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AI a peek into the future on digital platforms

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Sommario

1 Introduction:	3
2: Definitions of Digital Platforms and Artificial Intelligence	4
2.1 Digital platforms: definitions, characteristics and Functionalities	4
2.2 Types of Digital Platforms:.....	5
2.3 Definition of Artificial Intelligence:	11
3. Impact of Artificial Intelligence on Digital Platforms	13
3.1 Impact of Artificial Intelligence on services and products offered by Digital Platforms and on User Experience:	13
3.2 Impact of Artificial Intelligence on Digital Platforms - Impact on internal and external processes of digital platforms:	18
3.3 Impact on marketing and sales strategies.....	20
4: Case Study: Twitch	22
4.1 Description of Twitch	22
4.2 How Artificial Intelligence Wants to Transform Live Streaming	23
4.3 Application of Artificial Intelligence on Twitch.....	24
4.4 The Neuro-Sama case.....	26
5: Conclusions	28
BIBLIOGRAPHY	31

1 Introduction:

The scope of this chapter is to provide a global understanding of digital platforms, analysing the different features of the main ones, and investigating their functionalities. Digital platforms have produced a profound change into our lives, and have become fully integrated into our daily lives, as they have transformed the way we interact, conduct business, and use information. Defining the key elements of these platforms and their main features is crucial to allow the subsequent discussion that constitutes the focus of this thesis: the impact of Artificial Intelligence (AI) on digital platforms.

2: Definitions of Digital Platforms and Artificial Intelligence

2.1 Digital platforms: definitions, characteristics and Functionalities

Digital platforms are dynamic ecosystems, "hardware or software infrastructure that provide services and technological tools, programs and applications for the distribution, management and creation of free or paid digital content and services, even through the integration of multiple media (integrated digital platform)"¹. They are capable of connecting different systems together and displaying them to multiple users through simplified and integrated interfaces, usually a mobile app or website. Their main feature is to facilitate interactions, transactions and information exchanges among multiple users and businesses. They play a central role in our modern society as they have modified the way we access services, conduct business, and socially interact.

By acting as intermediaries, they increasingly mediate our relationship with space, not only replacing the intermediaries who have traditionally played this role in the physical world, but also amplifying their impact through their distinct capability of allowing an easy access from anywhere, resetting the physical distances.

A fundamental characteristic of digital platforms is their multi-sided nature, targeting to diverse user groups with distinct interests and roles. Consumers seek products and services, content creators contribute user generated content, advertisers target specific audiences, influencers try to create waves of market interests and businesses aim to expand their market reach: all these stakeholders become interconnected in the dynamic and networked ecosystem of digital platforms.

The active participation of users is a fundamental and key aspect that sets digital platforms apart. Users are not mere consumers but active contributors in content generation and, through their interactions with other participants contribute to co-creation. This user-generated content serves as a valuable resource, driving the

¹ Treccani https://www.treccani.it/enciclopedia/piattaforma-digitale_%28Lessico-del-XXI-Secolo%29/

success of these platforms. In addition, user behaviours and interactions are analysed by data-driven algorithms, often powered by AI technologies, thus providing personalized experiences and tailored recommendations. As a consequence, users feel more engaged and connected to the platform.

The capability to manage a continuously growing number of users and a large volume of transactions at the same time is a crucial factor that enables digital platforms to expand and thrive. Indeed is that capacity, usually known as “scalability”, that requires the platform's efficiency and responsiveness, whether it's millions of users sharing content on social media or thousands of transactions processed on e-commerce platforms.

Another key feature of digital platforms capable to foster innovation is openness, i.e. the capability of extending the platform’s functionalities. It is allowed by the provision of Application Programming Interfaces (APIs), that give developers the possibility to leverage the platform's infrastructure and data to create new and diverse services.

In conclusion we can say that digital platforms are dynamic ecosystems that continue to shape our daily lives. Their multi-sided nature, active user participation, scalability, and openness contribute to their success and significance. Understanding these characteristics and functionalities lays the foundation for exploring the profound impact of Artificial Intelligence on them.

2.2 Types of Digital Platforms:

Having established the fundamental features and functionalities of digital platforms, it is essential to explore their various types, trying to understand how AI impacts on them and also providing some practical examples.

Today there are different types of platforms depending on the characteristic of the complex ecosystem they are involved in. Here we will describe the most common ones:

- **E-commerce Platforms:**

The growth of faith on digital payments and thus on electronic commerce has fostered the emergence and increasing popularity of third-party electronic marketplaces. An electronic marketplace (EM) is an online platform that connects buyers and sellers and provides opportunities for conducting business in the same way as a traditional market except that the transactions are executed via electronic channels, usually through an internet-based platform. The unique feature of an EM is that it brings multiple buyers and sellers together in one central (non-physical) market space, where sellers can offer their products, and consumers can browse, compare, and purchase from the comfort of their houses. While there are pure EMs (such as booking.com) other such marketplaces are associated with firms that also operate a more traditional online retail business, like Amazon. In addition, eBay recently introduced a shopping assistant within Facebook Messenger, which places two online platforms between third-party sellers and buyers on eBay and potentially increases the lock-in effects for professional sellers, helping them obtaining data on their potential customers. The main advantage of EMs is that they operate in broader industry configurations. This allows the consumer to have the option to choose whether to purchase a particular product directly from a traditional physical retailer (specialist merchants), or through online sellers (mixed retailers).

