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EXECUTIVE SUMMARY: ARTIFICIAL INTELLIGENCE TOOLS FOR DEALING WITH COPYRIGHT PIRACY: TECHNOLOGICAL, LEGAL AND POLICY DIMENSIONS[*]

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ABSTRACT

This study provides an overview of the technical, legal and policy dimensions of artificial intelligence (AI) tools for combating copyright piracy, and examines their value in the context of traditional tactics for detecting and responding to copyright piracy. It highlights changes in the content piracy landscape that are fueling demand for AI-enabled tools and examines challenges associated with them, including technological, legal and policy considerations. It concludes with a discussion of practical recommendations and good practices.

[*] The study was conducted with funds provided by the Ministry of Culture, Sports and Tourism of the Republic of Korea. The full study is available (in English) on the Advisory Committee of Enforcement website (https://www.wipo.int/meetings/en/details.jsp?meeting_id=90608).

[**] The views expressed in this document are those of the author and not necessarily those of the Secretariat or of the Member States of WIPO.

I. INTRODUCTION AND SCOPE OF THE STUDY

1. Revolutionary technologies are rarely perfect in the early stages of development and artificial intelligence (AI) is no exception. Tools using AI show great promise in helping content owners to detect and respond more readily to the ever-increasing scale of piracy of their works. However, many of the challenges long associated with traditional tools for combating piracy also arise in the case of AI-enhanced tools.

2. This study addresses technological, legal and policy aspects of AI tools for combating content piracy. It frames the need for and role of AI tools by first reviewing the traditional pre-AI tools for detecting and responding to copyright piracy. The study then examines changes in the content piracy landscape that are fueling demand among copyright owners for AI-enhanced tools to detect and combat piracy. There follows an overview of the role of AI tools and potential related challenges, including practical, legal and policy concerns. The study concludes with a discussion of practical recommendations and good practices.

3. The study does not focus on the myriad legal, policy and technological issues arising from the training of AI foundation models, including the use of AI tools for detection of which copyrighted works have been used to train an AI foundation model or on the interplay between use of copyrighted content to train AI systems and the output from such systems. AI-generated content is, however, addressed to the extent that it infringes copyright, without regard to the way in which the infringing content may have been created.

4. The focus of the study is copyrighted content. It does not address the complicated and troubling issues of infringement of individuals' (notably performers' and celebrities') name, voice, and likeness to the extent such indications are not fixed, as such indications of identity are not protected by copyright.

5. AI tools for detecting deep fake images or academic plagiarism and for monetizing the online distribution of content also fall outside the scope of this study.

II. TRADITIONAL TACTICS FOR DETECTING AND RESPONDING TO COPYRIGHT PIRACY

6. The traditional tactics for detecting and responding to piracy of copyrighted content can be divided into three categories: (i) protections embedded in the content or the distribution platform; (ii) tactics for monitoring infringing content; and (iii) responsive tactics when infringing content is detected. AI tools carry significant implications for each of those categories.

7. Embedded protections provide a first line of defense in protecting copyrighted content against piracy. Embedded protections include content-based and platform-based encryption. At the core of both types of encryption are digital rights management (DRM) tools that aim to safeguard digital content against unauthorized access and distribution. DRM tools encrypt digital content and then deploy that encryption to limit access to authorized users and uses.

8. Monitoring tools enable content owners to detect pirated copies of their works, most frequently using technology that automates the process of detecting pirated content by watermarking and fingerprinting the original content and then using those markers to scour the Internet and online platforms for matching copies.

9. Responsive tactics have included a range of options, such as graduated response culminating in termination of Internet access, notice and takedown of infringing copies, copyright infringement litigation, and the blocking of sites and services when engaged in pirate activity.

III. CHANGES IN THE PIRACY LANDSCAPE AND THE GROWING NEED FOR AI TOOLS TO COMBAT PIRACY

10. The primary driver of demand for AI-enhanced tools to combat piracy of audiovisual copyrighted content has been the shift from physical media (including DVDs and CDs) to online distribution, including digital downloads and on-demand streaming.

11. The shift of consumer demand for audiovisual content from physical media to content accessed online has made it easier to create and distribute pirated copies of works. At the same time, the borderless nature of the Internet has created new challenges for effective enforcement.

12. Online piracy has had an especially dramatic impact on broadcasts of sports and live entertainment.

13. The worldwide sports broadcast rights market was valued at approximately $62.6 billion in 2024, continuing a rapid upward trend over the past decade. The number of United States viewers who stream a sports event at least once a month is estimated to have risen steeply from 57 million in 2021 to more than 90 million today. Major sporting events, including the Olympic Games, the FIFA World Cup and championship finals for professional leagues, attract billions of viewers worldwide, generating enormous commercial value for broadcasters, leagues, teams and sponsors. Broadcasting revenue has become the dominant financial pillar for most major sporting events. For example, the National Football League's media rights deals are valued at approximately $110 billion for the period from 2023 to 2033. The English Premier League's domestic and international broadcast rights for 2022 to 2025 exceeded $13.2 billion.

14. Unfortunately, piracy of live sports streams has also grown dramatically. Unauthorized streaming services, illegal retransmission through social media platforms, and illicit Internet Protocol Television (IPTV) operations increasingly undermine legitimate markets.

15. Unlike movies or television series, which retain commercial value for extended periods, sports content derives almost all its economic value from real-time or near real-time viewing. A soccer match generates minimal viewing interest even hours after its conclusion. This compressed value window means that, by the time enforcement mechanisms detect and remove unauthorized streams, much or all of the commercial value has been lost. The live, time-sensitive nature of sports creates an asymmetry that heavily favors pirate operations over rights holders and enforcement authorities and increases the need for AI-enabled tools to combat piracy.

