

## Presence of Social Media during Catastrophes

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During emergencies, those affected use social media platforms to interact and collaborate. Social media is used to seek help, offer moral support, and help each other without direct face-to-face interaction. From a social presence perspective, we analyzed facebook feeds to understand how people cooperated and collaborated during earthquake struck southern and central Turkiye and northern and western Syria. I investigated manual content analysis to create a social presence classifier incorporating the concepts of intimacy and immediacy, which we use to train a machine learning method to subsequently analyze the entire dataset about 5000 posts. The results showed that the majority of instant posts communicated the need and urgency of those affected to seek help. We argue that online social presence during catastrophes creates a sense of ownership and shared identity among social media users to participate in catastrophes relief efforts.

**Keywords:** Social media, social presence, Catastrophes, and disaster.new media,

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1. باحث ماجستير صحافة وإعلام- فلسطين

## Introduction

Yes, it is true that social media has significantly changed the way we interact on the Internet. It has become popular because it enables the creation and exchange of user-generated content, quick dissemination of information, and the availability of public content (Kaplan and Haenlein 2010,A. Mukkamala and R. Beck 2016). Social media platforms such as Facebook, Twitter, Instagram, and others are used not only for social networking but also for emergency communication and response during catastrophes.

During emergency situations such as natural catastrophes, people turn to social media to gather information, communicate with others, and coordinate their response efforts. Social media platforms have been used during several natural disasters, such as hurricanes, earthquakes, wildfires, and floods,Covid- to share information and collaborate in response efforts.

For instance, during Hurricane Sandy hits the east coast of US, people used social media to coordinate rescue efforts, share real-time updates on the storm's progress, and locate missing persons (Kryvasheyev et al. 2016).( Similarly, during the 2010 Haiti earthquake, social media platforms were used to share critical information about the disaster, including the location of survivors, the status of hospitals and medical supplies, and the extent of the damage.

Newly,social media has been used during including the earthquake that struck southern and central Turkey and northern and western Syria in 2023.

During that earthquake, people turned to social media platforms such as Twitter and Facebook to share real-time updates on the situation, including the extent of the damage, the location of survivors, and the status of relief efforts. Social media was also

used to coordinate rescue efforts, organize donation drives, and provide assistance to affected communities.

In addition, social media was used to provide emotional support and connect people who were impacted by the earthquake. People shared messages of solidarity and offered words of encouragement to those affected by the disaster.(Verma et al. 2011; Vieweg et al. 2010a)

In order to grasp the seriousness of the situation and act in concert to organize and participate in emergency response, people first need to perceive, sense and empathize with others on social media, which corresponds to the related concept of social presence (Short et al. 1976).

Although There are a few studies that have used questionnaire-based methods in their social media presence studies (Al-Ghaith 2015; Xu et al. 2012), but so far no study has examined facebook-based content analysis for social presence catastrophes. People's social presence on social media is important. Therefore, our research question is:

***How can social presence be detected through content analysis of posts, and what role does it play in building relationships, cooperation, and collaboration in catastrophes?***

In order to understand how people express intimacy and immediacy as forms of social presence in times of disasters, we analyzed 5000 posts from a devastating earthquake that struck southern and central Turkey and northern and western Syria which took place On 6 February 2023.

The remainder of this paper is structured as follows: Section two provides the theory of social presence. The main focus in section three is about the methodology we applied which is of three-fold:

1) operationalizing social presence in social media, 2) conducting manual content analyses to develop training dataset for message classification, 3) training and using a Naïve Bayes machine-learning approach to classify our dataset. In section four, the empirical analysis and results will be presented and subsequently, we conclude the paper with discussion, limitations, and future research.

## Literature Background

### Social presence

To put The concept of social presence emerged in the 1970s (Lowenthal 2009; Short et al. 1976) in telecommunications research, where it was considered a characteristic (Kehrwald 2008, C. Irwin, L. Ball, B. Desbrow, and M. Leveritt,) of the media being used. Social presence refers to how much importance is given to the other person in an interaction and the resulting significance of the interpersonal relationship. This is determined by the perceived feeling of the presence of the other person. The effectiveness of communication depends on the quality of the communication medium, which can impact the way people interact and communicate. In summary, social presence is a significant factor in communication that is influenced by the quality of the medium being used.

The extent to which a communication medium can effectively convey non-verbal cues such as facial expressions, posture, and attire is used to evaluate its level of social presence, as stated by (Gunawardena in 1995). Different communication mediums possess varying degrees of social presence, for instance, audio versus video, as noted by (Lowenthal in 2009, M. Krstajic, C. Rohrdantz,. The two main components associated with social presence are intimacy, which explains how individuals behave and get close to one another during social interactions, and immediacy, which pertains to interpersonal communication and communicative behavior, according to Argyle and Dean in 1965 and Wiener and Mehrabian in 1968, respectively. Short et al. (1976) also highlighted these two concepts.

