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Dr. Celia RANGEL
Universidad Complutense de Madrid. Spain. cerangel@ucm.es. https://orcid.org/0000-0002-5692-2915

Artificial Intelligence as an ally in monitoring commercial content harmful to children on the Internet

Inteligencia Artificial como aliada en la supervisión de contenidos comerciales perjudiciales para menores en Internet

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Abstract
Nowadays, vast amounts of data are produced on the Internet thanks to the democratisation of technology and the rise of video and social media platforms. Through Artificial Intelligence, digital service providers can improve their services and recommend content based on different user-profiles. Children also participate in the digital culture as they consume more and more content on these platforms. Hence, brands want to reach them in this environment with commercial messages that can sometimes be detrimental to their moral and physical development, an issue which Spanish and European legislation wants to confront. To study the protection of minors from inappropriate advertising messages on the Internet, this paper analyses five legal texts: current Spanish General Law on Audiovisual Communication 7/2010; European Directive 2018/1808 on digital services; the preliminary draft of the new Spanish General Law on Audiovisual Communication; and the drafts of the European Regulation on Digital Services and on Artificial Intelligence. AI tools can serve service providers and regulators in improving the protection of minors from commercial content harmful to their development.

Keywords
Advertising; legislation; artificial intelligence; LGCA; DSA

Resumen
Hoy en día se producen millones de datos en Internet gracias a la democratización de la tecnología y al auge de las plataformas de vídeo y redes sociales. A través de la Inteligencia Artificial, los prestadores de servicio son capaces de mejorar su servicio y recomendar contenidos en función de los diferentes perfiles de usuario. Los menores también participan de la cultura digital porque cada vez consumen más contenidos en estas plataformas. De ahí que las marcas quieran llegar a ellos en este entorno con mensajes comerciales que, en ocasiones, pueden resultar perjudiciales para su desarrollo moral y físico, algo que la legislación española y europea desean atajar. Para estudiar la protección del menor ante mensajes publicitarios inapropiados en Internet, en el presente trabajo se analizan cinco textos jurídicos: la vigente Ley General española de la Comunicación Audiovisual 7/2010; la Directiva Europea 2018/1808 de servicios digitales; el anteproyecto de la nueva Ley General española de la Comunicación Audiovisual; y los borradores de Reglamento europeo de Servicios Digitales y de Inteligencia Artificial. Las herramientas de IA pueden servir a los prestadores de servicios y a los reguladores para mejorar la protección de los menores ante los contenidos comerciales perjudiciales para su desarrollo.

Palabras clave
Publicidad; legislación; inteligencia artificial; LGCA; DSA.

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1. Introduction

The increase in channels, terminals and technologies on the Internet is creating a volume of data that is difficult to manage in the era of the so-called Fourth Industrial Revolution (Túñez, 2021). Artificial Intelligence (AI) is a key tool to be able to manage and analyse the volume of data currently being generated, among other things, to study and understand how people behave and what content they consume on the Internet (Perakakis, Mastorakis and Kopanakis, 2019; Huang and Rust, 2020; Shah, Engineer, Bhagat, Chauhan and Shah, 2020).

Digital platforms encourage individuals to be active agents by sharing information and producing their own content (Shah et al., 2020). An estimated 2.5 trillion pieces of data are generated on the Internet every day (Gouda, Biswal and Parveen, 2020). Much of this data is created by social media and video platforms that promote communication and information sharing between people (Hayes, Britt, Evans, Rush, Towery and Adamson, 2021).

The high penetration of Internet-connected terminals is favouring a digital culture that has had an impact on society and on the way we relate to each other (Gouda, Biswal and Parveen, 2020; Llorente, García and Kolotouchkina, 2020; Pedrero-Esteban and Pérez-Escoda, 2021), a culture in which children are active actors (Gaitán, 2006) because they use the Internet as a tool for entertainment, socialisation and expression (Smahel et al., 2020; Núñez-Gómez, Ortega-Mohedano, Monguí Monsalve and Larrañaga, 2020a; Rangel, Monguí, Larrañaga and Díez, 2021).