An important question that allows us to put ourselves in the shoes of the sellers in this specific situation is: how efficient it is for sellers and buyers to engage in multi-homing, and how efficient it is for them to use competing online trading platforms in parallel? For many sellers it is not as attractive to engage in multi-homing as it would first seem, for several reasons. First of all, multi-homing is difficult for small sellers because they often sell unique items and benefit heavily from a large group of customers to find buyers for their products. Additionally, it is difficult to build up reputation on several platforms, as reputation depends on the number of transactions a seller has already honestly completed on a given network. Transferring reputation from one platform to another is rather difficult or often even impossible. Hence, a seller's investment in its reputation is typically platform specific. Furthermore, sellers which use smaller

platforms run the risk of selling their products at below market value, as the price mechanism works best with a sufficiently large number of market participants on both sides of the market. Finally, certain online platforms try to lock-in business users by technological means, for example by imposing the exclusive use of a proprietary booking tool. Hence, multi-homing is reasonably difficult for sellers. This limits their bargaining power, and it seems that most of the time they face "take-it-or-leave-it" decisions about accepting the terms and conditions imposed by the platforms.

The biggest change that E-commerce platforms brought, is linked to the wide offer possibilities, related to products that can range from electronics and clothing to books and groceries. To enhance such characteristics, AI-powered recommendation systems analyse users' past behaviors, preferences, and purchase history, providing personalized product suggestions and improving customer retention.

- **Social Media Platforms:**

Social media platforms, such as classic social networks (Facebook, LinkedIn), video sharing sites (YouTube), on-line dating communities (eHarmony, Match.com) represent a diverse and rapidly growing industry. In this industry, typically, multiple sites compete in a relatively well-defined niche (professional platform, video sharing, on-line dating).

While these categories are quite different, social media sites share several important features.

For instance, most of these sites *rely extensively on user-generated content* where consumers largely define the firms' product offerings. Typically, users have very heterogeneous content preferences and prefer sharing content with similar users, leading to large direct network externalities. In addition, it is easy for consumers to join multiple communities (multi-homing), and typically, sites compete with each other for consumer attention which represents time.

Social networks *share many characteristics with other online platforms*. To maintain or increase their penetration, social networks use several diversification strategies. They

enable and foster interactions with alternative online services, becoming the perfect example of “networks of platforms”. For instance, Facebook recently introduced e-commerce bots in its messenger function and also a classified marketplace, in order to enter the marketplace ecosystem. Similarly, due to data generated by its huge number of users, Facebook has been able to gain a strong position in the online advertising industry. In principle, multi-homing is possible, as it is relatively easy to set up a profile in many social sites. In this context, it is also interesting to note that well-established social networks can lose many active members over a very short time period, mostly due to the entry of a new platform, which is more appealing for a sub-set of users of already-established networks. As we have seen, Facebook, which has been one of the undisputed leaders in the industry of social networks for years, has gradually ceded more and more ground to another major giant, Instagram. New networks can easily emerge as far as multi-homing is rather easy and switching costs are not too substantial, even though, to avoid this drawback, many social networks have made efforts to increase switching costs by offering third-party log-in services.

Although the social media industry is still young, the following facts seem to emerge. First, because of user-generated content, the content positioning of competing platforms is strongly influenced by their users. This helps us to underline the key role that this plays in determining firms’ market positions. In other words, a social media appeal strongly depends on which type of users it attracts in the first place. As mentioned earlier, we can see how while network externalities are clearly significant in all social media markets, different social media categories show widely varying levels of concentrations. In some markets, we observe the emergence of a single, leading site (YouTube in the video-sharing industry, and Facebook in the social-networking industry) and a ‘winner-takes-all’ market structure develops, which is a typical market outcome in traditional network industries. On the contrary, in other markets, competing firms are able to coexist with differentiated positions despite strong network externalities. Let's consider the case of Google+ and Facebook, both were social networking platforms, but despite Google's efforts, Google+ couldn't compete with Facebook's dominance in the sector. Eventually, Google+ shut down due to low

user adoption and the inability to coexist with Facebook's well-established success. On the other hand, Netflix and Amazon Prime Video are two video streaming platforms that offer similar content, yet they both have been successful in the market. They have a large user base and manage to coexist by diversifying their content and subscription offerings. Many users choose to subscribe to both platforms to access a wider range of content. In this case, competition didn't lead to the elimination of one platform by the other, but rather resulted in both platforms thriving.

