ETHICAL CHALLENGES IN THE EVOLUTION OF ARTIFICIAL INTELLIGENCE AND FASHION

A PROSPECTIVE ANALYSIS

NICCOLÒ MUSMECI
University of Florence
niccolo.musmeci@unifi.it

PIETRO SALVATORE PANTANO
University of Calabria
pietro.pantano@unical.it

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Abstract

The present study pays particular attention to issues of originality, intellectual property, and potential biases in machine learning models. European legislation on AI, along with various legislative acts that have followed this initial attempt at regulation, is examined as an essential reference point for initiating a technologically responsible and sustainable prospective discussion. The article analyzes two main perspectives: the risks of uncontrolled AI growth, with emphasis on the damage to the conceptualization of technological primacy over human cognition, and the opportunities for harmonization between human and AI. These themes are contextualized in relation to technological development, regulatory policies, consumer trends, and social values.

Keywords: *Artificial Intelligence (AI), Fashion and Technology, Ethical Challenges in AI,, Intellectual Property, Regulation of AI*

Introduction

The evolution of artificial intelligence (AI) is radically transforming various sectors, including the field of fashion, traditionally guided by human creativity and sensitivity. A crucial aspect of this transformation is the use of large datasets, which also presents significant challenges, particularly regarding data privacy and security, as discussed by Zheng et al. (2020). The first section opens with a discussion on ethical challenges related to the use of large datasets, addressing issues such as data bias and the need for increased transparency and explainability of decisions made by AI. The second section shifts focus to the analysis of European AI regulations and the impact of legislative acts on AI regulation in the fashion industry. This leads to a discussion of two contrasting perspectives in the third section: the risks associated with uncontrolled AI growth and the opportunities offered by harmonization between humans and AI. Finally, the relationship between technological development, regulatory policies, consumer trends, and social values will be explored to better understand how these aspects influence the evolution of AI in the world of fashion.

Ethical Challenges of Using Large Datasets

In this section dedicated to the ethical challenges associated with the use of large datasets in the field of artificial intelligence (AI) in the fashion industry, we will address three crucial issues: formative bias, the challenge of explainability, and the need

to formalize AI methods to ensure clarity and transparency.

Formative Bias Due to Training on Culturally Connoted Data: One of the main ethical concerns in the use of AI in fashion revolves around the bias that can arise when systems are trained on datasets that do not equally represent diverse cultures and populations. This can lead to outcomes that favor certain groups at the expense of others, as discussed by Barocas and Selbst (2016). In an industry like fashion, where diversity and inclusivity are becoming increasingly important, it is crucial to ensure that AI does not perpetuate stereotypes or cultural biases.

The Challenge of Explainability in AI: Explainability, the ability to elucidate AI decision-making processes in understandable terms, is another significant ethical challenge. According to Doshi-Velez and Kortz (2017), explainability is crucial for building trust and accountability in the use of AI. In the fashion industry, where decisions can directly impact consumers and market trends, it is essential for stakeholders to understand how AI arrives at its conclusions.

Formalization of AI Methods for Clarity and Transparency: Lastly, there is a need to formalize AI methods to ensure greater clarity and transparency. This involves the development of clear standards and guidelines for AI usage, as suggested by Jobin et al. (2019). This formalization is particularly important in a regulated and visible industry like fashion, where AI-based decisions can have broad social and economic impacts.
In summary, while AI offers significant opportunities for innovation in the fashion industry, it is crucial to address these ethical challenges to ensure that its implementation is fair, transparent, and responsible.

Novelty and Intellectual Property in AI

This section of the work analyzes the complex issues related to originality and intellectual property in the context of using artificial intelligence (AI) in the fashion industry, as well as potential biases in machine learning models.