Although technology and innovation are advancing faster than the answers that can be given at the legal level (Pedrero-Esteban and Pérez-Escoda, 2021), the main contribution of this work is to highlight the potential of AI tools for service providers and regulators to detect harmful content on the Internet (European Parliament, 2020), in this case, commercial content harmful to minors, while respecting the fundamental rights enshrined in the Charter of Fundamental Rights of the European Union (EUR-Lex, 2000) and in the Spanish Constitution (BOE, 2011). The fusion between advertising and content makes it very difficult for children to distinguish potential harmful commercial content (Olstad and Lee, 2020).

At a time when Europe is defining its roadmap for its digital transformation between now and 2030 (European Commission, 2021) and at a legal level, the European Audio-visual Media Services Directive 2018/1808 is in the process of being transposed into Spanish law through a draft to update the General Audio-visual Communication Law 7/2010 (MINECO, 2021a) and the European regulations on Digital Services (EUR-Lex, 2020) and AI, known as the future Artificial Intelligence Law (EUR-Lex, 2021b), are in the process of being debated for approval and mandatory compliance throughout the European territory. Therefore, the objectives set out in this paper are:

- Analyse the main new developments in the regulation of commercial communication in the most recent legal texts at national and European level.
- Analyse how technology can help to implement control and monitoring measures to protect minors from new commercial content on the Internet that may be harmful to their moral and physical development.

Therefore, the hypothesis put forward in this paper (H1) is that, given that legal responses always lag behind technology and people's innovation, it is essential to incentivise voluntary regulatory measures by brands and service providers to protect minors from harmful commercial content. To test this hypothesis, firstly, a literature review is presented on how brands try to reach minors on the Internet and the applications of AI for content recognition; secondly, a description of the methodology and the legal texts under study are described; thirdly, an explanation of the main results of the research is given; and finally, a discussion and conclusions are also included.

1.1. Children and commercial content on the Internet

From the age of three or four, children can identify commercial products (Aktas, Tas and Gürgah, 2016), a skill that increases as they grow, so that by the age of twelve they are able to identify and classify brands and products under rational and emotional criteria (Rangel et al., 2021). The emotional bond will be more intense if the product or brand is part of their environment, either because they are used by their adults of reference, by their families or by their peers (Rodhain, 2006; Jones and Glynn, 2019; González-Durán, 2021).

The Internet is a meeting place for people with similar interests where brands also convey their commercial messages (Llorente, García and Kolotouchkina, 2020; Martorell and Serra, 2020). Children are part of the communicative activity of the Internet (Núñez-Gómez, Sánchez-Herrera and Pintado-Blanco, 2020b) where it is estimated that they spend more than two hours a day (Smahel et al., 2020) given that the audiovisual content they previously consumed on television is now consumed on platforms such as

YouTube and social networks (Ofcom, 2019). While the Internet is a medium that entertains kids from when they are very young (Holloway, Green and Livingstone, 2013; Blackwell, Lauricella and Wartella, 2014), it is from the age of eight to twelve that they begin to distinguish commercial content from purely informational content (Rozendaal, Lapierre, van Reijmersdal and Buijzen, 2011).

More and more children have mobile devices, such as smartphones or tablets, at their disposal (Renés et al., 2020), due to the democratisation of technology by a greater number of mid-range manufacturers and Google (GFK, 2019; CCN-CERT, 2020). In fact, recent studies reveal that children in Spain have on average 4.1 devices connected to the Internet in their homes (AIMC, 2019). Given that video platforms such as YouTube and Twitch or social networks themselves have more children's audiences than many traditional television channels (García, Catalina and López, 2016; Gutiérrez and Cuartero, 2020), companies are designing commercial content to reach minors or their families in digital media (Cervilla-Fernández and Marfil-Carmona, 2019; Martínez and Paul-Larrañaga, 2021). In this regard, according to the latest data from InfoAdex (2021), advertising investment in digital media in Spain is at the forefront for the second consecutive year.

