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Deepfake: A Technique for Manipulating Media Content

التزييف العميق (DEEPFAKE) تقنية التلاعب بالمحتوى الإعلامي

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Abstract: This study explores deepfake technology and its negative implications for the fabrication of media content on online platforms. It aims to define the technology, identify its types, characteristics, and risks, while exploring methods for detection and mitigation. The research highlights examples of deepfake usage in news disseminated via social media, as monitored by the "Fatabyyano" platform. The findings indicate a growing trend of forgery in news, images, and videos. Furthermore, the study identifies specific tools and methodologies for detecting fabricated content. Finally, the research emphasizes that while detection tools are evolving, detecting sophisticated deepfakes remains a significant technical challenge, necessitating robust strategies to confront this dangerous technology.

Keywords: Deepfake, types, characteristics, risks, detection methods, Countermeasures.

ملخص: سعت الدراسة إلى التعرف على تقنية التزييف العميق (DEEPFAKE) واستخدامها السلبي في صنع محتويات إعلامية مزيفة، تنشر على المواقع الإلكترونية، من خلال معرفة تعريفها والتعرف على أنواعها، خصائصها، أخطارها ومعرفة طرق كشفها ومواجهتها، وأبرزنا أمثلة عن استخدام تقنيات التزييف العميق في أخبار منشورة على مواقع التواصل الاجتماعي رصدتها منصة فتبينوا، وتوصلت الدراسة إلى تنامي أعمال التزييف في الأخبار والصور والفيديو، كما توصلت الدراسة إلى تحديد الطرق والأدوات التي يمكن من خلالها تحديد نوع الصور والفيديوهات والأخبار المزيفة ،وأظهرت الدراسة انه أصبح ليس من الصعب اكتشاف التزييف الذي يحدث على الصورة أو الخبر أو الفيديو، وضرورة مواجهة هذه التقنية الخطيرة.

الكلمات المفتاحية: التزييف العميق، أنواع التزييف العميق، خصائص التزييف العميق، أخطار التزييف العميق، طرق مواجهة التزييف العميق.

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1. Introduction

Deepfake technology, powered by advanced generative artificial intelligence, represents one of the most significant challenges to digital media authenticity in the contemporary era**.** (Rasa, et al., 2026)

The technological advancements of the 21st century have significantly altered the media landscape and the way news reaches the audience. These advancements have facilitated distribution and dissemination, enhanced the immediate value of news and information, and fostered interactivity. This means that the audience has become both sender and receiver of information simultaneously. On the other hand, these advancements have also empowered the audience to interpret information according to their own perspective, leading to a loss of neutrality and objectivity. Furthermore, these technological developments have created opportunities for manipulating news, information, images, and events on the international, Arab, and local stages. This manipulation has led to a loss of trust between the media and the public, and a breakdown of trust between the audience and their media outlets. This study examines aspects of this technology that have contributed to changes in the structure of news and impacted its credibility with the audience.

This study comprises two sections: the first focuses on the methodological framework, and the second addresses the theoretical framework, deconstructing the concept of deepfakes. Finally, it includes a conclusion and recommendations.

2. Methodology

2.1 The Research Problem

Since September 2017, deepfakes have marked a technological turning point in the production and distribution of online content, impacting credibility and impartiality. While the origins of digital media were based on factual reporting, and digital bloggers emphasized the credibility of information before disseminating it, transformations in both the medium and the user have distorted the ideal image of digital media's original purpose: the pursuit, reformulation, and dissemination of truth to internet users. Technological advancements have not only contributed to revealing the truth but also to obscuring and distorting many facts. Digital media users are no longer solely committed to professionalism and impartiality in reporting events; some have even begun to fabricate falsehoods. In light of this, the research problem can be defined by the following question:

What defines deepfake technology, and what are the methods for detecting and countering it?

2.2 Research questions

1. What is deepfake technology?
2. What are the types of deepfakes?
3. What are the characteristics of deepfake technology?
4. What are the dangers of deepfakes?
5. What are the methods for detecting fake content?
6. What are the methods for countering the misuse of deepfake technology?

2.3 Study Rationale

The importance of this study lies in its attempt to define the term "deepfake" and demonstrate how this technology is used to produce fake news, influence individuals and groups, and raise awareness that not everything seen online is true, nor is everything published on the Internet necessarily accurate.

