

Research Article



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Exploring the Tools and Techniques for De-bunking Fake News

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Fake news is a disturbing phenomenon that has become widespread due to its easy online dissemination. The spread of fake news should be stopped to protect human rights, peace and harmony in society. Fighting the spread of fake news requires a clear understanding of its nature and practical tools and techniques for fact-checking. This article describes the results of a case study that explored the conceptual understanding of fake news, the characteristics and categories of fake news, and the tools and techniques to eliminate it, highlighting its prevalence as an emerging challenge to the well-being of people and nations. It emphasises the high vigilance towards fake news that Internet and social media users must exercise to end its effects on society. Moreover, scientific studies are recommended to explore the depth of this menace and government policies to curb it.

INTRODUCTION

Every citizen should be given a choice to become informed and enlightened to contribute productively to nation-building and the democratic process, upholding democracy. However, the citizens must be alert to the authenticity of the information and exercise high caution when obtaining and using it. Virtual connectivity that blurs territorial divides between nations increases the need for heightened alertness over news, ideas, perspectives and ideologies. Moreover, the technological revolution in communication facilities manifolds the reach of information formally and informally, influencing people's lives worldwide. Besides, social media's broad reach and easy accessibility complicate identifying true and false information.

According to a 2018 survey by Pew Research Centre, 64.5% of US citizens prefer social media sites like Facebook, YouTube, Twitter, etc., to traditional modes like TV for news updates (Martin, 2018). Similarly, Internet users in India have grown considerably, and so has an exponential increase in the number of people accessing social media platforms for news updates and sharing information with others. As of January 2022, India has 658

million Internet users (Kemp, 2022). Due to the accessibility of the Internet, India had 330 million active social media users in 2019, and 448 million are anticipated by 2023 (ACUMEN, n.d.). With increasing urbanisation, rising education levels, growth in consumer base, cheap broadband connection, pocket-friendly Internet-enabled handsets, and a youthful demographic profile, India's active Internet users are likely to grow further.

People, irrespective of their socio-economic and demographic profile, use social media for many purposes ranging from entertainment to forming opinions and sharing emotions, transforming the contours of communication and interaction. Although this indicates narrowing the digital divide, increasing social media use raises the possibility of fake news. As smartphones with high-speed Internet connectivity become ubiquitous, the spread of phony information is encouraged along with genuine ones.

Fake news has become popular recently, but it is not new as biased/malicious/manipulated facts/false information has been circulating since immemorial. Donald Trump frequently used the phrase 'Fake news' to dismiss reports unfavourable to him, so Collins Dictionary declared it the word of the year in 2017 (Meza, 2017). Experts marked 2021 as the year of fake news considering the

copious amount of false information shared on social media about COVID-19 (Susarla *et al.*, 2022). Internet penetration and use have increased the speed and scale of fake news sharing, and its effects have become far-reaching and long-lasting. Most countries recognise fake news as a fundamental problem and a symptom of deeper problems. Both developed countries like the United States and underdeveloped countries like sub-Saharan Africa are facing the problem and consequences of fake news.

In the past few years, the phenomenon of fake news has been studied mainly as having occurred in America or Europe. Due attention was not given to its impact on developing or underdeveloped countries' social, political and cultural structures. However, fake news has recently drawn attention in these countries where the spread of fake racist, misogynistic and hateful messages has caused heavy loss of human life, massive destruction of public and private property, and resulted in ethnic conflicts. The case is no different for India. Fake news not only triggered communal violence at various points in time (e.g. Muzzafar Nagar riots, 2013; Delhi riots, 2019) and at times, resulted in panic buying in the country leading to corruption, black marketing, hoarding of essential items (e.g. salt shortage in 2016).