Commercial content is inserted wherever children are and according to their favourite online activities, such as watching videos, accessing social networks, playing video games or chatting with friends (Smahel et al., 2020). Today, the digital platforms preferred by children are YouTube, Twitch, TikTok, Snapchat, Instagram, or Twitter (Gaptain, 2020). Commercial messages use the codes, language and tools that govern digital media, such as the use of influencers and the creation of *ad hoc* fun content (Google, 2012; Tur-Viñes, Núñez-Gómez and González-Río, 2018; Ramos, 2019) where it is difficult to distinguish advertising from information or entertainment (Feijoo et al., 2020). Hence, we are witnessing a growing industry of digital commercial content creation by brands in what is being called *inbound marketing*, where companies strive to capture attention by creating a myriad of pieces ranging from videos, series, sponsorships, branded content, contests, unboxings, challenges, tutorials, or blogs, among others (Opreana and Vinerean, 2015; Dakouan, Benabdelouahed and Anabir, 2018) and where children themselves are encouraged to be creators of advertising content (Vizcaíno-Laorga, Martínez-Pastor and Serrano-Maíllo, 2019). All this is in order to reach children in a more relevant and closer way that allows content creators to have a greater interaction with them (Jones and Glynn, 2019). In a year marked by COVID-19, investment in paid influencer actions, branded content and native advertising on the Internet were the only media that grew in 2020 in Spain (InfoAdex, 2021).

Given the increase in communication activity on the Internet, it is important to bear in mind the risks to which children are exposed. The main risks include excessive Internet consumption, viewing images with sexual content, *sexting, cyberbullying*, viewing content that is not appropriate for their age, or anything related to infringements of their privacy, honour or intimacy (Sádaba and Bringé, 2010; Gaptain, 2020; Smahel et al., 2020; Fang, Yang, Zhao and Huang, 2021). In this regard, Livingstone and Stoilova (2021) have updated the classification of digital risks for minors to include exposure to harmful content of various kinds.

In the wake of the pandemic, families are more aware of children's digital communication activity, the risks involved and the need to improve digital skills at home and in schools (Empantallados, 2020) so that children can have a full and safe digital life (Núñez-Gómez, Ortega-Mohedano and Larrañaga-Martínez, 2021). At the European level, various initiatives are being implemented to go beyond current legislation and prohibit the commercial communication of certain products on the Internet, such as food products high in fat, salt or sugar, tobacco, and alcoholic beverages, given that, although the communication is not aimed at minors, they can be exposed to actions on their own channels or the dissemination of events on social networks, etc. (The WHO Europe, 2019).

1.2. Artificial Intelligence and content recognition

AI is based on Aristotelian syllogisms which, broadly speaking, are based on reasoning from premises to draw a conclusion (Túñez, 2021). Its evolution has been discrete since the term "artificial intelligence" was defined in 1956 at the Dartmouth College Conference organised by John McCarthy (Gouda, Biswal and Parveen, 2020; Túñez, 2021). It has taken off since it began to be used to analyse big data from various industries, thanks to increased computational and storage capacity in the cloud (Gouda, Biswal and Parveen, 2020; Huang and Rust, 2020). Although there are numerous definitions of AI in the literature, many of them agree that AI is a computational approach to tasks associated with human intelligence related to continuous learning, problem solving and explanation, and pattern creation (Hayes et al., 2021).

More and more sectors are incorporating AI tools in their digitalisation processes, such as banking, politics, medicine, food and transport (Giletta, Giordano, Mercaú, Orden and Villarreal, 2020; Innerarity, 2020; Túñez, 2021). Hence, there is a very current critical debate on the impact of AI on people's lives (Giletta et al., 2020; Innerarity, 2020). Authors such as Sadin (2018) point out that more and more tasks

are left in the hands of algorithms with greater decision-making capacity or that this type of tool makes us assume that we are what we search for on the Internet (Pedrero-Esteban and Pérez-Escoda, 2021). Other authors advocate an application of AI guided by ethical and transparent use, something that is generating debate among institutions and researchers (Gouda, Biswal and Parveen, 2020; Pedrero-Esteban and Pérez-Escoda, 2021), as reflected in the European Commission's White Paper on AI (2020a) or the OECD's recommendations in this field (2019).

Within AI, some of the most widely used tools are those associated with machine learning (ML), deep learning (DL) and natural language processing (NLP), as they can extract information from existing data to analyse problems, establish patterns and/or make future decisions (Li, 2019; Gouda, Biswal and Parveen, 2020; Hayes et al., 2021). ML allows training computational models from past data to organise the data according to certain rules to make future decisions, so that rules can be created that allow generalisations to be made (Capatina, Kachour, Lichy, Micu, Micu and Codignola, 2020; Giletta et al., 2020; Shah et al., 2020). Within ML, the DL technique allows finding patterns in data through neural networks for e.g., image or speech recognition (Giletta et al., 2020; Aguirre, 2021). NPL allows computers to understand texts and classify them (Gouda, Biswal and Parveen, 2020; Huang and Rust, 2020).