An important aspect of many social media companies is that they can also be used by small business owners and independent professionals to market their products. Unfortunately, many small business owners continue to be disadvantaged because of their lack of knowledge and experience in how to use social media to grow business profits. In order to overcome this, social media platforms have developed specialised tools to help potential users to learn how to better use their outlets. For instance, Youtube introduced the Youtube Academy, basically a catalogue of tutorials to help potential users to shoot and edit videos. This transition from user-generated content to professional-generated content is developing fast and could eventually re-shape social media platforms completely in the future.

In addition to the above-mentioned categories, which can be considered the most significant ones with reference to the topic discussed, we can find other types of platforms that completely or partially incorporate the characteristics mentioned for the previous groups. Among these, we can mention on-demand service platforms, crowdfunding platforms and collaboration platforms.

- **On-Demand Service Platforms:**

They are able to provide convenient and flexible services at the tap of a button. Examples of this category range from Uber that revolutionized the transportation

industry by connecting riders with drivers, to Airbnb that disrupted the hospitality sector by offering travellers unique accommodations from local hosts.

The success of on-demand service platforms depends on real-time interactions and seamless experiences. AI algorithms optimize route planning for ride-hailing services, ensuring efficient and timely pickups, while in the case of Airbnb, AI analyses user preferences to suggest suitable accommodations based on location, budget, and amenities.

- **Crowdfunding Platforms:**

Crowdfunding is a digital platform that aims to seek supporters for the financing of projects based on the contribution of small and medium-sized donors and lenders. Crowdfunding platforms have facilitated fundraising, allowing individuals and businesses to seek financial support from a diverse group of people. Kickstarter and Indiegogo are the main examples, enabling project creators to present their ideas and raise funds from backers in change for rewards or early access to products.

AI contributes to crowdfunding platforms by analysing project success patterns, identifying potential high-impact campaigns, and predicting their outcomes. This data-driven approach helps both project creators and backers in making informed decisions, fostering a supportive crowdfunding community.

- **Collaboration Platforms:**

Collaboration platforms focus on enhancing teamwork and communication in professional settings. They have become fundamental during these years, when working online inside a safe space has become the norm. Google Workspace (formerly G Suite) offers a suite of cloud-based productivity tools, including Gmail, Docs, Sheets, and Drive, which streamline collaboration and document sharing among teams.

AI features in collaboration platforms are geared towards improving productivity and efficiency. AI-powered tools help in document organization, suggest contextual insights during content creation, and enable seamless integration with other applications, creating a unified and collaborative work environment.

2.3 Definition of Artificial Intelligence:

Artificial Intelligence (AI) is a transformative field of computer science that aims to develop machines capable of performing tasks that typically require human intelligence. The core objective of AI is to create intelligent agents that can learn from data, reason, and make decisions, imitating human cognitive abilities. AI systems leverage advanced algorithms, data analytics, and machine learning techniques to process vast amounts of data, recognize patterns, and adapt their behaviour based on the insights gained.

One of the primary components of AI is machine learning, which enables machines to improve exponentially their performance over time through experience. There are two primary types of machine learning: supervised and unsupervised learning.

In supervised learning, AI models are trained on labelled datasets, where the desired output is provided for each input, enabling the system to learn and make predictions accurately. On the other hand, unsupervised learning involves training AI models on unlabelled data, allowing the system to identify patterns and structures in the data independently. Going deeper inside the AI characteristics and possibilities, the description of NLP, Natural Language Processing, seems essential. This feature enables machines to understand, interpret, and generate human language; and this is critical for developing applications like language translation, sentiment analysis, and voice assistants such as Siri and Alexa. Another important skill is related to what is called computer vision, which empowers machines to interpret and understand visual information from images and videos. Computer vision finds applications in areas like facial recognition, object detection, and autonomous vehicles. In recent years, great

strides have been made in terms of discoveries and improvements in artificial intelligence. Among the most important ones, we find the “deep learning” ability. That is a subset of machine learning that utilizes artificial neural networks, inspired by the structure and function of the human brain, they can process a vast amount of data and automatically extract relevant features, making them particularly adept at tasks such as image recognition, speech recognition, and natural language understanding.

Alongside this initial brief technical description of artificial intelligence, we find the significance of the role it plays today on an economic level. AI has found widespread applications across various industries and domains, as well as in healthcare, finance; in addition, AI has revolutionized the automotive sector with the development of self-driving cars, making transportation safer and more efficient.

Despite its remarkable achievements, that also raises ethical and societal considerations which will be analysed and described more appropriately throughout the continuation of this text.

In conclusion, Artificial Intelligence is a rapidly evolving field that aims to create intelligent machines capable of learning, reasoning, and performing tasks that traditionally required human intelligence. With advancements in machine learning, natural language processing, computer vision, and deep learning, AI has found applications in diverse industries, revolutionizing the way we live and work. However, ethical considerations and responsible AI development remain paramount as we embrace the transformative power of AI in our society.