Furthermore, due to the spread of fake news and rumours, India's lynching spectrum gradually broadened. A considerable increase in cases of innocent people being brutally killed in public in fake child abduction/cow slaughtering/sex trading/organ trading/beef eating or serving charges has been reported. Many leading personalities from an array of domains—politics, journalism, film industry, economics and sports—have become victims of fake news in some way or another. The general public does not have the awareness, time, patience and willingness to critically evaluate the information that reaches them. However, according to a report published by the National Crime Records Bureau (NCRB), an agency that compiles data for the government, 1,527 fake news cases were reported in 2020, 486 in 2019 and 280 in 2018. There is a significant increase in fake news circulation, and the pandemic is said to have added fuel to the fire. Amidst this backdrop, it becomes imperative to explore the various tools and techniques that can be effectively used to debunk fake news.

METHOD

This case study was conducted with the objectives of (1) highlighting fake news as an emerging challenge of the

present time, (2) developing a conceptual understanding of different categories of fake news, (3) exploring characteristics of fake news and ways to spot them and (4) gathering detailed information about various techniques and tools for debunking fake news. Data were collected from scholarly articles, government websites, newspaper reports, TV reports and webpages of fact-checking services and tools (Snopes.com, TinEye, Alt News, SM Hoax Slayer, Google Reverse Image, InVID). Data analysis was done thematically in line with the pre-set objectives and collated results.

RESULTS

Understanding Fake News

Fake news is as slippery to define as it is to pin down. In the most general sense, fake means fictitious/fabricated/untrue/fraudulent information/news in the form of text, image, video, shared through print or electronic media or both for some specific reason/s. Fake news is nothing new as the terms, such as disinformation, freak news or yellow journalism used in the World Wars and Spanish War, respectively, are its historical antecedents (Molina *et al.*, 2021). However, in the present-day Internet-connected world, given its scale of spread and the enormity of its consequences, fake news has drawn more attention, especially after the US Presidential election in 2016. Even though fake news has received attention from an array of areas where scholars investigate the antecedents, characteristics and consequences of its creation and dissemination, complexities and ambiguities continue to define it. A substantial disagreement on what information should be included and what should be excluded as fake news prevails (Molina *et al.*, 2021). This disagreement heightens when it comes to political manipulations (Tadoc *et al.*, 2018). The government of India had an altercation with the tech giants; Google, Twitter and Facebook, for not proactively removing the information they labelled fake news (Kalra, 2022). Digital rights advocates, on the other hand, claimed that takedown orders set a worrying precedent limiting free speech (Kalra, 2022). Therefore, as a broad term that different people associate with different meanings, fake news is confusing and controversial. Figure 1 illustrates the conflict on 'fake news'.

Wardle and Derakhshan (2017) interpreted fake news as a term used by politicians to describe dissident news, which is insufficient to represent information pollution.



Figure 1. Illustration of Disagreement on Fake News

Source: Cartoon by Cathy Wilcox, drawn for UNESCO for World Press Freedom Day 2017. | Download Scientific Diagram (researchgate.net)

Therefore, they introduced a conceptual framework lodging fake news in a more scientific phrase, information disorder with three dimensions; misinformation, disinformation and malinformation. Misinformation is false information that does not mean to cause any harm, whereas incorrect

information shared to drive damage is disinformation. On the contrary, malinformation is genuine private information that shares with the public illicitly to cause harm. Redesigning the original illustrations (Wardle and Derakhshan, 2017; Wardle, 2018), this study represents the conceptual framework for information disorder as in Figure 2.