AI algorithms learn from the vast amount of data that is generated on the internet, e.g., through interactions with content, time spent reading, day and time, likes, etc. (Li, 2019). In fact, the Internet content industry with players such as Google, Facebook, Twitter, TikTok, Netflix or Amazon use AI tools constantly to, among other tasks, analyse the large amount of data generated by users, propose better advertising solutions for their customers, identify images, recommend content to users, analyse tastes and preferences, track campaigns or current topics, object recognition, use chatbots to interact with people, or perform automatic translations and transcriptions (Li, 2019; Capatina et al., 2020; Giletta et al., 2020; Gouda, Biswal and Parveen, 2020; Huang and Rust, 2020; Al-Ghamdi, 2021; Pedrero-Esteban and Pérez-Escoda, 2021).

The following is a synthesis of the main tasks related to the recognition of content produced on the Internet where AI has direct application (Perakakis, Mastorakis and Kopanakis, 2019; Capatina et al., 2020; Huang and Rust, 2020; Shah et al., 2020; Aguirre, 2021; Hayes et al., 2021; Pedrero-Esteban and Pérez-Escoda, 2021; Túñez, 2021):

- Collection and structuring of data from different Internet platforms, whether in the form of voice, text, image, or video.
- Model generation: using existing data, algorithms can be trained under previously defined categories to solve a specific task. For example, data can be related to platforms, interactions or visit time, among other parameters.
- Extracting meaning from the data:
    - ¤ Content: analysis and classification of images, videos, texts, voice, and audio. This means, for example, that logos of commercial brands or influencers can be identified according to criteria such as subject matter, followers, engagement, reach, audience, brands they work with, platform, etc.
    - ¤ Sentiment and affinities: these consist of identifying and classifying emotions, feelings, attitudes, tastes and behaviours of people and their interactions associated with texts, images, videos, or audio. In this way, for example, facial recognition of expressions can be done automatically, or people can be grouped according to their affinities expressed in videos, photos, or conversations, without having to define their user profile on social networks.
    - ¤ Predictions: AI models can predict user behaviour based on certain parameters. This means that it is possible to extract, for example, the probability of users being likely to publish a certain type of content, know whether it will be liked or not, identify trends or even anticipate possible crises.
- Constant evolution of AI models to improve patterns: e.g., for personalised interpretation of people's feelings, emotions, opinions, behaviours, and tastes or for micro-segmentation of audiences.

2. Methodology

A critical-descriptive analysis has been carried out to study the aspects of commercial communication harmful to minors that are and will be regulated at national and European level, to then link them to the specific applications of Artificial Intelligence that have been previously reviewed in the literature. To this end, the five units of analysis are: the General Law on Audio-visual Communication 7/2010 of 31 March

(BOE, 2015); the European Directive 2018/1808 on digital services of the European Parliament and of the Council of 14 November 2018 (EUR-Lex, 2018); the preliminary draft of the Spanish General Law on Audio-visual Communication (MINECO, 2021a); and the drafts of the European Regulation on Digital Services (EUR-Lex, 2020) and Artificial Intelligence (EUR-Lex, 2021b).

The Spanish General Law on Audio-visual Communication 7/2010 (hereinafter, LGCA) was based on the legal framework of the European Television without Frontiers Directive of 1984 (MINECO, 2020), which also includes amendments to the Audio-visual Communication Services Directive 2007/65/EC to address the changes in the sector at that time, and which was last updated in 2015 (BOE, 2015). According to Art. 1 of the LGCA, the coverage of this Law is national in scope and determines the general regulations, without prejudice to regional and local competences in this area (BOE, 2015).

The Audio-visual Media Services Directive (EU) 2018/1808 is an evolution of Directive 2010/13/EU (EUR-Lex, 2018), which reflects the evolution of the audiovisual sector following the generalisation of Internet access at a global level and the proliferation of new video-sharing platforms and new communication channels such as social networks. Although its transposition was due to enter into force on 19 September 2020 in all Member States, at the time of writing, it has not yet taken place in the Spanish legal system (EUR-Lex, 2021a), which means that the Spanish General Audio-visual Communication Law 7/2010 is still in force, although the Spanish Ministry of Economic Affairs and Digital Transformation (MINECO, 2021a) is working on the preliminary draft of the Spanish General Audio-visual Communication Law that will soon see the light of day, given that the second phase of public hearing ended on 12 July 2021 (MINECO, 2021b) and whose objective is to extend the regulation envisaged by the European directive.