16. The focus of this study is on audiovisual works but such challenges radiate across all forms of copyrighted content, including print works, journalism, music and games. The study touches on the unique challenges faced by each of those types of content and the potential role in each sector of AI-enhanced, anti-piracy tools.

17. Online platforms and services that host user-uploaded content are coming under growing pressure in the AI era, both from a business perspective and because of the increasing number of legal challenges they face, as the volume and variations of pirated content continue to expand at a significant rate. The study addresses those issues.

IV. ROLE OF AI TOOLS IN COMBATING COPYRIGHT PIRACY

18. In the context of anti-piracy, AI represents a combination of tools rather than a single specific technology. Those tools can include natural language processing, machine learning and computer vision.

19. Machine learning algorithms can enhance detection accuracy over time by learning from past piracy patterns, decreasing false positives and enabling automated review for possible fair use/fair dealing scenarios (the term “fair use” as used in the study encompasses concepts such as fair dealing and the three-step test). Forms of piracy continue to evolve rapidly; machine learning algorithms also have the capacity to evolve and refine detection and identification methods, as well as appropriate responses.

20. Computer vision can detect pirated videos by analyzing visual frames, even where the image in the pirated copy has been cropped, mirrored or otherwise altered to avoid detection by traditional monitoring systems. By comparing video frames pixel by pixel, AI systems are able to detect even subtle modifications in pirated versions that enabled pirated content to elude traditional forms of detection. Computer vision technologies are also being deployed to protect images and graphics. Stock photo companies, for example, are deploying AI-powered image recognition to locate and identify unauthorized usage of their copyrighted images.

21. An additional AI-assisted functionality is improved watermarking and fingerprinting, where AI recognition capacity – including computer vision functionality – can thwart manipulation by pirates and improve detection by content owners and distribution platforms.

22. Natural language processing can enable AI-assisted scanning of metadata and file descriptions for piracy-related keywords, adding another source of detection to scanning for the content itself. For example, natural language processing can detect and react to suspicious descriptions such as “free movie download” or “unlocked access”. That functionality can also assist with monitoring online forums and other sites where pirated content is promoted and unauthorized access links are offered.

23. Automation of monitoring is another key value inherent in AI-assisted anti-piracy tools. Expanding on traditional methods of manual scanning and monitoring, AI tools can automatically monitor vast amounts of data across multiple platforms, including websites, forums, torrent platforms and social media platforms. Automation has the potential to detect and respond to pirated copies before they spread widely across the piracy ecosystem. That kind of monitoring scalability is a key source of value for AI-enhanced anti-piracy tools.

24. AI-enabled automation of the take-down process, including generating take-down notices and monitoring compliance, could significantly expand the scope and accelerate the process of removing pirated content from platforms, while reducing false-positive identifications (such as a takedown mistakenly issued based on a licensed third party musical composition contained in the soundtrack of a film) and permitting fair-use activity.

25. AI-enabled anti-piracy tools have the greatest potential value for content owners, but they can also help websites and platforms that host user-uploaded content to comply with notice+takedown and to improve blocking of user uploads of pirated or infringing content.

26. AI content protection tools can also offer analytical guidance for content protection strategies, such as by analyzing data trends to predict high-risk periods for specific content and identifying and prioritizing platforms where pirated content first appears. Information and predictive data of this type assists content owners with developing prevention strategies to supplement their reliance on reactive defenses.

V. POTENTIAL CHALLENGES POSED BY AI TOOLS

27. An initial challenge with assessing AI-enabled tools for dealing with piracy of copyrighted works is an issue inherent in all cutting-edge technology: differentiating between actual efficacy of a service and the salesmanship in which the service is wrapped. Some computer-assisted tools being branded as “AI tools” do not actually contain the types of AI functionality described in this study. The purported efficiency and effectiveness of some tools are not substantiated by proof-of-concept testing.

28. With all AI-enabled tools, similar challenges exist as with traditional tools, including complications created by false positives, inability to appropriately assess possible fair-use activity, and use of imbedded license content owned by third parties.

29. *False positives*: While tools using AI functionality have the potential for greater accuracy and sophistication in detecting pirated content, false positives will likely never be completely eliminated. As a result, a key part of assessing any AI tool is how it deals with – and learns from – false positives. Where an AI tool relies on crowd sourcing for monitoring, the tool is only as reliable as the crowd that is sourcing it, so extra scrutiny should be applied to any such tool.

30. *Fair use*: A fair-use determination requires consideration of multiple factors, including purpose and character of the use, nature of the copyrighted work, amount and substantiality of the portion used in relation to the copyrighted work as a whole, and the effect of the use upon the potential market for or value of the copyrighted work. Those determinations cannot be automated easily but AI machine learning has the capacity over time to make informed determinations that non-AI systems are largely incapable of.

31. *Imbedded licensed works*: The use of imbedded licensed works within an audiovisual work has at times been a challenge for avoiding false positives when flagging pirated copies. For example, the licensed use of the recording of a popular song in the soundtrack of a motion picture could be mistakenly flagged as a pirated copy. AI systems are not able to independently determine whether such use is appropriately licensed, however they can learn and respond to allow-lists.

32. These challenges underscore the continuing, and perhaps elevated, importance of human oversight and review of the selection and use of all new content protection tools, including those with AI functionality.

VI. CONCLUSIONS

33. AI-enabled tools for combating copyright piracy are still in the early stages of development but they are already showing strong potential to assist copyright owners in detecting and responding to piracy of their works. Traditional and AI-enabled anti-piracy tools face many of the same challenges, including with regard to false-positives and respect for the fair use of copyrighted material. Nonetheless, AI tools have the capacity for far more sophisticated forms of automation that can address those concerns while keeping pace with the ever-expanding threat posed to copyright owners by digital piracy.

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