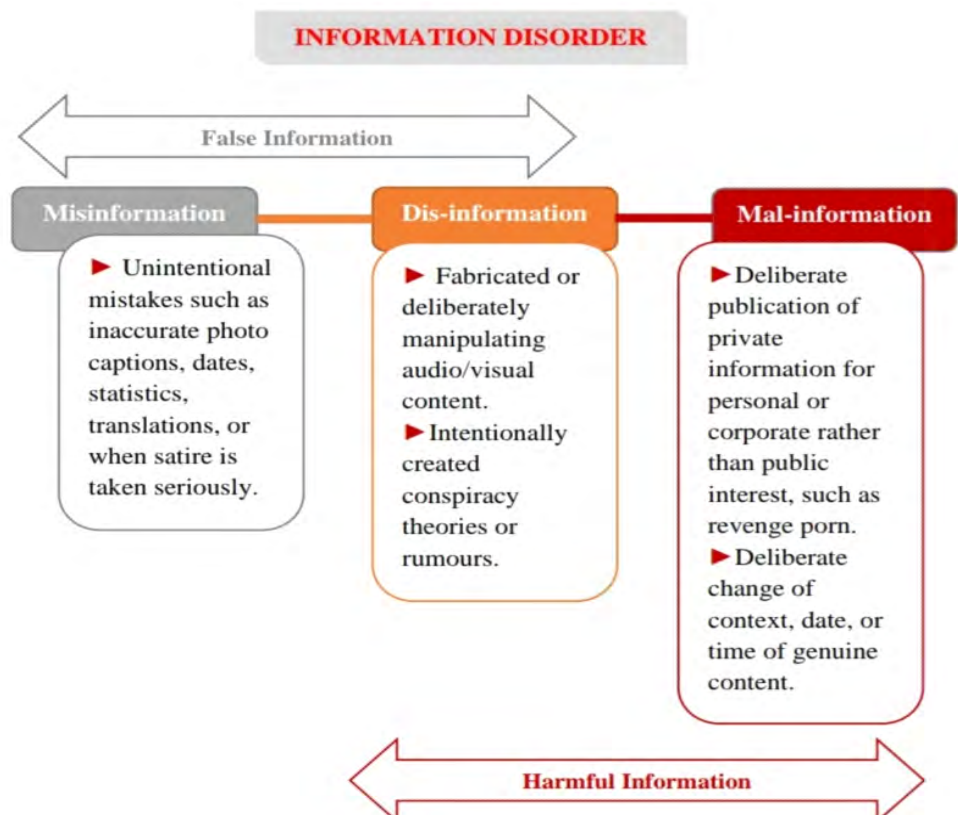
Types of Fake News

Wardle (2018) categorised information disorders into seven groups and arranged them according to their severity to cause problems. Figure 3 illustrates the types of information disorders.

Satire or Parody

Some fake news is created and published which are not intended to cause harm but is capable of fooling/entertaining people. Like the American satirical digital media company and newspaper organisation The Onion, which publishes international, national and local news, The Daily Mash is a satirical website that offers parodic comments on current affairs and other news stories. Other notable websites that publish fake news articles on a wide range of topics covering homosexuality, atheism, popular