The European regulation on the future Digital Services Act (EUR-Lex, 2020), better known by its acronym DSA (Digital Services Act), amends Directive 2000/31/EC on electronic commerce, which was transposed in Spain through Law 34/2002 on Information Society Services and Electronic Commerce (BOE, 2020). This proposal highlights the changes the rise of the Internet brought at an economic and social level. Hence the need to harmonise the rules for service providers in all member states, as well as to promote the proper functioning of the market and define rules that make the Internet a safe, predictable, and reliable place. The draft regulation dates from 15 December 2020 and is currently being debated by the European Parliament and the different member states to be approved and made mandatory throughout Europe.

The future European Law on Artificial Intelligence (EUR-Lex, 2021b) has also been under discussion since 21 April 2021. This European regulation seeks to find a balance between harnessing and boosting the possibilities of AI on a social and economic level, guaranteeing a stable framework that provides confidence to the different actors, and providing security and protection of the fundamental rights and values of the European Union. Therefore, the future law establishes minimum standards to correct the risks and drawbacks of AI, without undermining AI-based initiatives or increasing their cost, and where fundamental rights and coherence with other regulations are always guaranteed.

3. Results

After analysing the units of study in this paper, firstly, it emerges that the main areas of current and future regulation to protect minors from potentially harmful commercial content revolve around four areas: the authorship of content, the type of content that can be broadcast, protection from commercial communication, and mechanisms to encourage responsible and consistent protection. A link between the areas of regulation and the articles detailed in the units of study is shown below (Table 1).

Table 1: Areas of regulation of commercial content in minors by the Spanish General Law on Audiovisual Communication 7/2010 (LGCA), the European Directive 2018/1808, the preliminary draft LGCA and the future Digital Services Act (DSA) and Artificial Intelligence.

Areas of regulation	LGCA 7/2010	EU Directive 2018/1808	LGCA Preliminary draft	Future DSA	Future AI Law
Authorship	Articles 2 and 13.	Considerations 16 and 47. Article 9.1.a.	Article 2.	Considerations 17, 22 and 26. Articles 24 and 30.	
Type of content	Articles 4.2., 4.4., 7.2. and 7.5.	Considerations 4, 19, 20, 44, 45, 47, 48 and 51. Articles 6 bis. 1-3. and 11.2.	Articles 4 – 7, 95, 96, 98 and 119.	Considerations 57 and 62. Articles 23. c, 30.	Considerations 28. Article 9.
Protection against harmful and unlawful commercial communication	Articles 7, 14.4., 17.4., and 18.e.	Considerations 19, 20, 21, 28, 29, 30, 34 and 46. Articles 6 bis. 2., 9. 1. c – g., 28ter 1 and 28ter 2.	Articles 14.4. c – f, 82, 84, 87, 88, 89, 90, 97, 120 – 122 and 134 - 136.	Considerations 5, 12, 21, 25, 29, 40, 46, 48, 52, 57, 56, 58, 63 and 68. Articles 2. g, and p., 24 and 36.	Considerations 16 and 28.
Mechanisms to promote responsible and consistent protection	Articles 7.4 and 57.4.	Considerations 14, 28, 38, 49 and 59. Articles 4 bis. 1, 9. 4., 30ter and 33 bis.	Articles 10 14, 90, 93 and 94.	Considerations 40, 46, 47, 58, 60, 61, 62, 66, 67 and 70. Articles 14. 1 and 2, 17. 3., 19, 20, 21, 26, 27, 28, 35, 36 and 57.	Considerations 81. Articles 69 and 84.

Source: own elaboration based on BOE (2015), EUR-Lex (2018, 2020, 2021b), MINECO (2021a) and Martínez-García and Paul-Larrañaga (2021).