2.4 Research Objectives

This study aims to achieve the following objectives:

1) To define deepfakes and when this type of technology emerged.
2) To identify the types of deepfakes.
3) To identify the characteristics of deepfakes.
4) To understand the dangers of deepfakes.
5) To explore methods for detecting fake content.
6) To identify ways to counter the misuse of deepfakes.

2.5 Research Methodology

In this study, we employed a descriptive method to examine news falsification using deepfake technology. Additionally, we applied the historical method to present the history of this phenomenon, including the facts and events that have been falsified throughout history.

3. Understanding Deepfakes

3.1 Defining Deepfakes

The term 'deepfake' refers to synthetic media-including videos, images, and audio-created or manipulated using sophisticated deep learning techniques, particularly Generative Adversarial Networks (GANs) and other neural network architectures (Akhtar, 2023).

Deepfaking consists of two terms: "deep" and "fake." The first refers to a type of artificial intelligence software used, the Deep Learning Model. The second term means falsifying truth and reality. Some experts indicate that the term "deepfaking" refers to the illegal use of deep learning technology. However, deepfaking technology also has positive and beneficial uses, and to this day, no definition or term distinguishes between the positive and negative uses of this technology.

A European Parliament report defined deepfakes as “audio or visual media that are altered or artificially created to appear real, depicting a person or people as if they were saying or doing something they never said or did, and are produced using artificial intelligence technologies, including machine learning and deep learning.” Some have defined it as video produced by deep learning algorithms using readily available software capable of producing and presenting distorted content that contradicts reality by placing a target person on top of another person's body without discerning whether this actually occurred. Another definition states that it is “audio or video recordings that have been digitally altered using machine learning algorithms to create fake events that never happened.” Alex Angels defines deepfakes as “audio, image, and video clips that appear real but are in fact artificial, created using artificial intelligence techniques.” In this study, we use the term deepfake as an umbrella term covering all forms of audio and visual manipulation using AI-based technology. Artificial.
As mentioned earlier, the term comes from combining "deep learning" with "fake."

3.2 Emergence and Evolution of Deepfakes

The term "deepfake" first appeared in 2017. (2024 ،النجار)
When a user posted videos of altered pornographic films on online forums on Reddit. (2024 ،صباح)He digitally manipulated faces, replacing the actors' faces with those of other people (Keitzmann Jan), usually celebrities. The content spread widely, leading to an explosion of deepfake content that initially targeted famous actors and singers and later expanded to include politicians and other public figures. Returning to the origin of the term, it's clear that "deepfake" is a combination of the underlying technology, deep learning, and the term "deepfake," which refers to the nature of the fake outputs generated by deep learning algorithms that bear no resemblance to reality. It's well known that advancements in deep learning have significantly contributed to solving complex problems such as big data analysis. Discoveries in this field have also facilitated significant progress in image and facial recognition, speech recognition, and natural language processing, which have helped develop numerous sectors, including communications, banking, biomedicine, national security, pharmaceuticals, computers, and the internet. This includes applications like image and voice search. However, deep learning advancements have also been used to create programs that can pose threats to privacy, democracy, and national security. Deep learning-enabled applications, including the technology we're discussing, have made producing fake images incredibly easy. This technology

has been marketed and disseminated through numerous applications, most notably FakeApp and Faceswap. And others (Paris & Donovan, 2018, p. 04). The technology has become popular and widespread due to the quality of the resulting videos, as well as the ease of use of its applications by users with different computer skills, from professionals to beginners. (كريمة، 2021)

4. Types of Deepfakes Content

Deepfakes rely on what is called "deep learning," a branch of machine learning. The concept of deep learning is based on mimicking the workings of neurons in the human brain by creating an artificial neural network (ANN). This network can analyze and translate massive amounts of unstructured data, such as different languages and images, by passing it through the neural network for recognition in several stages. Hence the term "deep." Applications of deep learning include, for example, speech,voice, and image recognition. These capabilities have enabled various uses of deepfakes, which are most commonly seen in the following areas. (Magdi, 2020)

The most common uses of deepfakes are related to the following:

4.1 Visual Content

This refers to the use of deepfake technology in creating images and videos. This is done through:

A - Face swapping using encoder/decoder algorithms (to overlay a digital map of one person's face onto another's).