Discussions on Novelty and Intellectual Property in the Era of AI: With the advent of AI, new challenges arise concerning the definition and protection of originality and intellectual property. Authors like Bodó et al. (2020) have discussed how works generated by AI challenge our traditional concepts of creativity and originality. In the fashion industry, this raises questions about who holds the rights to designs generated or influenced by AI. For example, if an algorithm creates a unique fashion design, who owns the rights to it? These questions are at the center of the debate on integrating AI into fashion and require careful consideration to ensure that intellectual property rights are adequately attributed and protected.

Potential Bias in Machine Learning Models: Another important issue is the potential bias in machine learning models. As examined by Obermeyer et al. (2019), AI models can unintentionally perpetuate pre-existing biases present in the data on which they are trained. In the context of fashion, this could mean that certain styles, fabrics, or even body representations are favored over others, creating a partial and potentially distorted view of consumer trends and preferences. Addressing and mitigating these biases is crucial to ensure that AI in the fashion industry is fair, inclusive, and representative of a wide range of styles and preferences.
In summary, this section will explore the challenges posed by AI in terms of originality and intellectual property, as well as examine ways to identify and reduce biases in machine learning models, ensuring that AI's contribution to the fashion industry is both innovative and fair.

Regulating AI: The European Model in Its Relevant Features

Concerning the proliferation of AI, the design of specific regulatory foresight has been advocated globally. As has already happened with *privacy*, the European Union (EU) has positioned itself at the forefront, but it is not on this journey alone. Concurrently with the initial provisions of *soft law* on the part of the EU[1] In the United States of America (USA), the *'National Artificial Intelli-*

1 Casonato, C., & Marchetti, B. (2021). Prime osservazioni sulla proposta di regolamento dell'Unione Europea in materia di intelligenza artificiale. BioLaw Journal - Rivista di BioDiritto, 3, 415–437. https://doi.org/10.15168/2284-4503-1793: among the most relevant, we find the White Paper on Artificial Intelligence by the Commission (February 19, 2020).

gence Initiative Act of 2020'[2] was enacted: the similarities to the general provisions, encompassing definitions to objectives, are numerous, although the strategies are different. The USA, in fact, positions itself with the perspective of continuing a path to maximize the benefits of AI for *'all American citizens,'* positioning the country as a leader 'in the development and use of reliable artificial intelligence systems in both the public and private sectors'.[3] The EU, on the other hand, has set as its primary objective "the protection of fundamental rights and the safeguarding of the democratic process".[4] To achieve this goal, however, soft law and self-regulation are not sufficient.

To this end, the EU has determined that a regulation for AI was necessary: the latest text, the definitive one, is the result of a political agreement between the Council and the European Parliament. It will be the first and, for now, the only unified source of AI regulation worldwide. It consists of 85 articles and 9 annexes, and the system is united by a specific underlying logic, that of *'variable geometry risk management combined with choices and data governance obligations primarily aimed at avoiding or limiting deceptive effects of artificial intelligence systems on individuals, while ensuring the reliability of the systems.'* [5]
The legislative proposal aims to improve the functioning of the internal market and promote a conception of AI that is *'human-centric and trustworthy'* [6]. For this reason, it aims to create a system of rules applicable within the Union territory and to prohibit certain AI applications. Likewise, the regulation proposal pays attention to the transparency of certain AI mechanisms designed to interact with individuals[7].