In the study of the Spanish LGCA 7/2010 about the protection of minors, it should be noted that the Law devotes an article to the rights of minors, which is complemented by others. The LGCA includes the rights of children, ranging from the protection of their image, honour, privacy, and identity, to the prohibition of broadcasting content that may harm their integrity and development in certain time slots and public holidays at national level. There must also be an age coding of content so that adults can exercise parental control. Regarding commercial communication, it is stipulated that it must not incite direct or indirect purchases, nor show situations of danger or inequality between people, nor about the characteristics and safety of toys. Furthermore, audiovisual service providers are encouraged to include in their codes of conduct the need to reduce the consumption of unhealthy food and drink for minors. The LGCA also regulates advertising interruptions in children's programmes and the prohibition of product placement in such programmes.

For its part, Directive (EU) 2018/1808 considers the new communication services derived from the Internet, which have been very popular among children. Hence, as can be seen in Table 1, a large part of the considerations and articles of this Directive are related to the protection of minors from content of different types and formats that may harm their integrity and mental, moral, or physical development. For this reason, measures are maintained for the codification of traditional media content, but these must also be applied to the new digital communication channels so that they are visible and recognisable by adults and minors. Emphasis is also placed on data protection, self-regulation, co-regulation, and parental control to protect children. The aim is to reduce content related to alcoholic beverages, food high in trans fats and sugars aimed at minors; to eliminate visual and audio exposure

to gambling, tobacco, and related products, as well as to prohibit surreptitious or subliminal advertising, product placement in children's programmes or the reproduction of content with harmful behaviours or conducts; plus, advertising of medical products subject to prescription or that encourage criminal offences. In addition, commercial content aimed at minors must not directly incite them to make a purchase or persuade people they trust to do so, nor must it show children in dangerous situations. This puts service providers in the spotlight as the publishers of the content and as guarantors of the protection of minors' rights, even if they are not the authors of the uploaded material. In this way, service providers must guarantee the identification of commercial content by authors and users, age verification, parental control, the prohibition of the content described above, enable complaint, notification and monitoring procedures in the event of irregularities, as well as include and enforce clauses in the provision of their services related to the protection of minors. In addition, service providers may not use the data of minors for any direct or indirect commercial purposes.

The preliminary draft of the Spanish LGCA, in its transposition of Directive 2018/1808, aims to update the reality of the audiovisual market as set out in the current regulation LGCA 7/2010, as well as the different audiovisual products and the different types of commercial communications that compete for the same audience, to provide legal certainty. Furthermore, it shows that this type of communication not only entertains, but also transmits a series of values and meanings that influence the education and construction of people's identities and opinions. Voluntary regulation is encouraged to go beyond compliance to reduce, among other aspects, the exposure of minors to commercial content and promote media literacy. Regarding the protection of minors from harmful advertising messages, the text includes specific protections and obligations on the part of service providers, including social networks and video platforms. For example, commercial communications must be unambiguously identified, authors must specify whether there are commercial messages in their content, and they must not promote conduct prejudicial to their physical or moral development, including stereotypes of any kind. Commercial communications that may be harmful to children must be age-verified so that they are only accessible to adults. Finally, it should be noted that the future law highlights audiovisual innovation and research for the promotion of the audio-visual sector.

The proposed Digital Services Regulation aims to update and unify the rules for service providers and online platforms, which also include social networks, to guarantee the rights of the Charter of Fundamental Rights of the European Union (EUR-Lex, 2000), freedom of expression, freedom of information, freedom to conduct a business and non-discrimination. Another aim of the DSA is to promote a safer and more transparent market throughout the European Union. The DSA focuses on prohibiting the marketing of illegal products and services, as well as content that is harmful to citizens, with a particular focus on minors. Other key areas of the DSA are related to the promotion of codes of conduct and collaboration with trusted informants to improve market self-regulation. Hence, to limit the dissemination of illegal content, it is suggested, for example, to strengthen recommendation and moderation algorithms to limit and deter the dissemination of illegal content, not to collect advertising for such content or to enhance the visibility of official sources. In addition, to combat illegal content, the DSA requires service providers to set up warning and notification systems to enable users and trusted informants to request its removal, or service providers and authors of such content to defend themselves. In this respect, online platforms are obliged to cooperate with the authorities in the event of possible requests for content removal or the identification of users. Regarding digital advertising, there is also an obligation to identify in real time the authorship, the content, as well as the criteria for audience segmentation and profiling, and to publish this information in a repository so that it is accessible for one year. The main parameters on which online platforms' content recommendation and moderation and advertising systems are based must be made public to promote transparency and to allow users to challenge their decisions. In addition, digital platforms are required to have a risk report and a crisis protocol for systemic risks such as illegal content, fake news or harmful commercial messages that may affect children, as well as accountability through annual audits. Authorities will be able to launch surveillance actions to ensure compliance with the future Regulation.