Figure 2. Conceptual Framework for Information Disorder



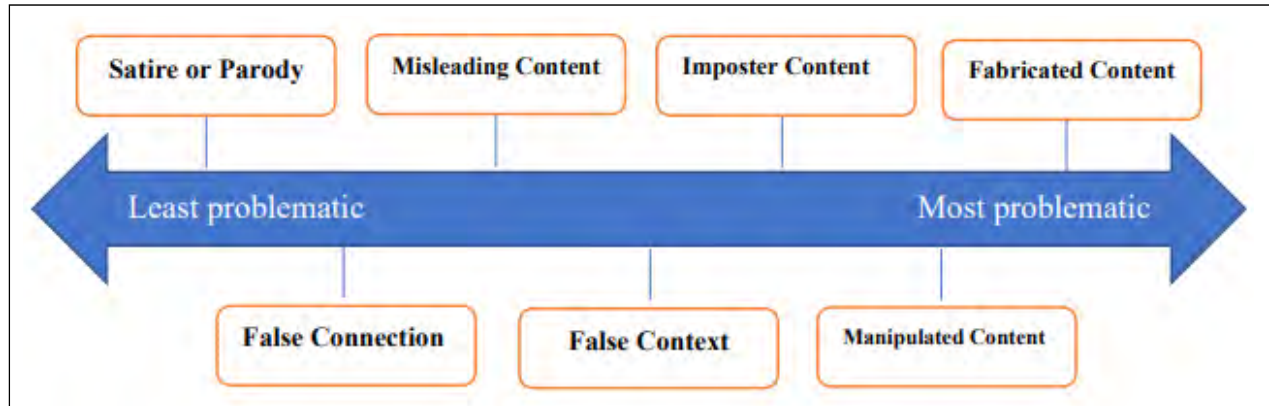


Figure 3: Categories of Information Disorder



Figure 4: Satire on the Founder of Facebook

Source: Types of Misinformation - Evaluating Online Information - Guides at University of Iowa (uiowa.edu)

culture, politics and technology are The Spoof! The daily Curreant, National Report, etc., tickle the funny bone of the readers and viewers. Figure 4 shows an example of satire.

False Connection

Often, we come across headlines that seem sensational, but on actually reading the content, nothing sensational could be found; there is a complete mismatch between the headline and the content, so that is the 'false connection.' If the caption/image is too loosely connected or unrelated to the content, it falls into the category of fake news. The purpose of false connection stories is to gain

more viewership/readership, and such stories on social media are called 'Clickbait' that entices people to click and open the link. However, if such news continues to be shared without careful reading and verification, it is more likely to create panic, fear, and disgust.

Misleading Content

The use of content to misguide the public to frame an issue or individual comes under this category. To frame a person means to contrive events or to cook up evidence to incriminate them falsely. Misleading content is the most challenging kind of fake news to expose. This kind of news is intentionally/ deliberately created for a specific purpose. On the face of it, it seems genuinely authentic and quickly finds its way into many real news stories. More often than not, expertise is required to debunk such news/information. Fact-checking websites Snopes and Alt news can provide some respite.

False Context

When genuine content is shared with false contextual information or unrelated things such as a photo, caption, or headline, it does not match up with the content. Thousands of fake websites or posts on which information is presented with intriguing and eye-catching headlines are often perceived to retain the audience's attention to sell information. People generally stop reading content after a couple of paragraphs as long as that sounds legitimate. Many might have come across thumbnails on YouTube which does not even match the content of the video. Figure 5 is one of the thumbnails used with false context, anticipating that it would intrigue viewers to watch the video to find Messi did not hold a gun against the referee.



Figure 5. Picture of Lionel Messi with Wrong Contextual Information

Source: <https://the18.com/soccer-entertainment/funniest-youtube-soccer-thumbnails?amp>

Imposter Content

It refers to fake news created when false and fabricated sources impersonate genuine sources. For example, people are less likely to check the authenticity of the information published in a trusted newspaper/website, etc., when the fake news leverage the relationship and trust of an established news agency/website to spread misinformation. In actual practice, fake news creators often use subtle variations of well-known news websites; Instead of abcnews.com, they use abcnews-us.com. In such a case, 'About Us' is a guide for the users to confirm the legitimacy of the websites. An original website provides detailed information in the 'About US' section; the absence of this section or lack of writer attribution indicates that the website is not legitimate and, therefore, the content shared is 'fake'.

Manipulated Content

Fake news is also created by manipulating genuine content, that is, when truthful information, video clips or images are used to deceive.

Fabricated Content

In this case, the content is 100% false and designed to deceive and harm. These stories have no basis in real life but only have the sole purpose of deluding the readers and corrupting their minds. Figure 6 shows an image

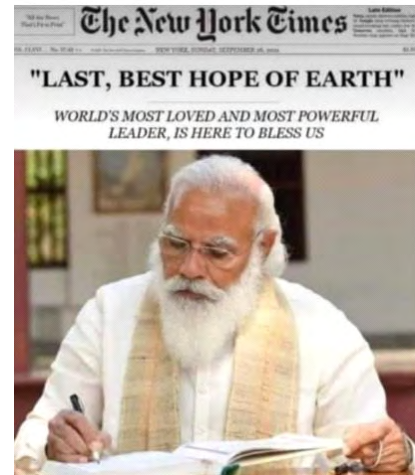


Figure 6. Fabricated Content Example

Source: Fact-check: Did NYT term PM Modi 'last, best hope' for Earth? - Alt News

widely shared on social media claiming to be the front page of the New York Times. This story was later debunked by The New York Times itself.