The encoder algorithm uses thousands of images to study the facial features of two different people, then identifies similarities between them, reduces them to shared features, and compresses the images. A second AI algorithm, called the decoder algorithm, is then trained to recover faces from the compressed images. Since the two faces are different, the first algorithm is programmed to recover the second person's face. To swap the faces, the decoder algorithm is fed the encoded image data of the other face. Figure 1 illustrates this (الأسد، 2022)



(a) Subject 1 (b) Morph (c) Subject 2

Figure 1: The process of creating a new image of a person using two different images
Source:(Assad Saleh s. d.)
The images of people (a) and (c) were merged into image (b)

B- Facial Manipulation

This involves modifying facial expressions and synchronizing lips using competitive generative networks. This method employs two artificial intelligence algorithms. Random data is fed into the first algorithm, known as the generation algorithm, to transform it into an image. This artificial image is then added to a series of real images of celebrities, for example, and fed into the second algorithm, known as the discrimination algorithm, to generate new images. After several iterations and observations, the algorithm begins producing completely realistic faces of non-real people, as illustrated in Figure 2.

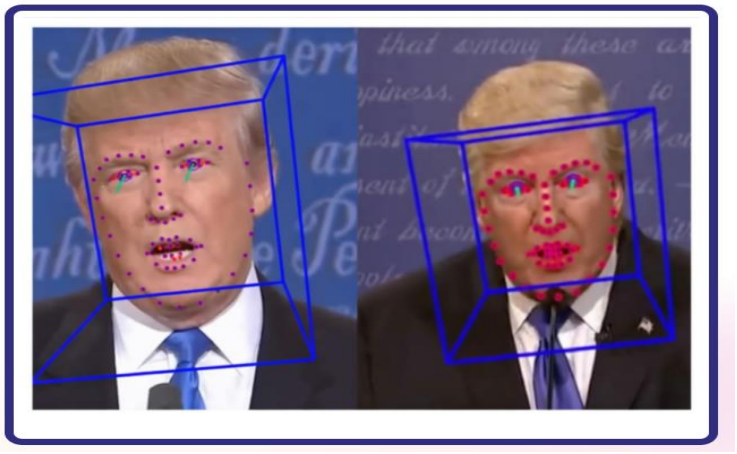


Figure 2: Producing perfectly realistic faces of unreal people
Source: (Assad Saleh s. d.)

4.2 Text-to-Speech Conversion

Figure 3 illustrates the text-to-speech process. In this process, the user enters a string of text, which is then processed by the text-to-speech system and converted into an audio signal. The semantic content of the audio matches the provided text, and ideally, the synthesized voice mimics the characteristics of the target person specified by the user. In principle, this technology can be used to deceive both humans and automatic speech recognition systems.