The future Artificial Intelligence Law does not expressly regulate commercial content aimed at minors, beyond the protection provided in the fundamental rights enshrined in the Charter of Fundamental Rights of the European Union and in digital rights established by the United Nations Committee on the Rights of the Child (2021). The future regulation places particular emphasis on codes of conduct to encourage self-regulation by all parties involved in the development and implementation of AI-based technological solutions.

On the other hand, as reviewed in the literature, the main applications of AI related to content recognition on the Internet are those linked to identification, coding, prediction and recommendation. Table 2 relates the areas of regulation of the five legal texts studied with the specific applications of AI to recognise digital content.

Table 2: Relationship between areas of regulation of commercial content in minors and content recognition through AI.

Areas of regulation	Intelligence Applications
Authorship	• Text, voice, image and video recognition
	• Audience micro-segmentation
	• Detection of relationship between profiles
Type of content	• Analysis of text, voice and image according to previously set parameters
	• Automatic content categorisation
	• Content and crisis prediction
	• Trend analysis
Protection against harmful and unlawful commercial communication	• Text, voice and image recognition
	• Automatic content rating
	• Automatic generation of alerts
	• Recognition of the use of personal data
Mechanisms to promote responsible and consistent protection	• Text, voice and image analysis
	• Recommendations for improving optimisation and content allocation
	• CE marking identification
	• Quality management and regulatory compliance control recommendation systems
	• Recognition and analysis of codes of conduct

Source: own elaboration based on BOE (2015), EUR-Lex (2018, 2020, 2021b), Perakakis, Mastorakis and Kopanakis (2019); Capatina et al. (2020); Huang and Rust (2020); Shah et al. (2020); Aguirre (2021); Hayes et al. (2021); MINECO (2021a); Pedrero-Esteban and Pérez-Escoda (2021); and Túñez (2021).

Although AI models need to be trained and this requires time and resources, this technique offers technological applications to ensure compliance with the areas of regulation contemplated in the current LGCA, in the LGCA draft, in Directive 2018/1808 and in the future DSA and Artificial Intelligence Act, to protect minors from commercial content harmful to their moral and physical development.

4. Discussion

Regarding the objective of analysing the main novelties in the regulation of commercial communication in the most recent legal texts at national and European level, we can observe the following:

- The legal texts studied include the protection of minors from harmful commercial content, although the European directive and the draft bill contemplate a much broader comprehensive protection of minors.

- Directive 2018/1808, the Spanish LGCA draft and the DSA reflect the new digital media and communication channels with a special focus on the protection of children from harmful and commercial content.

- One of the main novelties contemplated in the European texts and the preliminary draft of the LGCA is authorship and editorial responsibility. Service providers (social networks and video platforms) have editorial responsibility for the content they provide on the Internet, even if they are not the authors or creators of the material, as well as the obligation to facilitate the identification of commercial messages, verify age and prohibit content that violates children's rights. To this end, they must provide

all technical means to be able to identify the authorship, the age of the person consuming the content and advertising, if any.

- The encryption of traditional media content must be applied to digital media in an obvious way to be able to exercise effective parental control.

- Regarding advertising, the most recent legal texts show an interest in eliminating the exposure of minors to harmful commercial content, through unambiguous real-time identification of advertising, age verification, reinforcing algorithms, and making public the main parameters of recommendation systems, or through advertising registers.

- The prohibitions on hidden advertising or product placement in children's content are maintained, as well as their exposure to products such as gambling, tobacco, or high-proof alcoholic beverages. Advertising permitted on the Internet must be clearly identified and must not incite direct or indirect purchases, nor may it show dangerous situations or lie about the characteristics and safety of toys. Under no circumstances may commercial content on the Internet harm the moral or physical development of minors or encourage harmful behaviour, including that related to physical appearance. Hence, authors of content must identify whether, in their opinion, there is commercial content in their materials.

- Service providers should implement warning and notification systems to enable users and trusted informants to report irregular content which, in the case of minors, could also serve to communicate harmful commercial content.