With the emergence of computer-mediated communication (CMC), social presence theory has

evolved and become increasingly important in the field of online learning (Lowenthal 2009). CMC enables social interactions through written content, but according to the social presence theory, such interactions may lack the same level of social presence as face-to-face interactions due to the absence of nonverbal cues. Although new technologies have improved information processing, transmission, and user experience, it is not yet clear how substituting face-to-face encounters with text-based electronic messaging affects the social meaning of interactions (Walther et al. 2005, p. 1).

Contrary to the belief that text-based communication lacks social richness, studies have shown that text-based media, such as e-mail and chat, can actually be richer than face-to-face conversations (Walther 1992). Additionally, mediated communication is crucial for perceiving the other person as real during communication (Gunawardena 1995). Consequently, the social presence theory, which has its roots in media studies, has been widely used to investigate the interactions between students and teachers in online learning settings (Tu and McIsaac 2002).

In online learning, social presence is communicated through the messages exchanged among online participants and how these messages are interpreted by others. Activities such as posting messages, responding to others, and engaging in group activities provide cues about the social presence of individuals both sending and receiving them (Kehrwald 2008). Despite the absence of nonverbal cues in online environments, people can still gather cues through language, style, and other means to establish relationships (Walther et al. 2005). Therefore, the social presence theory can be applied to comprehend how people interact in online learning environments, though there is still uncertainty about how to accurately detect and measure social presence in social media contexts. As a result, social

presence has been defined differently in various studies related to online learning (Kehrwald 2008; Lowenthal 2009).

Social networking sites are considered a rich medium due to their various attributes such as text, videos, pictures, and other forms of information like URLs and website links (Kaplan and Haenlein 2010). While social presence has been investigated in social networking research, it remains unclear how social presence can be utilized during emergency situations to stimulate relief activities. However, previous studies have suggested that online users' interactions and engagement with others are directly related to social presence (Lim et al. 2015) and that it plays a vital role in fulfilling the social connection needs of individuals in online environments (Han et al. 2015).

### **Social Presence**

Facebook's various features and characteristics enable individuals to interact and engage in conversations with others. Facebook and its features can be viewed as a media-related component that fosters a sense of intimacy and immediacy based on its content. Textual content in a post can also generate a sense of intimacy and immediacy. The social presence of individuals in online environments is communicated through the messages they send and how others interpret them (Kehrwald 2008)

To put the concept of "intimacy" into practice, we examined it through the lens of affective intimacy, which elucidates how individuals demonstrate their sense of emotional closeness by showing support and bonding through actions such as liking and providing moral support (as discussed by Hu et al. in 2004 and Tolstedt and Stokes in 1983).

To clarify, during emergency situations, individuals may use Facebook posts to express their moral support and create a

sense of closeness with others who are also experiencing the same hardships. This can include sharing information and news about road closures or other important updates related to the emergency. Although immediacy means perceived psychological distance people feel while communicating with others (Mehrabian 1967; Walther 1992), immediacy is expressed also through situations that give rise for a sense of urgency or excitement and involve people instantly in the action. In general, people perceive psychological closeness towards immediate family members or friends but whenever the whole community faces an emergency, people feel psychological closeness towards affected people such as neighbors or the community itself. Therefore, people come forward to provide help in times of emergency situations as they perceive the closeness, which creates a sense of urgency and importance to act immediately to the people who are in vulnerable conditions such as in need for shelter or food in life threatening situations. Some of the example tweets for social presence reflecting intimacy and immediacy are provided in Table 1.



Table 1 Overview of the Social Presence concepts and their operationalization		
categories	Description	post Content
Intimacy	Feeling closeness: sharing road closure info, asking for help on behalf of others	Is there any way to provide any form of support monetary and supplies?
	Moral support: stand by people, providing hope for best	Pray for Turkey & Syria Scenes of destruction after the earthquake in Turkey Prayers are needed for the victim #turkeyearthquake #earthquake #earthquakehitsturkey #earthquaketurkey #earthquakeinturkey #turkeyearthquake2023
Immediacy	Urgent action: different types of rescue requests	Our team have procured 3,500 blankets from Northern Iraq, these will be distributed to provide warmth during these cold conditions. We will continue to do more...  #Turkiye_Earthquake #Turkiye #Turkiye #Humanity
	Sharing information and News: provide shelter, food and help	A two-month-old baby was rescued from under the rubble 128 hours (almost 6 days), after the earthquake God.