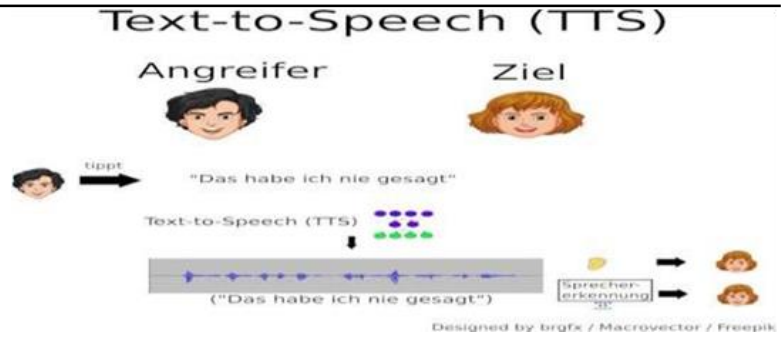


Figure 3: Text-to-speech conversion

4.3 Converting audio to a modified audio signal

Figure 4 illustrates the mechanism of voice transformation. Here, the user provides the voice transformation system with an audio signal, which is then converted into a modified audio signal. The generated audio signal retains the same semantic content as the original signal but differs in the speaker's vocal characteristics. In the most effective cases, the voice resembles that of the target chosen by the attacker, as illustrated in Figure 4.
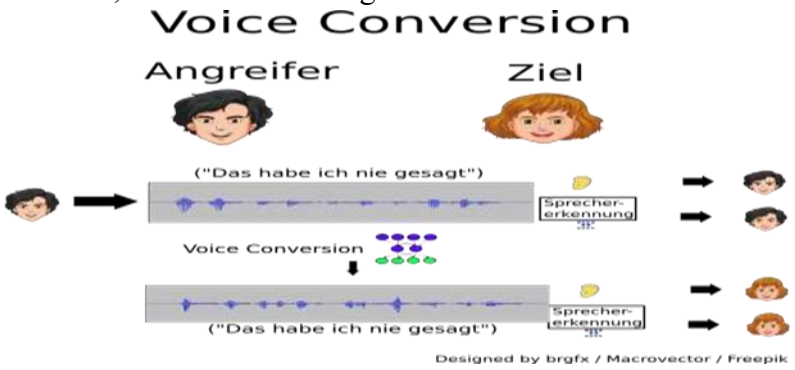


Figure 4*:* Voice Conversion

5. Deepfake Technology Characteristics

Several important features and characteristics characterize this technology. We will present the most important attributes of Deepfake technology through the following points:

A. Deep Learning

Deep learning is a hallmark of intelligent behavior. In humans, learning occurs through observation and learning from mistakes, while artificial intelligence systems depend on machine learning strategies. Deep learning involves processing massive datasets to discover patterns and algorithms, enabling highly advanced inferential methods through data analysis. Its applications include facial and speech recognition, natural language processing, and computer vision.

B. Large-scale data processing

The growing exchange of messages containing personal photos, videos, or recordings—which many individuals voluntarily share with current or prospective partners—has created an environment rich in personal data that is vulnerable to misuse, including threats, exploitation, or malicious intent. For example, fake photos, audio, or video can be created using deepfake technology and then distributed to others.

C. 3. Multimedia generation

Deepfake technology enables the creation of convincing fake videos, images, and audio, facilitating the manipulation of different media formats.

D. High Realism

The programs used in deepfakes function through a sophisticated mechanism designed to deceive detection algorithms. This process involves a competition between two algorithms: the first generates multiple versions of a video clip by inserting an external face, while the second evaluates the quality of these generated videos to discard the least convincing ones. This approach is known as "GAN" technology (Generative Adversarial Networks), which trains systems to produce fake content that closely resembles authentic material, making it difficult to distinguish between real and fake, whether by humans or automated systems. As a result, deepfake technology is capable of creating highly realistic videos that are resistant to rapid detection.

E. Continuous Improvement

Deepfake technology is continually advancing, which enhances its accuracy and realism. Artificial intelligence relies on programmed algorithms and data to make decisions and predict future outcomes. Through these algorithms, AI learns to solve the problems and make the decisions it encounters.

F. Integration of Sounds and Images:

Images and sounds from different sources can be combined to create highly accurate and convincing content. Fake news is no longer limited to fabricating events with images; it now extends to distorting facts, altering the general context of events, and manipulating videos. This enables the fabrication of statements and actions attributed to individuals without their knowledge, often to promote rumors or malicious propaganda, or to spread ideas and beliefs that shape public opinion or alter certain trends. It can even be used to ridicule or mock certain figures, especially political ones, which may lead to serious consequences.

6. Deepfake Risks

Deepfake technology poses severe risks to digital security and content authenticity due to advancements in generative models (Sakthivel, Harine, & Chandra Mohan, 2025). In addition, there are numerous risks associated with deepfakes that affect individuals, businesses, and society as a whole. One of the most significant risks is the erosion of trust. Deepfakes make it difficult to distinguish between real and fake media, casting doubt on the authenticity of information and increasing the likelihood of believing misinformation. This can have serious consequences, especially during election seasons or when public opinion is shaped by what people see and hear on social media.

Another major concern is the potential for identity theft and financial fraud. Scammers can use deepfakes to impersonate prominent figures—both in audio and video-to carry out unauthorized transactions or steal sensitive information. For example, in 2012, a fake audio recording was used to trick a CEO into transferring €220,000, under the false impression that he was following direct orders from his boss.

Other misuses of deepfakes include extortion and harassment, which can cause serious psychological distress to victims and lead to irreparable damage to their reputations. (Maghaireh 2024) Deepfakes may also be used in disinformation campaigns, where manipulated media content is created and disseminated by key figures to spread false information.

In addition to defamation, creating media content that can attribute any statement to someone or portray them in any situation makes it possible to spread falsehoods that can cause lasting harm to a person's reputation.