- Internet actors are urged to have codes of conduct, audits, crisis procedures and digital literacy programmes to create a safer environment for all people, especially for children.

In relation to the stated objective of analysing how technology can help to implement control and monitoring measures to protect minors from new commercial content on the Internet that may be harmful to their moral and physical development, that the following can be stated:

- AI offers content recognition automation tools to detect in real time and predict potential harmful commercial content for minors provided in the legal texts analysed, as well as to continuously learn.

- AI can predict user behaviour on the Internet by training its models. This implies that such training must be constant to detect new content that could be harmful, otherwise the recommendations it can make could be wrong or obsolete.

- Leading Internet service providers already apply AI tools to improve their service to users and advertisers, hence it can be deduced that they can use such tools to protect minors from harmful advertising content.

- One person's supervision in establishing AI patterns and recommendations is vital to ensure proper implementation free of bias.

- Digital literacy should include basic notions of AI so that people can correctly judge whether they agree with the parameters used by recommendation algorithms to display content and advertising.

- Beyond the fact that the main parameters of service providers' algorithms are public, national, and European authorities should be able to implement their own control mechanisms with AI to ensure compliance with the law and the rights of minors, this implies that the administration should allocate resources and personnel to implement this type of tool, provided that the fundamental rights of individuals are respected.

Finally, we can validate the hypothesis that since legal responses always lag technology and people's innovation, it is essential to encourage voluntary regulatory measures by brands and service providers to protect minors from harmful commercial content. The creation of internal codes of conduct, audits and crisis procedures is therefore encouraged so that service providers constantly update their policies to protect minors from systemic risks on the internet, such as commercial content that may harm their development. This encourages voluntary regulation and co-regulation to respond to new challenges, forms of communication or content that may undermine the moral or physical integrity of children.

To go beyond voluntary regulation, digital literacy campaigns to foster a critical spirit in European society should be included as part of companies' Corporate Social Responsibility (CSR) policies. Such literacy must be reinforced by international bodies, for example by setting up working groups with service providers and video-sharing platforms at international level, especially regarding minors. Service

providers should also create awareness campaigns aimed at children, parents/guardians, society in general, advertising agencies, companies that invest in advertising, among other audiences, on the protection of minors in the creation of commercial content, how to detect harmful messages and how to react to them.

5. Conclusions

Given the speed at which millions of pieces of content and changes occur nowadays on the Internet, AI is a critical tool for service providers, regulators, and researchers to automate the detection of commercial content that is harmful to minors (Olstad and Lee, 2020). In this sense, whatever is illegal in physical life should also be illegal in the digital sphere (European Parliament, 2020), so AI tools can be used by regulators to ensure compliance with the Spanish LGCA draft, the future DSA and the Artificial Intelligence Law, without implying strict control of the Internet or the removal of content, especially when the content is for educational, artistic, journalistic or research purposes (European Commission, 2020b). Human oversight is necessary in the management and application of AI, so the ultimate decision should not be left to such techniques or recommendation systems should not be taken for granted without prior validation systems (Pedrero-Esteban and Pérez-Escoda, 2021). In parallel, codes of conduct with self- and co-regulatory measures are essential for the whole industry to protect minors from harmful content, including commercial content (Lievens, Dumortier and Ryan, 2006; Lievens, 2010).

While it is true that the identification of digital commercial content with authors is becoming increasingly widespread, there is still work to be done to raise awareness. All actors in the creation of content must contribute to the correct identification of advertising messages, with special attention to influencers as they have more prescription on children than classic advertising. Content creators must be especially sensitive and responsible towards minors, and must clearly identify that, for example, what they are commenting on is advertising, so that kids are free to make their own decisions.

The work in favour of the digital education of minors, parents and teachers should be part of the CSR policies of advertisers, service providers and video-sharing platforms. By strengthening awareness-raising and education campaigns at all levels, we will be working to encourage reflection, criticism, and freedom of choice in the long term, rather than prohibition.

To overcome the limitations of this work focused on a theoretical analysis, it would be advisable to analyse whether voluntary regulatory measures have been put in place and how the control of advertising content harmful to minors has been implemented once the draft LGCA, the DSA and the Artificial Intelligence Law come into force, in order to compare whether some of the proposed AI tools have been implemented, as well as suggested awareness-raising and digital literacy campaigns.

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7. References

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