user feedback.

However, their studies focused exclusively on the persuasive side of concepts, disregarding their association with the fundamental concepts of social networks. And once more, this doesn't grant us a broad view of all concepts, even if we just identify the severely persuasive concepts, we risk omitting some that are less persuasive or that serve as the foundation for the remaining persuasive concepts, such as "post". The concept "post" is generally not part of persuasion, but if we look carefully, we see that it's the center of all networks and contributes to the rest of the persuasive concepts.

To the best of our knowledge, there is no study in the literature that has extracted all the concepts of social networks in an inclusive way. An approach that presents, explains and regroups the different concepts used in the different social networks, considering the different persuasion degree.

## 3 OUR APPROACH

In this paper, we present our initial step of research, which consists of analyzing the first social network, extracting its concepts, and creating its conceptual model. We used an iterative approach to accomplish this which consists of analyzing the application, developing the conceptual model, and then repeating several iterations to enhance it.

TikTok is the first social network we will explore in this research. It was launched in September 2016 by the Chinese company ByteDance under the name Douyin. It began to achieve interest outside of China, and barely a year after its launch, it had over 100 million users and spread abroad in 2017, under the name TikTok (Insider, 2020), with a primary concentration on short video content. It enables users to produce videos ranging in length from 15 seconds to 10 minutes by employing various filters and viral sounds. It is an innovative social network since the impact of TikTok's personalized content on viral behavioral objectives is affected by creativity, authenticity, and a yearning for uniqueness (Chu et al., 2022). TikTok research has grown in pace with the platform's popularity. For example, a research (Du et al., 2022) indicated that TikTok had a significant influence on luring visitors. Wang's study (Wang, 2020) demonstrated the benefits of applying Human-Computer Interaction theories to mobile short-form video applications and addressed the impacts of short-form video features on viewers' psychological reactions. It was also stated that TikTok can be deployed as a teaching tool by instructors to provide engaging learning to students (Alexandro et al., 2022). Since we opted to analyze the most prominent social networks currently, we decided to start with TikTok , which had the fastest expansion. It has seen tremendous growth, particularly since it was released worldwide in 2017 (Insider, 2020).

We've been exploring TikTok for nearly two years, and this provided us the opportunity to thoroughly analyze it across both web and mobile versions.

# 4 RESULTS

Figure. 1 illustrates the conceptual model for TikTok's concepts. We identified the concepts by analyzing each feature and function of TikTok across the mobile and website platforms, afterwards we classified the concepts' relationships into two types: the straight line symbolizes the source concept's control over the target concept, whereas the dotted line represents the effect of the source concept on the target concept. The identified concepts are as follows:

- **Profile:** This key concept assists the user's identity by allowing him to provide his personal data, as well as upload and manage his content. The user has control over his visibility to others in addition to the visibility of his following. Controlling not solely the user's account and content, and moreover his suggestions and explore page, influencing his general overview of the application.
- **Video:** This concept involves recording and posting videos from the user's side, ranging in duration from 15 seconds to 10 minutes, with the possibility to pause, forward, or rewind. This concept also allows users to make videos private or public. The user manages his videos, however they cannot be edited after they are posted.
- **Sound:** This concept enables users to explore, produce, and control sounds. Tiktok provides a variety of sounds, including musicals, cinematic scripts and memes. Users interact with sounds by liking, sharing or saving them.
- **Hashtag:** Hashtags describe TikTok's content and allow access to a large number of new content that shares the same hashtag. This concept serves as a classifier, with each hashtag representing a different category. Users experiment with hashtags on their videos while also browsing the hashtags of other users.
- **Filter/Effect:** This concept allows users to experiment while recording on TikTok, which offers a wide variety of humorous and aesthetic filters and effects. This makes it enjoyable to explore viral filters trending on TikTok. It also empowers users to express their creativity through the application.
- **Livestream:** Users may interact with others by launching livestreams while being on TikTok. They can become TikTok creators with this concept, getting and gifts from their loyal followers while also competing in challenges with other creators.This concept provides entertainment to viewers by allowing them to interact with the creator via his livestream by liking, chatting, and sharing it.
- **Gift:** This concept is strongly linked to the livestream concept when users gift streamers to support them. Since these gifts may be converted to actual money, majority of TikTok creators earn profit from livestreams through gifts.
- **Story:** It allows users to post a video or an image, however it isn't permanent and disappears after 24 hours. This concept solely shows the story's viewers and their numbers to the creator.
- **Seen:** When a story is posted, the creator can know who viewed it, however this concept doesn't apply on ordinary videos, and viewers remain anonymous unlike the number of views that gets displayed on content.
- **Message:** Users communicate with one another via conversations. Although TikTok isn't a chatting application, it still allows users to send videos to their friends and share content with them. This concept, nevertheless, doesn't allow for the creation of groups inside the message inbox.
- **Q&A:** Another concept that emphasizes on users' communication with each other, whether through posting questions and responding to them on a livestream, uploading a video on it, or through comments. It also allows users to explore various questions and think of fresh ones.
- **Notification:** This concept sends users reminders and alerts to draw their attention to an occurrence on the platform. Users can adjust their notification settings, however the options are limited and don't include all notification types.
- **Trend:** This concept provides several advantages to creators whose videos receive a lot of attention. It also shows viewers the most popular videos for them to watch and interact with. The like and comment concepts have a strong influence on this concept. If the content receives a great deal of engagement from comments and likes then it goes viral.
- **Like:** This concept preserves track of the user's likes and allows him to sort them into customized collections. The amount of likes is constantly displayed on the content.
- **Comment:** Users comment on each other's videos, and this concept allows users to manage their comment sections by disabling, deleting, or restricting comments. Therefore TikTok communities are formed by conversing and discussing the video's topic in the comments.
- **Auto-repeat:** When a video or story on TikTok starts playing, it will continuously loop until the user scrolls down. This concept requires the user