According to a report from University College London (UCL), “deepfakes of videos or audio are among the most alarming uses of artificial intelligence and are used in committing crimes and acts of terrorism.” This report was based on a study published in the journal Crime Science and funded by the Dawes Center for Future Crime at the University of California, USA. The study identified twenty ways in which artificial intelligence could be used to facilitate crime over the next 15 years. These were ranked by 31 AI experts based on their potential for harm, criminal profit, ease of implementation, and difficulty of prevention. According to the study, videos created by artificial intelligence using deepfake technology, featuring real people doing imaginary things, ranked as the most concerning.

7. Methods for Detecting Deepfakes in Digital Media

The rapid evolution of generative adversarial networks (GANs) and diffusion models has made synthetic media increasingly realistic, raising societal concerns around misinformation, identity fraud, and digital trust (Sales Aribe,

2025). Consequently, here are four ways to identify media content that may have been created using deepfake technology:

A. Unnatural Tone or Dialogue

One of the most common signs of deepfake audio clips is an unnatural or flat tone of voice. Human voices are full of subtle emotions and a natural variation in pitch and rhythm. A deepfake voice may lack the natural rise and fall of human speech, sounding overly robotic and emotionless.

In deepfake conversations, also pay attention to subtle interactions, such as how the speaker reacts in the dialogue. AI models may not fully pick up on social cues or timing, resulting in delayed responses, awkward pauses, or inappropriate facial reactions to certain phrases. These subtle dialogue errors can invalidate the deepfake illusion, indicating that the video has been manipulated.

B. Irregular Visual Cues

Pay attention to any instance where a person's speech doesn't perfectly match their lip movements. This subtle glitch can make a person's voice sound like it's coming from a different source, even if the voice is convincing. In addition, inconsistent facial expressions or inappropriate body language may constitute a major warning sign.

Sometimes, deepfake algorithms struggle to mimic subtle human facial expressions, such as delicate eye movements, slight muscle twitches, or the way the skin reacts to light. These imperfections can make the speaker appear somewhat robotic, with unnatural blink patterns or exaggerated, rigid facial expressions.

C. **Background Noise or Echo**

Background noise and echo are important indicators to look for when identifying deepfakes. In real-life recordings, there are often environmental factors, such as room acoustics, background chatter, or external sounds, that add a natural sense of depth and space to the audio. However, deepfakes often struggle to consistently reproduce these subtle environmental cues.

For example, in a fake recording of a public figure giving a speech, the voice might sound very isolated, as if recorded in a vacuum, without any interaction with the surrounding environment.

D. Pronunciation or Awkward Pauses

Another subtle way to detect deepfakes is to focus on unusual pronunciation of common words or awkward pauses in conversation. Because AI is trained on massive datasets, it may not always capture the unique pronunciation habits of each speaker. This can result in minor pronunciation errors or exaggerated words,

which sound unnatural in context. Similarly, deepfake technology may struggle with timing, resulting in awkward pauses or unnatural gaps between words. Humans tend to dynamically adjust their speech and pauses while speaking, especially in dialogue, whereas deepfake-generated voices may include pauses that seem out of place or poorly timed.

8. Countermeasures Against Deepfake Risks

- **Legal Action:** Using Deepfake Laws Legal action is one of the most important tools for deterring and combating the misuse of this technology and reducing instances of impunity. The People's Republic of China was among the first countries to issue laws and regulations governing artificial intelligence in general and deepfakes in particular. At the end of 2022, the Information Security Administration, in cooperation with the Ministry of Industry and Technology and the Ministry of Public Security, issued a system called "Regulations for the Management of Internet Information Services for Deepfakes," consisting of 25 articles.
- **Countering Deepfakes with Artificial Intelligence Tools:**

  Although deepfakes can produce highly accurate and realistic images, the originals can often be identified using various technological tools and programs. Researchers in the field of artificial intelligence confirm that there is fierce competition between deepfake technology and detection technologies.