Fake News: Some Definitions

Definitions of Fake News are fraught with vagueness. Reuters Institute report defined it by compiling its three aspects respondents expressed; '(1) news that is "invented" to make money or discredit others; (2) news that has a basis in fact, but is "spun" to suit a particular agenda; and (3) news that people don't feel comfortable about or don't agree with' (Newman *et al.*, 2017, p. 19). Whereas, Tandoc *et al.* (2018) reviewed 34 scholarly papers that defined

Fake News, and presented a typology of academic definitions considering two dimensions of Fake News, the levels of deception and facticity. A simple purpose by Jester and Lanius (2021) is that 'fake news is news that lacks truth and truthfulness' (p. 20). Anderau (2021) brought clarity to the philosophical debate on the definitions of fake news by introducing an exhaustive definition; 'Fake news is misleading information intentionally published and presented as news which has the function of deliberately misleading its recipients about its status as news' (p. 210).

Fake News Detection Techniques

A little digging can unravel fake news, yet people fall for it. Lack of media literacy, losing the notion of deep reading, cognitive bias, and not making a mere effort to verify a claim is the primitive reasons for it. Sometimes people jump on the bandwagon and share trending news

on the Internet, but just because something is trending on social media doesn't mean it's true. Therefore, it is essential to look out for red flags. Red flags are signs that what you are looking at might be fake and should be checked before sharing. Be suspicious and watch out for red flags if:

- There are no authors, dates, creators, publishers or organisations listed
- There is no way to contact anyone to verify the claim
- There is no mission statement, goal or background information
- There are broken links or images (for online sources)
- There are major spelling and grammar errors
- The title doesn't seem to match the content (especially for online media or websites)
- An unverified account/source makes a claim
- Something that seems to confirm your opinion
- Post has dozens and dozens of hashtags
- Person impersonating an expert

Nevertheless, users must be cautious of any information they seem to have doubts about. To counter such doubts, an individual can perform the following techniques to spot fake news or disinformation (Figure 7).

Read the Whole Article (Content Check)

The bold, dark-coloured and capitalised headlines not only engage but also enrage the audience. A news article's most important asset is the news headline. In most cases, that is all what people read. These kinds of headlines can be outrageous to get clicks or can play with the emotions of its viewers and persuade them to share with

others. Thus, reading beyond the headline and the whole article is essential. If the writing seems fishy, we can use the 'Reading Upstream' technique, which will navigate you right to the source of the claim or information you come across online.

For instance, if we're reading an article in the *Times of India* that mentions reporting done in the *Hindustan Times*, we can track down the source from *Hindustan Times*. Maybe that article from the *Hindustan Times* says reporting done in *The Hindu*; then we can track that information too down. Maybe *The Hindu* article mentions research done by the *Indian Council of Medical Research* so that we could track that down.

Reading upstream helps us to understand the truthfulness of the information. It took us back to the original claim, and we can cross-check whether the claim has been made or not, which is mentioned in the article. Thus, it is crucial to understand the whole story and its validation before sharing it.

Consider the Author

Check who wrote the story. We must ask these questions ourselves, whether the author is an expert. Is the person credible? Can they gain any benefit from it? Are they real people? Do they have any other motive? Answering these questions before sharing any information could help to restrict the spread of fake news.

