

Detection of pedophilia content online: A case study using Telegram

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ABSTRACT: Users of social media can consume a wide range of subjects and information, including pornography. Pornography usage as well as the difficulties linked with this sort of content have increased over time, particularly among teens. Now, another sort of pornographic content is popular: child pornography (CP). Controlling online CP has always been a difficult task for the international community. The introduction, growth, and use of information and communication technologies coincide with an increase in illegal activities. In terms of cyberspace, children's huge online presence as well as the emergence of CP as a business compel all governments to enact tough legislation and unite worldwide to combat this issue. Is social media assisting in the dissemination of this content? To understand this issue further, a study conducted in 2021 using Telegram data on the consumption of CP followed by a series of analyses show Telegram's potential effect on the spread and consumption of this type of content.

Keywords: Telegram; CP; pedophilia

1. INTRODUCTION

The engagement seen in online social media is already influencing and will continue to influence the social structure and population consumption experience. Today, a wide variety of information can be accessed via networks, such as news, entertainment, videos, music, and pornography [1]. Pornography consumption has surged as a result of the Internet. Several studies have described the spread and trafficking of child pornography (CP) through peer-to-peer networks [2]. However, few studies linked the use of CP to social media [3, 4].

Section 2 provides background information related to the research, including a summary of the application used in the study. Section 3 reviews various technologies that may be used for pedophile activities, along with monitoring and analyzing the practice for the technologies. Section 4 suggests methods for detecting pedophile activities using software. Section 5 offers recommendations for further research.

In this context, the goal of this paper is to contribute by conducting a study on how social media is used to spread pedophilia. The paper also focuses on the engagements, sharing methods, age, and gender data of the contents. Data samples are obtained on Telegram, followed by an analysis of the information discovered.

This paper presents and explores the idea of streamlining and enhancing the detection of pedophile activity on social media by automating some part of the process with software. The research challenge is to reduce law enforcement resources required online and the possibility of online environmental [5, 6]. The paper aims to take the initial steps of the research challenge by reviewing the problem and introducing the associated challenges.

The study reveals that Telegram is used by pedophiles to share content, and a large community is easily accessed by anyone. Data sharing sites such as mega.nz use frequency to share content because of the privacy policies provided by these sites.

This work suggests social media applications such as Telegram to use face, age, and gender detectors to find pedophile contents and provide more specifications in reporting options.

2. THEORETICAL FRAMEWORK

2.1 WHAT IS TELEGRAM

Since 2013, Nikolái and Pável Drov have worked on a messaging and voice over Internet protocol application. A free multilanguage access interface focuses on instant messages, sending multiple files, and multiple communication functions. The major features include user conversations (saved messages, forwarding, synchronization, cloud hosting, and archiving), sending files (up to 1.5 GB, including documents, multimedia, and graphic animations), contact management (with global search), surveys, calls, broadcast channels, and groups. Artificial intelligence can also be used to create bots that perform payments, games, group moderation, and task automation. It is compatible with Android and iOS devices and Mac OS, Windows, GNU/Linux, Firefox OS, web browsers, and other operating systems [7].

2.2 WHY TELEGRAM

Telegram is encrypted and easy to access compared with other online chat applications. It offers a faster connection speed [7]. Users can build channels and groups with 200000 users and a very efficient permissions system. Telegram's Channels feature allows users to broadcast messages to large groups of people. Telegram Channels, unlike Groups, can have an unlimited number of subscribers, and only administrators can post content. Most other messaging applications do not have these Telegram features.

2.3 DEFINING CHILD PORNOGRAPHY

Pornography that exploits children is known as CP. In many countries, it is against the law. These "visual portrayals" can take many forms and be present in various media types. These media types include online media, such as digital images or recordings; videos; possibly comics, cartoons, and drawings showing sexual scenarios involving children; and more rarely, sound recordings [8]. The age of consent is irrelevant regarding CP regulations. Even if the person photographed agreed to it, if the represented individual is under 18, the image could be considered CP. If a 19-year-old and a 17-year-old young couple exchange nudes by text, they might be prosecuted for creating and distributing CP [9].