3. Impact of Artificial Intelligence on Digital Platforms

3.1 Impact of Artificial Intelligence on services and products offered by Digital Platforms and on User Experience:

There are many roles in which AI is involved in services/products and on user experience but, one the most recurring characteristic of AI is its ability to provide a polished experience and service tailored to reflect specific traits (personalization). This is achieved through specific algorithms that allow the system to study the behaviour, preferences, and past interactions of the user in question. In practice, this enables artificial intelligence to have all the capabilities to curate personalized newsfeeds, displaying content that aligns with users' interests and engagement patterns, thereby enhancing user satisfaction and retention. This frequently experienced, social media platforms allowing content creators and advertisers to maximize their reach and impact.

Personalization is also an emerging need of the consumer too, as the users find themselves inundated with a vast amount of information and content that led themselves to a refinement of their needs and preferences, that make them seek a product that stands out particularly within the mass.

In this sense artificial intelligence has emerged as a transformative force in content personalization, allowing digital platforms to understand users' preferences, behaviors, and contexts to tailor content precisely to each individual's needs. This greatly increases customer engagement with the brand, reduces bounce rates (as users are more likely to quickly find what they are looking for), increases conversions (leading users to be more likely to act on relevant offers), and reduces service costs. An Accenture study reveals that 91% of consumers are more likely to engage with brands that provide personalized recommendations. All of this is possible thanks to a series of sophisticated algorithms that can analyse large amounts of user data in real time. Furthermore, the machine learning characteristic of this tool allows these algorithms to continuously learn from user interactions and adapt their recommendations

accordingly. As we can see in e-commerce platforms, personalization has transformed the way users discover products. By understanding past purchasing behaviour, artificial intelligence can suggest relevant products, offer specific deals, and even predict future purchases, also in terms of emotional preferences.

If we consider, as an example, Netflix, we can see that the platform provides personalized recommendation through:

- ✓ the use of viewing history of users with similar interests;
- ✓ the store and analysis of the Big Data (user ratings, social media information and search terms) of the millions of people who watch Netflix;
- ✓ the collection of video metadata, necessary to make the material searchable. Metadata is information about what and how characters are presented, as well as their emotional state and nature. The correct collection of metadata allows AI to predict which images best engage which viewers and to direct choices towards those specific emotions that the user loves.

While AI-based content personalization offers numerous advantages, it also raises ethical considerations. Privacy issues arise when collecting and analysing user data to create personalized experiences. Striking a balance between personalization and user privacy is essential, and platforms must be transparent about data usage and obtain user consent.

Also of fundamental importance is the capability of content moderation, as well as content recommendation. In fact, with the exponential growth of users across various platforms, it becomes critical to apply a filter to the multitude of information that each user receives. An obvious example can be seen with very young users, whose parents would prefer to shield them from certain types of content on certain platforms (like social networks). We can therefore affirm that this function serves a dual purpose: to safeguard both the platform and the users within it. On the other hand, this feature is flanked by recommendation systems, which optimizes user engagement by presenting relevant and trending contents, keeping them immersed in the platform's ecosystem.

Furthermore, there are additional capabilities supportive of the previous ones that include image/speech recognition and chatbots. AI's ability to process and interpret visual and auditory information has led to significant advancements in image and speech recognition on digital platforms. Image recognition enables automatic tagging and categorization of images, improving content organization and searchability. Speech recognition has enabled voice assistants and voice-based interactions, transforming how users engage with digital platforms. Lastly, we have chatbots, which have revolutionized the concept of customer support primarily through real-time responses but also thanks to the 24/7 availability and to lower associated costs required for implementation. Certainly, the integration of NLP (Natural Language Processing) greatly assists the machine in interpreting user requests and behaving as closely as possible to that of a human being.

Chatbots and similar technologies can provide proactive customer awareness, reducing volumes and costs assisted by humans while simultaneously simplifying the customer experience. This doesn't solely involve making the platforms completely AI-driven, but rather creating a bridge in the contact chain between the customer and the operators. Therefore, an AI-supported system can anticipate their likely needs and generate requests for the agent. For instance, the system could flag that the customer's credit card bill is higher than usual, highlighting the minimum balance requirements and suggesting instalment payment options to offer. If the customer calls, the agent can not only address an immediate question but also provide support that deepens the relationship and potentially avoids further calls from the customer later on.

The elements for safeguarding users does not end here, artificial intelligence is also used as an efficient fraud detector in relation to fake accounts, identity theft, or even financial scams. Taken together, these security measures allow for the development and maintenance over time the platform's credibility and trust among users, ensuring a safe and secure environment.

Multiple times, the important security role that AI plays within this context has been discussed; indeed, protecting consumers is a priority and a central focus of economic policymakers and authorities. Today, it is believed that the information the vast majority of the population possesses regarding the safe use of digital platforms is not sufficient to provide an adequate level of protection. This inevitably exposes these individuals to all the associated risks. Several trends, however, indicate that the level of vulnerability of consumers is increasing more and more, and they are no longer just a small category but rather a much larger group. We had the opportunity to witness this phenomenon during the recent pandemic when there was a rapid spread of e-commerce, which, while giving consumers some new powers on one hand, exposed them to much more dangerous risks on the other. Various scams or unfair practices regarding refund cancellations and unjustified online price increases are reported, as well as opaque corporate practices or business models that use digital elements to influence consumer decisions (such as pushing for a purchase with a fake countdown timer).