The essence of the regulation

The essence of the regulation lies in Title II of the proposal, where Article 5 identifies a series of prohibited practices, reflecting the risks to which individuals are exposed. The article is extensive but focuses on systems that employ subliminal, manipulative, or deceptive techniques to distort individuals' behavior, or exploit the vulnerabilities of a person or a group of people, such as age, disability, or socio-economic status, causing significant harm. Biometric categorization of individuals is also prohibited, as well as the assessment or classification of individuals based on a social score that leads to disadvantageous treatment in social contexts unrelated to the data collection or genesis, where such treatment is unjustified or disproportionate to social behavior or its severity. The use of real-time remote biometric identification systems in publicly accessible places is also prohibited, except for a series of exceptions, mainly related to public order, security, and the fight against crime, unless the risk assessment of an individual committing a crime is based solely on the profiling of a natural person or the assessment of the traits and characteristics of their personality. In any case, the aforementioned systems require prior authorization from a judicial authority or an independent administrative authority, whose decision is binding on the Member State where the use is to take place or has occurred in the last 24 hours. Finally, AI systems that create or expand *databases* of facial recognition through non-targeted exploitation of facial images from the Internet - known as *scraping* - or from closed-circuit camera footage, or that infer the emotions of a natural person in the fields of work and educational institutions are prohibited, except in cases where the use of the artificial intelligence system is intended for medical or security reasons and is to be implemented or brought to market[8].
The changes, compared to the previous text, lies in the remedies provided in Articles 68a and following of the regulation proposal[9].

2 https://www.congress.gov/bill/116th-congress/house-bill/6216/text#toc-H5C24E8CE4C60488783014BB97405E96C

3 National Artificial Intelligence Initiative Act of 2020, Title I, Sec. 101; translation by the authors.

4 Resta, G. (2022). Cosa c'è di 'europeo' nella Proposta di Regolamento UE sull'intelligenza artificiale? in Il diritto dell'informazione e dell'informatica, 38(2), 323–342.

5 Catanzariti, M. (2023). Rischio e vulnerabilità nel modello europeo di intelligenza artificiale. SocietàMutamentoPolitica, 13(25), 73–82. https://doi.org/10.36253/smp-13804.

6 Proposal for a regulation of the European Parliament and of the Council establishing harmonized rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union acts, 2021/0106, Article 1; hereinafter referred to as the AI Regulation. Regarding the 'Human-centric approach,' emphasis is placed on the provision in Article 14, where effective human oversight of AI is envisaged with a view to maximizing the prevention or minimization of potential harms that may be caused.

7 Proietti G., Una normativa per l'intelligenza artificiale. La proposta di regolamento europeo, in Rivista Trimestrale Responsabilità d'impresa e antiriciclaggio, n. 2/2021, 198.

8 For the full content, please refer to the AI Regulation Proposal, Article 5.

9 AI Regulation Proposal, Chapter 3b.

In addition to administrative or judicial remedies, there will be the possibility to file a complaint with the market surveillance authority in case of violation of the provisions contained in the regulation proposal. Furthermore, there are a series of actions aimed at preventing and encouraging operators to adhere to the regulation proposal, through the joint action of several entities - the AI Office, the AI Board at the Commission, and the Commission itself in certain cases. All of this is associated with the sanctions provided in Article 71 and following, which must be 'effective, proportionate, and dissuasive,' including warnings and non-monetary measures[10].

As a result, it is crucial, especially for high-risk AI systems, to establish an effective *compliance* system to be carried out before market entry or service deployment. This system should lead operators to identify, assess, and estimate potential risks, both direct and indirect, as well as to adopt appropriate and targeted risk management measures[11]. In this regard, specific provisions are established for training and datasets and for AI training, which include tests on datasets and their characteristics, even specific ones, that must be met[12]. Finally, high-risk AI systems must technically enable the automatic recording of events (*'logs'*) throughout the system's lifetime, as well as be designed and developed to ensure that their operation is sufficiently transparent to allow installers to interpret the system's results and use them appropriately.[13] All of this results in a series of obligations on the part of providers and implementers, always in accordance with a ratio of adequacy to the requirements and oversight of high-risk AI systems, with the perspective of preventing and correcting *biases*[14].