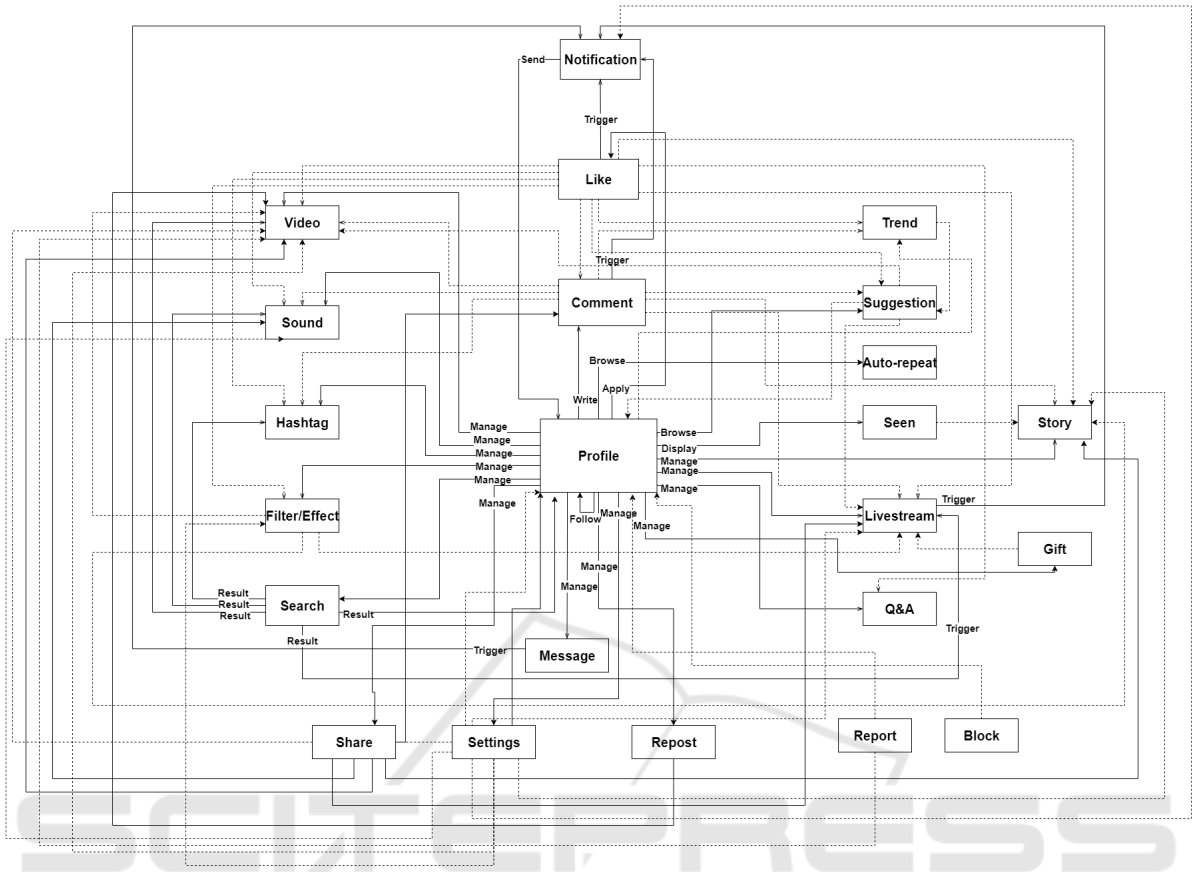


Figure 1: TikTok conceptual model.

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to pay attention to the video or story's duration until the proper moment for scrolling in order to prevent repeating the video.