Over time, the use of this powerful tool has continued to increase, stimulating research, innovation, and the development of innovative techniques to enhance its efficiency even further. In practical terms, AI is used to identify and protect critical cyber assets for the success of a mission, adapting to changes in its objectives. It also assists in the development, deployment, and secure operation of software systems, detecting low-level attack vectors and providing best practices for the system's secure operation. In this context, it is necessary to mention a particularly promising sector where the intervention of artificial intelligence is gaining ground: identity management and access control. Adversaries can compromise many techniques simply by stealing authorization tokens, so it is considered necessary to use a method based on a history of interactions and expected behaviors that is as simple, robust, and difficult to evade as possible. However, monitoring AI behavioural patterns could lead to privacy violations, and there is still ongoing discussion about the most suitable methods to use in order to respect both technical and ethical aspects, while avoiding potential abuses of identity management.

Despite the great progress that AI has made as a consumer protection tool, as previously described, these systems can be manipulated or even evaded, leading to profound security implications. This is why it is important to develop secure techniques and specific measures to prevent this from happening.

Typically, AI systems consist of four components: perception, learning, decisions, and actions, and each of them presents unique vulnerabilities. The goal is, therefore, to develop new techniques that allow for the verification of logical correctness, decision theory, and risk analysis performed by the systems to reduce the previously described issues. The areas that need to be addressed to make the decisions taken more reliable include defining performance metrics, improving domain-specific training and reasoning, and managing training data. However, since their implementations and configurations are difficult to assess, ongoing research is still aimed at achieving this goal.

Among the various studies being conducted, there is the concept of the "building code". This, present in the architecture of AI itself, could be derived from theory and experience, capturing best practices, and leveraging guidelines from other computer science areas. Analysing the building code would lead to a better understanding of AI mechanisms, helping advance the field.

Other vulnerabilities arise in the system's learning process. For now, this process still requires human intervention, which often may not be exactly representative of the given environment. This concept can be better explained with a practical example by analysing the case of an autonomous vehicle that, after being trained with specific images and situations, maintains them as fixed reference points in its operation while the operating environment changes.

3.2 Impact of Artificial Intelligence on Digital Platforms- Impact on internal and external processes of digital platforms:

As already represented above, digitization allows businesses to operate with a very high level of detail, to make millions of decisions every day on a single customer, product, supplier, resource or transaction. These same micro-decisions made by these innovative systems are defined as granular and as such impossible to manually operate by a human being with spreadsheets.

The nature of micro-decisions requires a certain level of automation, especially for all those decisions of a certain volume that are made in real time. In this text we have repeatedly described how thanks to the capabilities provided by AI it is possible to cope with this necessary automation, but the crucial question is: how do managers (humans) manage these types of algorithm-based systems?

Unlike autonomous systems, in fact, this need, albeit differently depending on the cases analysed, human involvement, mainly aimed at designing the decision-making system of the "machine". Therefore, depending on the nature of the intervention to be analysed, different management models are distinguished:

- HITL- Human In The Loop,
- HITLFE- Human In The Loop For Exceptions,
- HOTL- Human On The Loop,
- HOOTL- Human Out Of The Loop

HITL- Human In The Loop: in this model, it is the human who makes decisions and the machine that provides support or partial automation for some decisions. It is a method of machine learning that combines the best parts of human intellect with the best features of artificial intelligence to develop an effective and modifiable algorithm for predictions. Contextualizing its application potential in relation to digital platforms, HITL is found: in data labelling operations, which ultimately aim to assist systems in interpreting the surrounding world with appropriate tags to the data analysed, or even

during the design of interactive AI systems, such as in Google's Deep Art, where it is used to create hybrid images by infusing the style of one image onto another. In addition, HITL introduces a unique feedback mechanism that distinguishes it from traditional supervised learning. When the confidence in a machine learning model's prediction is below a certain threshold, data scientists provide feedback to the model to improve its performance. This continuous adjustment helps the machine learning model refine its understanding and improve over time.

The second model, Human In The Loop For Exceptions (HITLFE), has very similar characteristics to the previous one. Here, in fact, the decisions that are managed by the human being are exceptions, as most of these are automated. For exceptions, the system requires a certain judgment or input from the human being before it can make the decision, even though it is unlikely to ask the human to make the entire decision. It is often used for automatic content moderation on social media or for reporting inappropriate posts, where a more careful check by a human being is needed.

We then have the Human On The Loop (HOTL) where instead the results of the micro-decisions made by the "machine" are checked by the man who, based on them, can adjust rules and parameters for future decisions; In a more advanced configuration, the machine also recommends parameters or changes to the rules that are then approved by a human being.

As the last model to analyse, we have the Human Out Of The Loop (HOOTL) where the "machine" makes every decision and the human intervenes only by setting new constraints and objectives, both improvement and adjustments are automated.

3.3 Impact on marketing and sales strategies

Artificial Intelligence (AI) is having a significant impact on the marketing and sales strategies of digital platforms.