## Disaster Description and Applied Methodology

Kahramanmaraş is a city located in southern Turkey, situated at the border of a productive plain below Ahır Mountain. It is positioned east-northeast of Adana and is located near the southern exit of three significant passes in the Taurus Mountains, which are from Göksun, Elbistan, and Malatya.

In February 2023 an earthquake with a magnitude of 7.8 struck south of the city; a second major tremor with a magnitude of 7.5 struck northeast of the city hours later. Shoddy construction and poor enforcement of building regulations led to widespread devastation throughout the region, exacerbated by the makeshift housing of refugees displaced by the Syrian Civil War. Tens of thousands of people were killed as whole neighbourhoods were destroyed.

In this section, we will outline our methodology for building a classifier and analyzing social presence through Facebook posts in emergency situations. To achieve this, we utilized both manual coding and machine learning techniques, as illustrated in Figure 1. In the subsequent sections, we will delve into the individual phases that are depicted in the diagram.

## Data Collection and Preprocessing

We used the social media data collection tool Radian 6 to collect the posts messages. In case of catastrophes, hashtags are created during or Soon after the devastating earthquake occurred to share and communicate information regarding disasters. Hence, we used the hashtags #earthquakeinturkey, #PrayForTuerkiye #TurkeySyriaEarthquakeand ##Arab\_in\_solidarity\_with\_Türkiye to extract related posts.

The timeline for the collected data was from 4th of February to 23 February, 2023 with a total dataset consisting of 5000 unique users as shown in Table 1. The Radian 6 tool provided some Facebook attributes such as post ID, author, content, and followers count, but it does not provide metadata such as post status.

### **Manual Coding and Content Analysis**

In analyzing social presence, a manual content analysis was conducted in two phases, as illustrated in table 1. Through content analysis, researchers can develop their own framework and concepts to effectively analyze data that is relevant to their research question. This method allows for the drawing of reliable and valid conclusions at a broader level, which can help identify patterns, trends, and differences. Previous studies have shown the effectiveness of this approach (Krippendorff 1989; Lombard et al. 2002). For this study, a directed content analysis approach was utilized, with a coding scheme developed based on existing theories from Hsieh and Shannon (2005), Risius et al. (2015), and Risius and Beck (2014).

To ensure the reliability and validity of their content analysis, we followed Morris' 5-step process (Morris 1994), which established principles for trustworthy measures and results. This approach provided a step-wise iterative research process and increased transparency. In this study, the unit of analysis was the entire post content, as it could be objectively identified by coders (Rourke et al. 2001). Categories for social presence were developed in the second step, based on existing theory, with three categories: intimacy (in), immediacy (im), and none (n). The "none" label was introduced to filter out tweets that did not fit the categories. To ensure validity, the two researchers working on the theoretical background extensively discussed what constitutes the categories. In the third step, one of the coders coded a sample of 100 tweets in both phases, which enhanced their familiarity with the coding scheme and acted as a training session for independent coders. The coders later analyzed the results together to minimize subjective bias and discrepancies.

A good indicator of valid agreement between coders is an inter-coder agreement of 0.40 to 0.80 (Stemler 2001). In the final step of the content analysis, one researcher processed a randomly selected sample of 5000 tweets according to the coding scheme for social presence to create a training dataset. This involved manually coding the tweets for social presence, specifically for intimacy and immediacy. The trained dataset was then used to apply machine learning to classify the entire dataset for social presence.

## post Classification using Naïve Bayes Classifier

To classify the tweet content in this study, a supervised machine learning approach was used. This involved assigning predefined categories to new texts or documents based on a probabilistic measure of likelihood using a training set of labeled texts. The Naïve Bayes classifier was chosen as the probabilistic classifier for this task. It estimates the probability of a given text based on the joint probabilities of words and categories using a bag of words approach. The classifier assumes that the conditional probability of a word given a category is independent of the conditional probabilities of other words given that category. This makes the classifier more efficient and practical than other classifiers with exponential complexity. The Naïve Bayes classifier is commonly used for text classification tasks and has been shown to work well with a fair amount of accuracy. The classifier was trained using the training datasets containing manually coded posts, and the Natural Language Toolkit (NLTK) and Python programming language were used for this task.

The authors used a training set of 5000 manually coded posts for social presence, where 80% of the posts were used to train the Naïve Bayes classifier, and the remaining 20% were used to test its accuracy. They used several strategies to improve the accuracy of the classifier, including removing stop words, bigram association measures, and feature selection. They found that the best strategy for their text corpus was to use bigram association measures while removing stop words and proper nouns. This strategy yielded the highest accuracy for the Naïve Bayes classifier.