- **Setting:** Users can access and manage their settings as they deem suitable. Settings contain sections for each TikTok feature, such as notification settings, content settings, and livestream settings. Yet, the user has no control over certain options that aren't under his authority, such as concealing specific data or blocking notifications indefinitely.
- **Share:** This concept provides the user with several options for sharing content with friends or on other social networks. Since every content on Tiktok is shareable, the number of shares on the content, such as videos, sounds, and hashtags, is always displayed.
- **Re-post:** Using this concept will assist you to promote the video you reposted and have it recommended to your friends on TikTok. Users utilize this concept to spread their favorite video on the pages of others.
- **Suggestion:** The explore page of the user presents an infinite number of recommendations according to the content he likes and comments on. This page is known as for you page, and it represents the content that is specifically chosen for the user.
- **Search:** This concept makes every content easily accessible by simply typing the relevant keywords. Users can acquire videos, sounds, livestreams, hashtags, and other users. The search concept provides several filters to facilitate selecting the proper results, which are by default a combination of the most recent popular content referred to as TOP.
- **Block:** TikTok allows users to block another user by using this concept. After getting blocked both users will be unable to interact or search for one another, and their content won't be recommended to the other. The block concept also allows users to unblock users.
- **Report:** TikTok has guidelines that must be respected and pays attention to behaviors that individuals perceive unacceptable, such as bullying and racism. Using this concept, users can express their disapproval and flag inappropriate content while clarifying the reason. The reports are for-

warded to the Tiktok team for examination, then get treated depending on the report's analysis.

Our model currently includes the various concepts that we identified using both web and mobile platforms throughout several iterations. Although the analysis from both platforms contributed to the model, there were some subtle variations in the structure of the interfaces, but the behavior was coherent across both platforms. We noticed that the navigation on the website is more sophisticated than on the mobile in order to enhance content accessibility. Therefore, website interfaces have several, concurrent design features such as a visual keyboard to conveniently browse and like videos or autoplay videos on mouse hover, as opposed to mobile interfaces, which concentrate on a specific feature at a time. In addition, even though the website labels the notifications to make them searchable, the mobile notification system is more consistent.

## 5 DISCUSSION

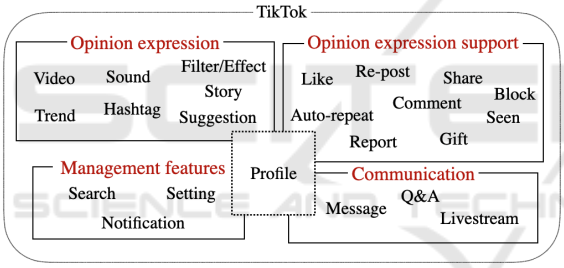


Figure 2: Schema of the concepts categorization.

After analyzing and investigating each concept and based on our initial impressions of the conceptual model, we proposed a set of four categories, each of which includes particular TikTok concepts that are targeted at the same goal and hence are tightly tied to one another. Therefore, we proposed a schema as shown in figure. 2, that represents a higher abstraction of the prior model while incorporating the categorization of concepts. The concepts have been categorized as follows:

- **Opinion Expression:** This category encompasses the concepts that allow TikTok users to create and generate their own content, such as recording videos, designing filters, or uploading an audio. It also covers concepts associated with user generated content, including trend and suggestion concepts.
- **Opinion Expression Support:** This category covers concepts that equip users with support and options to communicate their viewpoints on the content. This can emerge from good impressions, such as shares and likes, or negative impressions, such as report and block, for unpleasant content. This category is heavily reliant on opinion expression, therefore they typically operate concurrently.
- **Management Features:** It includes concepts that supplement and transform other concepts in order to manage or customize them. This category is considered an extension to the other categories. For example, managing settings for profile and content.
- **Communication:** It contains concepts that focus on user communication and interaction. For example, viewers conversing with the creator on livestream by sending questions or users exchanging messages to one another.

All of these categories are strongly connected to profile, since it was observed to be the key concept of TikTok, controlling, regulating, and impacting most concepts. The four categories are interconnected to one another, and their relationships are established by the interactions between their concepts. For example, if a user posts a video and attaches it to a new creative filter. The likes and shares on the video will make it very interactive, increasing its chances of being suggested and going viral. This interactivity and popularity will cause notifications to appear to the user on a regular basis. To maintain engagement with his new followers, he will begin interacting with them more on livestreams and uploading content often on his profile.

## 6 CONCLUSION

In this paper, we presented our first TikTok conceptual model. The model contains all the concepts identified in the mobile application and website application. This model will be evaluated and broadened further in the future to ensure its inclusivity. Similarly, we will do the same with the other social networks in order to gain control of them and determine their concepts. Our goal is to develop a meta model that encompasses all social network concepts. A meta model that will allow us to advance to a higher level of abstraction and evaluate the amount of persuasion of the various aspects of social networks.

We believe that this meta model, along with the various conceptual models, will not only serve as a foundation for other researchers in the field to gain a general understanding of all concepts used in social

networks, along with their categorization/abstraction and levels of persuasion, but will also serve as a good starting point for thinking about the next generation of social networks. A generation that considers not only how to influence and motivate active user participation for business benefits, but also users' goals such as how they want to spend their time, relationships both interpersonal and social choices, mental and emotional limits e.g.vulnerabilities, fatigue, and the ways their minds form habits.

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