According to Mohamed Chawki [10], every content will not be considered pedophilia, and not all will be considered against the law. According to the author, these materials can be "categorized along with a range from less overtly sexual, through nudity, to explicitly sexual." Sexually explicit materials have three types: (Mohamed Chawki, 2021)

- (1) erotica
- (2) nudity
- (3) sexually explicit materials

Erotica is defined as content that does not feature nudity or depict sexual behavior, such as photographs of children in underwear or swimwear. These materials are not likely to be classified as CP. Materials that contain nudity in some way fall in the second group. Nudity is not illegal in and of itself. Moreover, some of this content may be sexually motivated and portray youngsters in seductive poses. Some legal definitions of CP include the more explicit content in this category.

In adult pornography, this category is comparable with "softcore" pornography. Materials that are explicitly sexual fall in the third group. These materials may show children engaged in actual or simulated sexual activities, or may focus on specific parts of a child's body, such as the genital or anal regions [11]. These materials will most likely be classified as CP in most countries and may compare with "hardcore" pornography associated with adult pornography (ibid). Even international attempts to define CP, ignoring country differences, have failed to provide a clear, definitive operational definition [12]. Recognizing CP "in a multinational society" is challenging because diverse cultural, moral, religious, and legal standards overlap. The Internet's growth has made identifying CP more difficult. It has removed national boundaries and placed CP in a global culture with no clearly defined social, sexual, or legal standards [13].

3. MATERIALS AND METHODS

Telegram application was used to collect data. A crawler written in Python was used to collect data, and Link crawling was performed as frequently as possible within the period. Crawling begins on the application's home page and dynamically repeats the process after detecting relative and absolute sub links. From September 1 to December 1, 2021, the Telegram crawler collected messages.

The collection was based on the search term “cp.” CP is the most common word used by users to search for this type of content. Many users remain unrecognized and ignored because most people have no idea what it means. After discovering groups and channels, the following data from each group and channel were collected and processed.

1. Media content count in each group
2. User count in each group
3. Media content duration time
4. Media content view count
5. Shared links

To estimate the age groups in media content, a Python written program using the IMDB-WIKI dataset in training was employed.

Given that this paper aims to find a long-term effect of sharing unlawful, pornographic information, more precisely, pedophilia in social media, three research questions were elaborated, followed by null hypotheses.

1. Has Telegram been used to share child pornography?
2. Does pedophilia content create positive engagement?
3. What are the third-party applications or sites that involve in content sharing?

A total of 15297 messages were collected. These data include all the links that shared the duration of the research conducted, which were categorized as relevant to the research’s goal. In addition to the number of messages, the Active, Deleted, and Closed groups were collected. Fifty-three telegram invite links were collected, and 407 active third-party links were recorded. The engagement of the term “CP” reached 2424 messages, which means other people interacted in these groups intending to view and exchange CP.

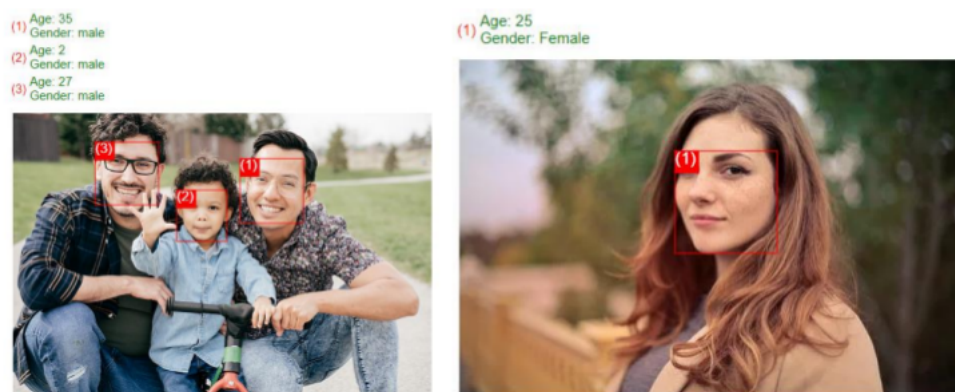


FIGURE 1. Sample results of face age and gender estimation script using non copyright images