As previously extensively exposed, AI is revolutionizing the way companies interact with their audience, making marketing practices more precise and effective (i.e., targeted marketing). Marketers can segment the audience more precisely and produce targeted campaigns that resonate, promoting stronger connections between brands and consumers.

The prototype example of the benefit of using artificial intelligence in marketing is that it improves ROI by making marketing more efficient. Previously, companies paid huge amounts of money for television, radio, or newspaper advertisements, fully aware that only a small number of people who saw their ads would ever become customers (i.e., low level of sales conversion). The ability of platforms to carry out targeted marketing has been enhanced with machine learning technology that allows them to become increasingly effective as they are fed more data on customers and their purchasing habits.

Digital platforms are leveraging AI to improve efficiency also in terms of content production (i.e., content marketing).

In fact, the rise of social media marketing has made content-based marketing among the dominant forms of marketing in many sectors. Artificial intelligence lends a hand in understanding what kind of content interests our customers and what are the most efficient ways to distribute our content to them. For example, AI tools like ChatGPT can help create and execute content, such as emails and slogans, much faster than traditional methods. In addition to the above, AI-powered design tools can generate creative banners and designs, providing inspiration for marketing and sales campaigns.

An example can be considered the title generation algorithms that monitor their success and modify their output to achieve better metrics, such as the email opening rate or the social media post sharing rate.

The incredible ability of AI to manage massive data allows for the automation and optimization of marketing: all the activities of continuous and real-time analysis of marketing campaigns, testing variables and providing marketers with data-based information that allows more accurate assessments, which minimize dangers and allow to seize opportunities that could have gone unnoticed without the help of AI.

As for sales strategies, artificial intelligence is able to provide support through:

- Price optimization, identifying what level of discount is necessary to ensure the highest probability of sale;
- Identifying opportunities for Upselling and Cross-Selling: AI is indeed able to identify which existing customers are more likely to buy a better version of what they currently own (upsell) or which are more likely to want a new product offer (cross-sell)
- AI is also able to provide customer assistance through product demonstrations. The use of AI-generated sellers can help companies save time and resources while providing a high level of customer service, even though there are still some consumers who prefer the personal touch of a real human being, which is why it is important for companies to find a balance between AI and human interaction
- Refining forecasts: AI can revolutionize the way sales forecasts are processed by leveraging engagement data from both buyers and sellers. AI algorithms can predict a high degree of accuracy in revenues

4: Case Study: Twitch

4.1 Description of Twitch

Twitch is a live streaming platform launched in 2011, now owned by Amazon. It was initially launched as a spin-off of the similar platform Justin.tv as a platform primarily dedicated to video games, a theme that is still at the heart of the social network today, although it is accompanied by: sports competitions, event broadcasts and even broadcasts dedicated to various topics and live broadcasts (in real life).

In the site's guidelines, some types of broadcasts are prohibited, including any game classified as "Adult Only" (AO), or, regardless of its classification and any game that openly contains "sexual content" or "gratuitous violence" or content that violates the terms of use of third-party services. We see in fact that recently (2019) Twitch has taken temporary measures after the channels related to the video game Artifact were used for inappropriate video content, including, entire copyright-protected films, pornography, Nazi propaganda and at least one stream that showed the entire video of the shooter at the Christchurch Mosque attack.

Of fundamental importance in this context is to justify the boom in popularity that this social network has had over the years. In fact, due to the recent Covid-19 pandemic, the platform has seen a significant increase in its popularity, recording an 83% increase in viewers compared to previous years. The approach was mainly due to the need to find a continuous source of entertainment that at the same time allowed to maintain and develop social connections. In fact, some studies report that Twitch represented 65% of the total hours of streaming watched and 72% of the total hours broadcast, surpassing competitors such as YouTube Gaming, Facebook Gaming and other similar platforms like Microsoft's Mixer.

4.2 How Artificial Intelligence Wants to Transform Live Streaming

Before describing how AI fits into this context, it is necessary to remember what levels it is divided into. We start by talking about machine learning which takes a further step forward compared to the activities carried out by artificial intelligence (detecting, reasoning, acting and adapting) referring to algorithms that acquire knowledge autonomously through exposure to data, allowing the computer to no longer depend on predefined rules, but to develop its own. At the second level we find deep learning, consisting of artificial neural networks, that is, thousands of interconnected nodes designed to process and transport information throughout the network. In fact, these are the ones that allow to perform intensive computing functions such as image recognition, sound recognition and natural language processing.

In summary, we therefore see how artificial intelligence is composed of two fundamental subsets: machine learning and deep learning.

Considering the set of processes and capabilities that artificial intelligence provides, streaming industry leaders have seen in these systems, tools to address some problems that have emerged in the live video streaming space. As we also see in reference to what has been reported previously in the text, regarding the platform's guidelines and the growing number of creators who have decided to participate in it, more and more people have started to broadcast content contrary to the site's policies such as: crimes, fatal road accidents and even assaults. To this type of problems is then added that related to accessibility, in fact thanks to today's technology, anyone has the possibility to publish or view videos in real time, and not always these subjects are moved by good intentions.