## Results and Analysis

The performance of the text classification using Naïve Bayes classifier for social presence was evaluated based on precision, recall, F-measure, and accuracy. Table 4 shows the results of the evaluation. The model was trained using 5000 manually coded posts, where bigram association measures were used with stop words and proper nouns removal. The results show that the accuracy of the classifier is 0.805 for intimacy and 0.898 for none label. For immediacy, the precision is 0.626, recall is 0.520 and F-measure is 0.568. The precision for intimacy is 0.158 and the recall is 0.466, resulting in an F-measure of 0.236. These performance measures indicate that the classifier has a high accuracy for none label, but a lower accuracy for intimacy and immediacy labels.

The results of text classification using Naïve Bayes classifier are shown in Table 2, indicating a high accuracy for the overall classification. However, precision and recall values were higher for the Immediacy label than the Intimacy label. F-measure values were reasonably good for all categories, except for Intimacy which had a lower F-measure value.

Table 2 Most Informative Features for Social Presence		
Model	Labels	Most informative features/words
Social Presence	Intimacy	elderly, child, glad, responsive, struck, requesting, praying, help, bravery, aged, catastrophic, together with Turkey
	Immediacy	tonight, labour, pregnant, accommodate, rides, blankets, mall, ambulance, parcels, surgery, packets, inside, needed, evacuate, food, distribute, immediately
	None	media, Turkiye, victims, well, news, money, hope, government ,day, helpTurkey

The study also extracted the most informative features or words with high probabilities used by the Naïve Bayes classifier to classify the tweet messages into categories of social presence. Table 3 presents some of the top words from each category for illustrative purposes. The words in the immediacy category are more related to the urgent needs of affected people, such as blankets, ambulance, and pregnant, while the words in the intimacy category are more related to expressing concern and moral support. The words in the none categories are more related to opinions and criticism, as they indicate media, news, government, citizens, and Turkiye.

### **Discussion and Conclusion**

Emergent support groups are formed immediately following the Catastrophes or crisis to collectively cope with the situation, as stated by Drabek and McEntire (2003). Nowadays, social media platforms are increasingly being used to interact and communicate during emergency situations. This study examines how social media presence creates a sense of responsibility and common identity among social media users during disasters. According to the social presence theory proposed by Short et al. (1976), people perceive intimacy and immediacy in mediated communications. One of the reasons behind the active participation of people on online social media during emergencies could be the perception of social presence through the messages sent by online participants and their interpretation by others. To detect social presence based on message content, the theory of social presence is applied

The study conducted manual content analysis of Facebook messages to categorize them into intimacy, immediacy and none categories, and then used machine learning to automatically categorize the dataset. The findings suggest that

during emergencies, Facebook is used as a means to fulfill people's social need for connections, and those who feel a higher level of social presence continue to use and interact more on the platform. Despite the lack of face-to-face communication, people feel a sense of bonding due to the intimacy and immediacy felt for each other, which leads them to offer assistance by simply reading and sharing the posts. Intimacy tweets focus more on showing moral support and coming forward to provide help online, while immediacy posts highlight the vulnerable situation and prompt people to actively take part in relief activities.

Study have shown that during emergencies, local people often post information to ensure that it reaches others through collective action and behavior. Our dataset also contains a large number of posts, indicating that social presence is an important factor on social media in reaching out to people during emergencies. Our findings support the theory that online participants perceive a feeling of closeness and get involved in grassroots activities during urgent situations

The research has two main contributions. Firstly, it contributes to the theory of social presence and social media analytics. Prior to this study, social presence theory was mostly applied in online learning and was measured through surveys. This research focused on message content and analyzed tweets using social presence as a theoretical framework. It is one of the first studies to apply social presence theory to social media messages. Secondly, this research offers new insights on how social presence is formed during Catastrophes through social media communication

The practical implications of our research are significant. Our findings suggest that immediacy posts, which convey the urgent needs and requests of affected individuals, are critical for emergency management agencies to effectively respond to a



crisis. We were able to demonstrate how machine learning can be used to automatically identify and extract these posts. This information can be used by emergency management agencies to coordinate their response efforts in real-time and potentially save lives. Therefore, our research offers practical insights on how social media can be leveraged as a valuable tool in Catastrophes response and management

### **Limitations and Future Research**

There are some limitations to our study based on our data collection method. We solely relied on collecting data through hashtags (#), which may have resulted in missing out on other relevant tweets that were not captured by our dataset. One of the limitations of our study is that the accuracy for the classifier concept of intimacy is relatively low compared to immediacy. This may be due to the subjective nature of intimacy and the difficulty in operationalizing it in a clear and consistent manner. As a result, further research is needed to improve the accuracy of the intimacy classifier and to explore other ways to operationalize this concept in a more effective way

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