4. DISCUSSION AND RESULTS EVALUATION

Some concerning findings were discovered in the study duration regarding the use of chat rooms to distribute child sexual abuse material. Figure 1 shows a high number of messages made using the term “cp.” The term indicates how often these groups share pedophilia content. Within the study duration, most text messages ask for content or sell it. These users actively appreciate the content, requesting more, and even uploading their own. Figure 2 shows that hundreds of videos have already been uploaded to the groups. All the contents are viewable to anyone joining at any moment. In addition, this has affected their operations because they are easily accessed by anyone. Most videos have 30 s of play time. The average view per content is 3100.

Moreover, some of these groups are used to sell child sexual abuse materials. Most commonly, this is a private Telegram link or a third-party file hosting the service link. They send the link to this private group or file hosting service once the consumer payment is made. In most cases, the payment method is a cryptocurrency or PayPal. The price range per group is generally between 2–20 US dollars.

Figure 5 shows that the most used third-party file hosting service is mega.nz mainly because it is a safe cloud service with many sharing options. For the shared links, this service uses numerous layers of protection. Everything uploaded

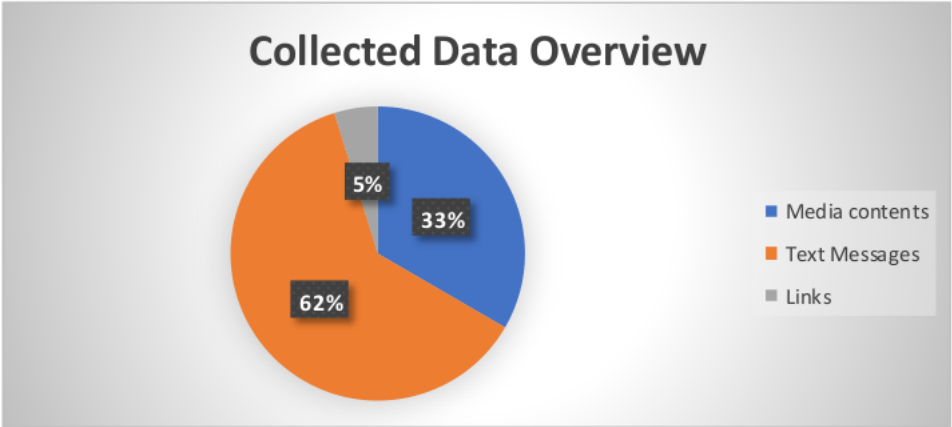


FIGURE 2. Collected data overview

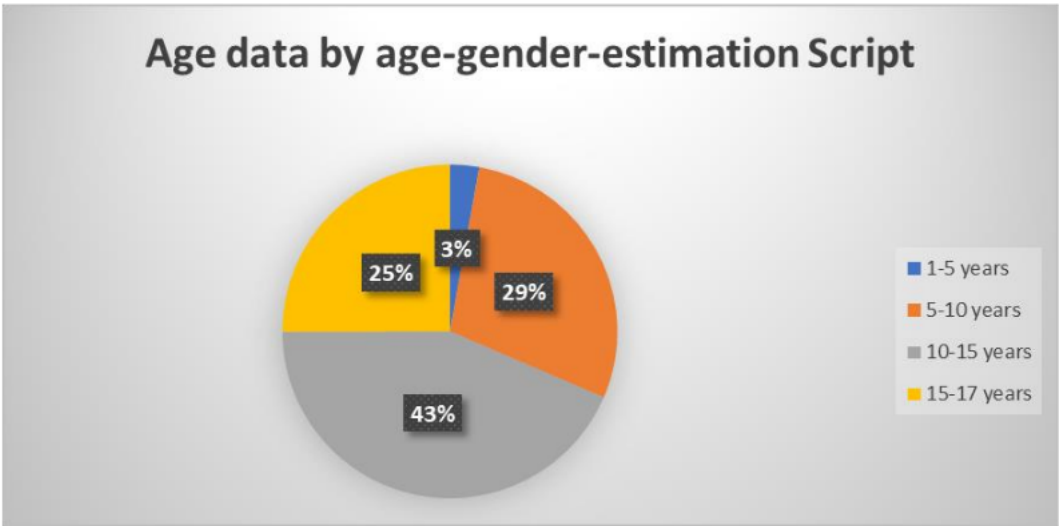


FIGURE 3. Age data by age-gender-estimation script

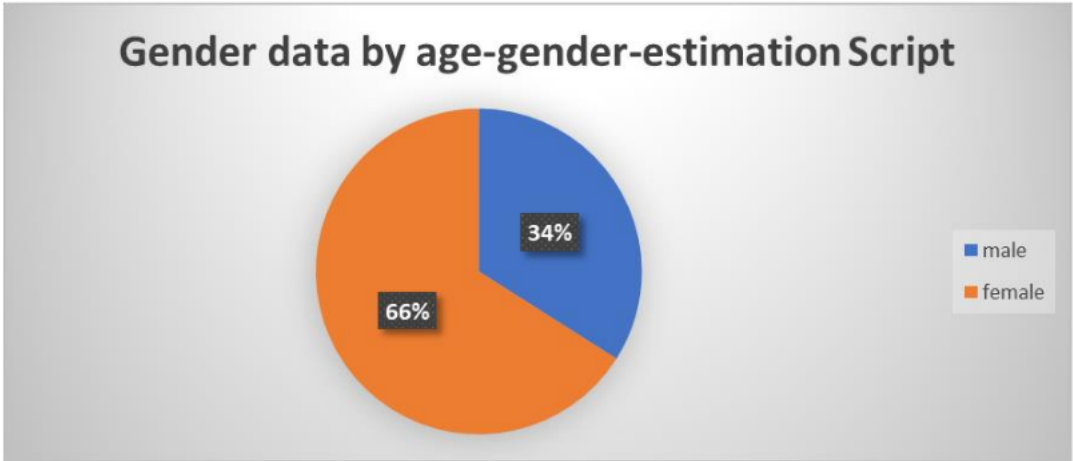


FIGURE 4. Gender data by age-gender-estimation script

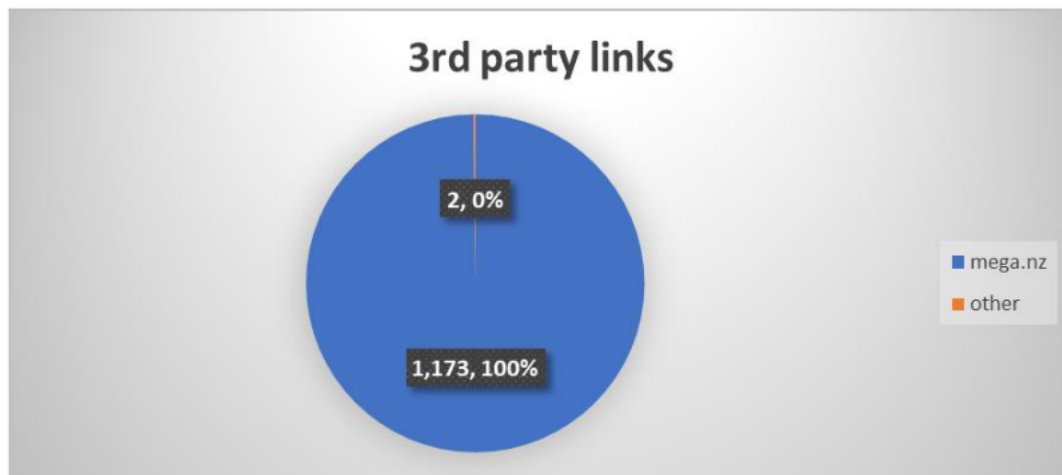


FIGURE 5. Third-party links

to MEGA is encrypted using a unique encryption key. The owner of the links can provide access separately and set up passwords. These security functions make mega.nz famous among these kinds of communities.