In addition to the dangers associated with users who use the site, we also find those to which content creators are exposed, first among these is the concept of privacy. The sharing mentality that characterizes the site, can lead to developing an unfounded sense of intimacy between the viewer and the streamer. This can lead to the formation of inappropriate behaviors directed precisely towards the creator. This was the case of a Twitch streamer whose fan showed up at the front door uninvited.

With machine learning and deep learning more quickly, you will have the ability to act intelligently and effectively. We can expect artificial intelligence to interpret streaming content and automatically extract metadata. From there, they will be able to monitor harmful content more effectively and protect the privacy of victims.

4.3 Application of Artificial Intelligence on Twitch

Moderation of real-time user interactions is of fundamental importance in the streamer community, activities that are normally carried out by the content creator through a series of quick commands to be entered in the chat, among the most used we find: `\\timeout <username>`, to ban a user from the chat for a specific period of time, `\\block <username>`, to block all chat and private messages from a specific user and `\\slow <seconds>`, which allows you to set slow mode that limits users to wait a specific period of time between one message and another. However, there are specific cases, especially referring to channels that have a large following, where the single streamer is no longer able to independently manage interactions in the chat with viewers. In this situation, you can alternatively decide whether to: entrust the moderation activity to physical people (usually followers who have very high levels of interactions with the streamer or who have been following him for a long time) or to chatbots.

In the first case, moderator privileges will be entrusted through the `\\mod <username>` command through which you will have access to a series of moderation tools such as suspicious user controls. These are customizable tools that allow you to detect, identify, monitor and limit the chat privileges of suspicious users in their channels. Among the various options, the most significant is the Ban Evasion Detection which can be activated through the creator dashboard in the site settings, from where it is possible to select the detection level for users against whom the action is exercised. This is a system that uses machine learning to identify users who may have evaded channel bans and who access the chat. Viewers can be marked as "possible" and "probable" ban evaders. By default, messages sent by the first category of users will be

automatically monitored; they will therefore continue to appear in the chat but will be marked in the panel and in the Mod View widget for review by moderators and streamers. On the contrary, the messages of the "probable" ban evaders will be automatically limited in the chat, always giving the possibility to creators and moderators to review the restrictions applied.

This tool is accompanied by the Shared Ban Info, a system that allows streamers to share information about their channel bans with other creators. This mainly helps to prevent serial harassing behaviour in their communities. To activate it, you need to send a sharing request from the moderation settings in your Creator Dashboard that will be received by the respective channel which can choose whether or not to accept it. In addition, the possibility is given to accept sharing requests from anyone or limit them to specific groups: partners, affiliates or mutual followers.

The shared ban info also includes the "share moderator comments" setting through which it is possible to share the comments of the moderators made in your channel with the channels with which you share the ban information. If this setting is activated, you can still choose whether to share new single moderator comments (if added) or whether to keep them private, while if the setting is deactivated, all previously shared mod comments will be made private until the setting is reactivated.

On the other hand, it is possible that the moderation activity is not carried out by a human being but by an AI, or by chatbots. These can be created directly by the streamer or you can use services available online, among the most famous we find: Nightbot, Moobot or even Wizebot. The activities carried out by these systems are multiple, but, in general, they allow to increase viewer engagement through: giveaways, minigames, personalized alerts in the chat, media sharing, quotes and much more. They can then take care of distributing prizes and unlocking additional features for subscribers or developing links between different social networks, keeping viewers always updated on the program that will be followed during the stream. It can therefore be said that you have a real personal artificial moderator who automatically

takes care of spam and unwanted comments in the Twitch chat, thus giving the creator the possibility to be fully focused on his streaming activity.

Among the most innovative and fun ways in which this tool is used, especially one is becoming popular in the world of Twitch: song requests from viewers. Very often creators decide to listen to music from their playlists while they talk, play and entertain, and it is thanks to chatbots that users can, through a series of commands, select a specific song from those proposed and listen to it again during the live.

4.4 The Neuro-Sama case

During the boom in the use of this application, there was discussion about virtual influencers, questioning whether they could generate the same interest, in terms of followers and interactions. Today, Neuro-Sama represents one of the most representative channels in the field, becoming a phenomenon with over 50,000 followers. The main characteristic of this content creator is that both his speeches and his personality are generated by an artificial intelligence (AI) system that uses a large language model, allowing it to communicate with viewers in a live chat. The AI was created by a programmer and artificial intelligence developer named Vedal, who decided to base it on the concept of an AI VTuber combining interactions between the AI's gameplay and a computer-generated avatar. To better understand the character described, it is necessary to understand the concept of VTuber, these are avatars inspired by fictional characters present in some Japanese TV series or films (anime). The main goal of streamers is to be able, through this mode, to hide their identity as much as possible.