Check the Date

Sometimes, legitimate old news articles are shared on the web to temper the current situation, which mistakenly is considered current by the people and motivates them to share or believe it. This distortion of a long-ago event creates disharmony and chaos and propagates untrue facts. For instance, a photograph from Vietnam taken in 2007 was posted seven years later under the pretence that it was a picture from Nepal taken in the wake of the earthquake in 2015 (Pham, 2015). Thus, it is essential to check the date of publishing any article because reposting old stories doesn't mean they are true today.

Check the About Us Page

The About Us page of any website usually talks about its history, purpose, employees, leadership team, management, ethics, and goals. Therefore, this page is vital for any website to gain the confidence of its audience. However, if its language sounds melodramatic, hyper-

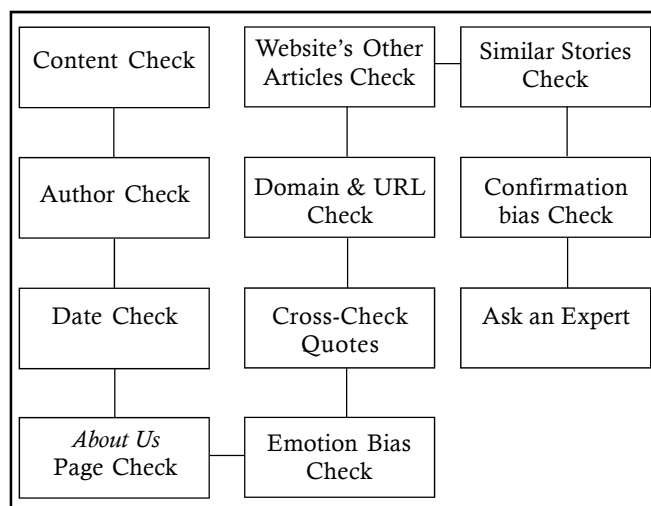


Figure 7. Fake News Detection Techniques

patriotic, targets certain sections of individuals, or has a particular ideology, a prudent user should question its legitimacy for a second. Although some sites openly state that it is for entertainment and satire, some of its pieces are circulated by uninformed people as legitimate news.

Check Other Articles on the Website

Checking other pieces of work of a website helps viewers to determine whether the articles produced by it are specific to one ideology or are pointing towards one objective. Fake news websites are deliberately created to push a particular point.

Consider the Domain and URL

Organisations generally have a domain and URL on their name for standardised purposes, which helps users to become familiar with it. Beware of the websites that end with '.com.co' as they are often fake versions of real news sources disguised as real. With a mere variation, such as '.co' or 'lo' rather than the typical '.com' or '.org' affiliation, these websites deceive people by gaining their trust as real, not just with URL but also with their presentation. The information presented may be distorted to falsify the truth.

Look at the Quotes in a Story and Who Said Them

In most publications, their narratives contain multiple sources of expert information from the same field. If it is a serious or controversial issue, you will probably find a lot of quotes. In such cases, look for the expert and cross-check their claim in the published stories. Most of the time, reputable people are quoted to make the stories more legitimate so that people can easily buy them. For instance, Indian billionaire philanthropist and former Chairman of Tata Sons, Ratan Tata, debunked a claim that he allegedly slammed the experts who predicted the downfall of the Indian economy.

'I do not know much about these experts. But I know for sure that they do not know anything about the value of human motivation and determined efforts', the quote read.

Tata, an Industrialist and talked about the Indian economy, which has optimum potential to be believed by the people. Thus, it is essential to take the first step on our own and check on the Internet about the claim by any expert mentioned in the story.

Checking Your Emotions

Social media is full of news stories that can be amplified by playing on people's emotions and political

biases. Using people's feelings (fear, anger, compassion, worry, happiness) is a powerful technique to spread a message. Viral articles often have sharp, short headlines that evoke these emotions. When something causes to feel strong emotions, people tend to respond quickly without giving it much thought. By pausing, one must give the brain a chance to process the response and analyse the information more critically. Moreover, suppose the article gets you upset. In that case, it is good to learn more about the subject from other sources to be sure the author was not trying to incite your rage by using potentially misleading or incorrect information to increase views and ad income.