  Some researchers assert that deepfake technologies and applications are constantly and rapidly evolving, making their detection increasingly difficult in the future.
- **Countermeasures by the Private Sector and Media:**

  The Programs Director at Witness emphasized the importance of the press's role in combating this phenomenon by having journalists provide evidence to viewers of the accuracy of what they publish and by adopting the SIFT method (an acronym for Stop, Check, Find Better Coverage, Find Source of Claim). This series of procedures helps journalists ensure they publish verified content instead of fake content. In this context, X adopted a four-step strategy: First, issue a notice when broadcasting fake content; second, issue a warning that it is fake before publication; third, include a link to the fake content that leads viewers to the source, explaining why and how the real content was faked; and finally, remove all fake content that poses a danger or threatens lives. (مغايرة ، 2024)

9. Examples of Media Content Manipulation Published on Social Media

1) Overlaying Old Audio onto Fake Video Footage

A video sparked controversy on social media by claiming to capture the sound of a blue whale off the coasts of Egypt, Libya, and Algeria. The footage garnered millions of views within hours of its release.

The videos were fabricated by overlaying an audio recording of the beluga whale Migaloo onto the footage. Notably, the sound was originally recorded in 1998 and published by The Oceania Project in 2008.



Figure 5: Represents the fake video
Source: Fatabyyano platform

2) Using Fake Images and Logos to Fabricate a Video

A TikTok account posted a fabricated video on September 3, 2025, falsely attributed to Syria TV. The video claimed that a new Syrian government had been formed under the leadership of Mazloum Abdi.



Figure 6: Shows the manipulation of fake images and logos to fabricate a video clip
Source: Fatabayyano platform

Upon investigating the news, the platform "Verify" revealed the artificial intelligence techniques used to fabricate the video, which are presented as follows:

a) Distorted Syria TV Logo

The logo appearing in the video differs from the original Syria TV logo, confirming that the clip does not belong to Syria TV.



Figure 7: Shows the Distorted Syria TV Logo
Source: Fatabyyano platform

b) Distortion of the presenter's features

A clear distortion appears in the presenter's eyes in the last second of the clip, as shown in the following image.



Figure 8: Shows the Distortion of the presenter's features
Source: Fatabyyano platform

9.3. Algorithmic Analysis of Media Manipulation Cases

In the case of the video (Figure 5), the manipulation relies on Audio-Visual Inconsistency. While the visual data remains intact, the algorithm facilitates seamless audio layering that ignores acoustic environmental mapping, a common flaw in early deepfake attempts. For the 'Syria TV' fabrication (Figures 7 and 8),

the algorithm fails at Temporal Coherence; the distortion in the presenter's eyes in the final seconds indicates a failure in facial landmark tracking during rapid frame transitions.

Furthermore, in addressing these manipulation techniques, innovative technological solutions have been developed to counteract the spread of deepfakes.

DeepFakeShield is a technology designed to detect AI-generated fake videos, commonly known as deepfakes. It utilizes advanced deep learning models in combination with explainable AI mechanisms to enhance detection accuracy and transparency. The system analyzes lip synchronization, facial feature consistency, and subtle video artifacts to identify manipulations. Its flexible architecture allows deployment in various settings, such as forensic labs and social media monitoring platforms. By providing clear explanations for its decisions, DeepFakeShield supports expert validation and strengthens trust in combating misinformation. (Kumar, Rmya, Paul, & S, 2026)

9. Conclusion: Deepfakes are a relatively new phenomenon, with researchers predicting their spread in the near future. They represent a facet of the artificial intelligence revolution, which now dominates many sectors. While deepfakes, like other modern technologies, can offer humanity numerous benefits in education, entertainment, and commerce, they are a double-edged sword. Deepfakes carry significant risks and can become a dangerous, accessible, and inexpensive tool in the hands of criminals, causing serious harm to individuals, institutions, and property, and even destabilizing national security. This reality necessitates equipping ourselves with legal, technological, and societal tools to combat them, as well as coordinated efforts between the public and private sectors to prevent and address their misuse. This research leads us to the following results:

1. Deepfake technology is a double-edged sword, with both positive and negative aspects.
2. Deepfake technology produces a variety of fake content, such as images, audio, videos, and even text-to-sound effects.
3. Deepfake technology has many characteristics, the most dangerous of which is its continuous improvement.
4. Deepfake technology poses a threat to society and individuals, including identity theft, financial fraud, defamation, and impacting the security and stability of nations.
5. There are ways to identify fake media content, such as an unnatural

tone of voice, the absence of background noise in recordings, and improper pronunciation and pauses.

6. Countering the negative use of deepfake technology requires enacting strict laws against deepfakes of electronic content, verifying information before publication by citizens and journalists, and developing programs to detect and combat fake content before it spreads.

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