In addition to the great abilities that the AI has to interact with the public, the shocking factor is that these do not stop here. In fact, this system even manages to play video games, such as Minecraft, a sandbox type game that offers players a great freedom of action without the need to achieve specific objectives. Clearly its interactions with the games are not particularly complex, usually these are limited to performing specific

actions repeatedly, it does not use specific strategies, it can therefore be said that the ultimate goal is simply to interact with the game.

The most delicate phase of the interaction offered by the AI corresponds to the interaction that this has with the chat, as a model based on the collection of information derived from it. Very often some questionable statements have been found, particularly famous is the video in which Neuro-Sama claims not to believe in the Holocaust. Fortunately, Vedal quickly clarified and resolved the issue, primarily modifying the ways in which information is filtered and proposed as responses to users and subsequently adding moderation members within his team.

5: Conclusions

In the course of this thesis, we have explored the impact of artificial intelligence (AI) on digital platforms, we have seen how it has revolutionized the way we interact with digital platforms, improving efficiency, personalization, and ease of use. However, we cannot ignore the ethical issues that emerge from this new digital era. The goal is to establish an ethics of AI, that is, a set of guidelines and moral principles that allow us to distinguish between right and wrong, helping us in the correct design of these systems. In this context, the Belmont Report of the academic community comes to our aid, from which a series of founding principles emerge such as respect for people, beneficence, and justice; which summarize the general principle of *neminem laedere* or not to harm anyone, adequately communicating the risks and benefits associated, ensuring that algorithms do not amplify specific prejudices or that issues of congruity and equality are respected.

There are a series of problems that are at the forefront of ethical discussions surrounding AI technologies, but the one that arouses the most interest is technological singularity, therefore thinking that these systems are able to surpass human intelligence in the future. We are certainly very far from reaching this dystopian future which, however, brings with it not a few questions among which: who should answer and be considered responsible for the actions of these machines? We have not yet arrived at the definition of an adequate answer, but on the other hand, these are the types of debates that accompany the development of new technologies like this.

Another central theme in this discussion refers to privacy, protection, and security of the data that are entered and analysed by the system, it is indeed on the basis of these concerns that the GDPR legislation (General Data Protection Regulation) was created in 2016, in defense of the personal data of EU or European Economic Area citizens. In addition, in the USA, real policies are being developed such as the CCPA (California Consumer Privacy Act) that require companies to reorganize the methods of personal data storage (PII, personally identifiable data). Today, perhaps this is the field that collects the largest number of investments in terms of AI, given by the need of

companies to eliminate any vulnerability and opportunity for surveillance, hacking, and cyber attacks.

It perfectly contextualizes, in function of the analyses carried out up to this point, the interview with Professor Elmondo Grassi, an expert in ethics and artificial intelligence, thanks to whose contribution it is possible to deepen the theme. So far, in fact, we have talked about how these systems are paradoxically both a great opportunity but also great risks, we are moving towards a world that will undergo strong changes where the main challenges will refer to the management of the network of norms of coexistence, respect for minorities and equalities. It is therefore considered that these forms of protection do not represent so much a form of aversion to change but rather necessary tools to recall principles of equity and democracy. The risk lies precisely in the excessive rigidity of these limits that would end up compromising the technological process. This leads us to a main question, whether or not it is necessary to define an objective ethics for AI, a question to which the professor expressed himself as follows:

"(...) we turn to ethics to be able to study, elaborate and understand the new moral issues that arose, more and more quickly, evoked by technological progress, scientific discoveries, the requests of the social individual to constantly improve his standard of living, from everyday life to the challenges against diseases and death. If until then, the person was projected only on the need to debate his ethical rights, as the only sentient and socially contemplated actor, in a system in which the technique was only a producer of passive instruments, with the advent of artificial intelligence and its universe of innovations - intelligent algorithms, digital home assistants, social or industrial robots, chatbots and further systems endowed with logic and cognitive abilities - it led the individual to observe that, in its development, an artifact is being constituted potentially autonomous and capable of learning from human society that is already having ethical impacts on social systems.

How does an algorithm make decisions? - What effects does artificial intelligence have on the individual's daily choices? - What are the ethical and normative implications of the actions of an intelligent machine?

These are questions that are addressed to the entire society and to its system of understanding and analysis of the impact that the advances of artificial intelligence will have in the future, given that, already now, with its imperfections, slowdowns and its denomination of 'weak' system, it is progressively changing multiple aspects of the human. Ethical values are strictly dependent on the socio-cultural context in which they develop and are strengthened by the ideological tradition of belonging, therefore, I believe that searching for an objective model is detrimental to the progress of ethical research."

In conclusion, the main objective of the text was to be able to analyze in detail the impact that artificial intelligence has had over the years within another great phenomenon that has characterized the latest innovations in the digital field: platforms. These have been and still are, a tool at the basis of most of the social interactions of the twenty-first century and the implementation of these systems has allowed their influence and their power to be greatly amplified. There are therefore infinite resources that man has at his disposal and equally vast are the risks and challenges that he will face in this radical process of change, towards which it will be right to approach with vigilant curiosity, carefully preserving himself from the dangers and developing its full potential.

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