Check Similar Articles on Other Websites

Besides the above, one can use the 'Lateral Reading' method to debunk a false claim. Verifying what you read as you read is known as lateral reading. In this technique, fact-checkers tend to read laterally rather than vertically across various websites by opening new tabs on the Internet to check whether they are also reporting it. They use keywords from the article and the given sources or URL to check what is behind the origin of the information. If no reliable news outlets are also reporting the story, then it's very likely fake.

Beware of Confirmation Bias

Confirmation bias means believing what you already know. People often believe a claim which resembles their pre-existing knowledge and belief. Fake news is no exception; posts and articles on the Internet and social media are specifically designed to target particular sections of citizens to stir up their emotions and prey on their biases.

Ask the Expert

The best way is to contact the concerned person/department/association/government's department about whom the information is presented. Moreover, people can check with fact-checking websites to learn about their authenticity.

Fact-Checking Tools

Internet and social media are everyone's primary sources of information today. However, one disadvantage is it is easy to publish wrong information online. With the rise of fake news in the past few years, we have been forced to be more cautious about how reliable the information we

read or write is. Automated fact-checking tools that enable fact-checkers to react more rapidly and efficiently to political lies, online rumours, and other types of misinformation are promising breakthroughs (Graves, 2019). These tools help Internet users understand the difference between fact and fiction; therefore, these are equally beneficial for the general public. Below is a discussion on different tools and websites that help fact-check the online content, such as videos, images, and articles.

Google Reverse Image

Google reverse image search helps you quickly find externally similar images across the web. By selecting the camera icon in the search box, users can do a search using a photo. Start a search by pasting a URL, uploading a photo, dragging and dropping an image, or using a website image to get results for similar pictures on other websites. This tool presents a vivid idea to google to reflect results that a user is looking for and additional information related to that particular image. For Android smartphones, it also provides a reverse image search app through Google Play with a range of filters and features, including similar photos. However, search results can sometimes be too overwhelming, hard to sort, and irrelevant (Robbins, 2022).

TinEye

TinEye is an image search and recognition firm focusing on computer vision, pattern recognition, neural networks, and machine learning. It provides another tool to check the authenticity of an image. Just like google reverse image search, users can upload an image on the site or search by entering the URL. The difference between the two is that the former has fewer false positives and is beneficial in finding images that have been altered by cropping and editing. In contrast, the latter has a gigantic index. TinEye does not save your picture. However, this tool also has drawbacks like the limit for uploads. Moreover, the free version neither shows similar photo results nor has an automated monitoring service for your photos (Robbins, 2022).

Snopes.com

The Snopes.com website, founded in the 90s, has been around for decades and specialises in debunking urban

legends and false information on the Internet. Users can contact Snopes through email or website; depending on the method used to request a fact-check, the user can provide details related to obscure news, articles, posts, or videos, and they will investigate, provide relevant basis, and source to debunk it.

SM Hoax Slayer

A hoax is a falsehood fabricated to masquerade as the truth intended to gain an advantage. Hoaxes are circulated via email, social media, blogs, and fake news websites. To counter this menace, Social Media Hoax Slayer (SMHoax Slayer), an initiative by Pankaj Jain, who set up this fact-checking website after witnessing people falling for incorrect and malicious information. It publishes information about these hoaxes regularly on its social media and website, which helps people check the veracity of these pieces of information. The SM Hoax Slayer website aims to achieve cleaner, logical, unbiased minds free of religious and political extremism.