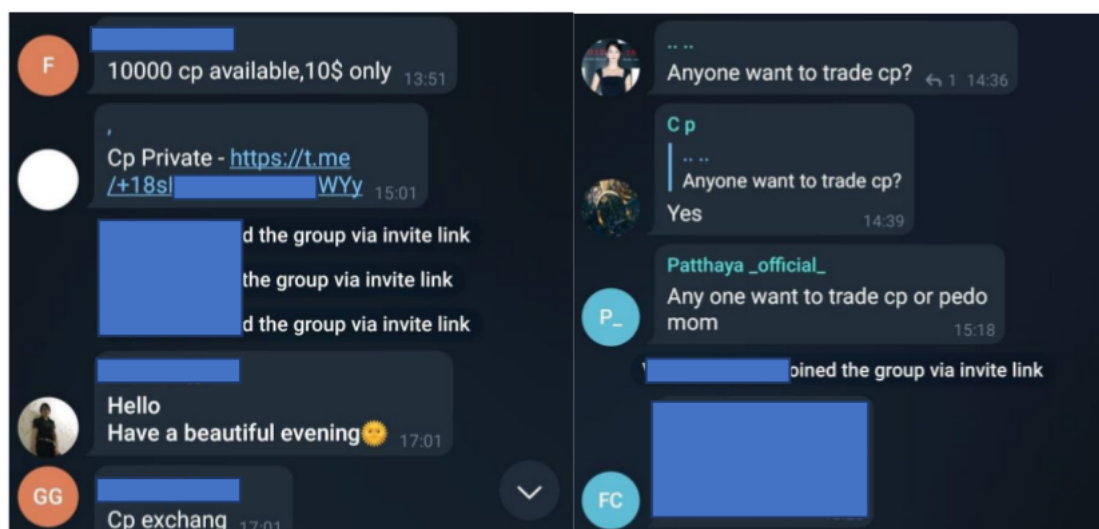


FIGURE 6. Users seeking and trying to sell content

Even though Telegram's policy explicitly indicates that the platform has zero tolerance for the sexual exploitation of minors' photos, videos, or posts, no specific measure is in place to prevent the situation described in this paper. At the end of the study, every group and channel that shares content were reported, but most groups remain active. For a starter, mega offers 20 Gb of storage space. During the study, the team discovered links that contain more than 100 GB of child sexual abuse materials. These materials were not included in the analysis because the study focused on the Telegram application.

After running the age and gender estimation Python script, most contents include minors between 10–15 years old. Figure 4 shows the percentage of genders featured in the contents. The data prove no gender-based preferred/specific gender among these communities.

As mentioned earlier, time is the most substantial limitation of this research. The collection in the study periods does not provide a comprehensive view of the amount of child pornographic content posted daily on the network. Generally, most groups with few participants are reported and banned by Telegram within three months. Telegram deletes all the available data from their servers. Deleted databases prevent the crawler scripts from collecting old data for the case study.

5. CONCLUSION

Despite the limits, that Telegram is used as a host to the distribution and consumption of pedophilia content can be concluded. These communities have found new ways to use encrypted well-known third-party sites with more security and storage capacity to make the distribution more effective and achieve a higher number of reaches, assisting the achievement of the research's desired goal. As a result, children and teens may be exposed to this type of content, which may damage them and society as a whole. These applications and services must act on this sort of content to guarantee that it is not made available on the network and that those who interact with it face clear punishments under the applicable laws in their country [14] [15] [16]. We suggest improving the reporting option with more functions and automating the process that takes longer time to review.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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