In Vid

The In Vid tool (<https://www.invid-project.eu/>) allows users to get contextual information on Facebook and YouTube videos quickly. It helps to perform the reverse image search on Google, Baidu, or Yandex search engines and fragment videos from social media into keyframes. Moreover, users can enhance and explore keyframes and images through a magnifying lens and query Twitter more efficiently through time intervals and many other filters. It assists in reading video and image metadata, checking the video copyrights, and applying forensic filters on still images.

Alt News

Alt News is a fact-checking website committed to debunking information disorders users encounter daily on social media and mainstream media. Political fact-checking, social media rumours and mainstream media misinformation and bias are the broad genres where fact-checkers of Alt news debunk political claims and mis/dis and biased information. The website provides links, sources, quoted individuals, tools, and techniques used to debunk fake news to its audience so that they can verify the results. Table 1 compares the fact-checking tools/websites described above.

Table 1. Comparison Table for Fact-Checking Tools/Website

Fact-checking website/tools	Users	Content	Method	Revenue/funding	Cost	Domestic/international
Snopes.com	General public	It debunks widely spread legends or information people are questioning and asking for.	It gives people a resource for locating fact-based information by identifying, exploring, and correcting false information.	By advertising and Reader donations.	Free to use	International
Altnews	General public	It fact-checks news from all ends of the political spectrum, provocative hashtags run by media houses to sway public opinion, monitors speeches and claims made by political leaders, social media content, and applies the same standards to claims irrespective of who originates them.	Using tools like Google reverse image, InVID, and methods such as verifying with concerned persons, primary/official data, experts and local authorities, providing people with link cross-check.	Donations and grants	Free to use	Domestic
SM Hoax Slayer	General public	Its fact-checks various stories surfing the Internet and at the audience's request through social media. It has a broad range of genres, such as Religion, Scams, Politics, misuse of emotions/patriotism, devotion, etc.	It uses Google search and tools like Google reverse image to check the signs of tampering in an image. Moreover, governance websites and statistics verify facts and scrutinise the news with common sense.	By advertisements and donations	Free to use	Domestic
Google reverse Image	Fact-checker and General Public	Verifying and authenticating images combats disinformation.	Google recognition technology identifies details in the image, like faces or objects, letting users browse similar photos.	N/A	Free to use	International
TinEye	Fact-checker and General Public	Verifying and authenticating images combats disinformation.	It offers a comprehensive database with 41.9+ images indexed. The tool has a comparison feature that helps you compare two similar images. You can toggle between each to see if you can spot any photo manipulation or other changes.	N/A	Free to use	International
In Vid	Fact-checker and General Public	It combats misinformation by verifying and authenticating video content.	It provides users contextual information on videos, reverse image searching, video metadata, video copyright information, and other features to verify content.	European Union's Horizon 2020 research and innovation programme	Free to use	International

CONCLUSION

Social media has become the primary source of gathering information, allowing people to publish content as they wish. People share fake content without realising it is false or misinformation. The world cannot rely solely on fact-checkers and websites to debunk malicious claims. As citizens, we must also inspect any doubtful information on the Internet or social media. This article explained how to cross-check any image or video potentially altered to deceive the audience, using tools like reverse image TinEye and InVID. It also discussed how to streamline finding fake news by introducing citizens to tools and techniques to debunk it. Many governments and media houses rely on Snopes, Altnews, SM Hoax Slayer, and similar sites to prove that a story appearing on the web is a fake, satire, humour, hoax, etc.

Moreover, at an individual level, a user can check for the red flags and apply the ways to spot fake news, like, reading the entire article and beyond the catchy headline, contacting the concerned authorities, doing the lateral and upstream reading, avoiding cherry picking information and control one's emotion. As a result of knowing how to check the authenticity of information on the Internet and social media sites, users will be informed citizens of a nation that will do its best to end disinformation and fake news. The vaccination for falling into the vicious circle is due diligence, being sceptical of what you see/read online, and equipping oneself with media literacy and technical aptitude. However, this article recommends government policies to end the fake news spread and research to investigate the root causes and mitigations of this problem.

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