Another relevant innovation is the 'impact assessment on fundamental rights for high-risk artificial intelligence systems.' Indeed, before using a high-risk AI system - see Article 6 of the regulation proposal - those responsible for distribution, whether public law entities or private operators providing public services, and operators distributing high-risk systems, must conduct an impact assessment according to the specified requirements. The assessment must be updated when the factors listed in the first paragraph change - such as the frequency of AI use or the categories of individuals who may be affected by its use. Once the assessment is completed, it must be notified to the supervisory authority using a questionnaire developed by the AI office[15]. Obviously, the reference to the Data Protection Impact Assessment (DPIA) of the European General Data Protection Regulation (GDPR) is evident; not coincidentally, the regulation proposal specifies that if the DPIA has already fulfilled one of the obligations provided by the *AI Act*, then they must be conducted jointly. The impact assessment on fundamental rights replaces the obligation for providers to undergo the conformity assessment procedure[16], however it still remains to obtain the EU conformity declaration[17] and the CE mark[18]. Providers, together with operators, are still obligated to the aforementioned transparency requirements outlined in the sixth title of the regulation[19].

Another innovation concerns the classification of general-purpose AI models[20] with systemic risk, defined as such in the presence of the following criteria: the AI has high-impact capabilities, which are assessed based on appropriate technical tools and methodologies, including indicators and reference parameters; based on a decision by the Commission, ex officio or following a qualified report by the scientific group, that a general-purpose AI model has capabilities or impact equivalent to those of the previous criterion. General-purpose AI is presumed in any case when the cumulative amount of computation used for its training, measured in floating-point operations (FLOP), exceeds 10^25[21]. The providers of general-purpose AI models are subject to the obligations outlined in Articles 52c and following of the regulation

10 AI Regulation Proposal, Article 71; translation by the authors.
11 AI Regulation Proposal, Article 9; translation by the authors.
12 AI Regulation Proposal, Article 10; translation by the authors.
13 AI Regulation Proposal, Article 13; translation by the authors.
14 AI Regulation Proposal, Chapter 3.
15 AI Regulation Proposal, Article 29a; the provision must be read together with Annex 3; translation by the authors.
16 AI Regulation Proposal, Article 19.
17 AI Regulation Proposal, Article 48.
18 AI Regulation Proposal, Article 49.
19 AI Regulation Proposal, Article 52 and following.
20 An AI for general purposes is defined as 'capable of serving a variety of purposes, both for direct use and for integration into other AI systems' by Article 2.5g No. 44e) of the AI Regulation Proposal. Consideration 60a) also identifies two characteristics useful for making it known, namely its 'generality and the ability to competently perform a wide range of distinct tasks. These models are typically trained on large amounts of data, using various methods such as self-supervised, unsupervised, or reinforcement learning'; translation by the authors.
21 Proposal for a regulation on AI, art. 52b; translation by the authors.

proposal, including transparency requirements and the maintenance and updating of specific technical documentation, ensuring adequate levels of cybersecurity.

Conclusions and Critical Considerations

Even from this partial overview of the provisions, two important interconnected criticisms, previously emphasized by scholars, can be identified.
The first concerns the structural model, based on a so-called 'top-down approach,' where upstream, the legislator has established a hierarchical level of risk divided into categories: unacceptable risk with a broad prohibition of use; high risk, with a system of preventive and subsequent control; limited and minimal risks, respectively under Titles IV and IX, where the use of codes of conduct is recommended. This approach, so different from the GDPR, could lead to excessive resistance to the possible development of AI in the fields of innovation and industry, despite the provision of specific sandboxes and exceptions for scientific research[22].
The regulation moves towards a foundational concept, namely that of the anthropocentric approach. It has rightly been noted that, compared to a concept of technological self-determination, the regulation proposal remains quite distant. Criticisms regarding the exclusion of individuals from decision-making processes and the absence of class action continue to be relevant, confirming that the established perspective is one of reporting to supervisory authorities[23]. In this regard, in the opinion of the writer, there is a greater emphasis on balancing the theme of democratic participation of European citizens with that of an increasingly technocratic remedial framework.

Technological and Social Development

In this section, we will focus on the complex interaction between technological progress, particularly the evolution of artificial intelligence (AI) in the fashion industry, the regulatory policies guiding its use, and consumer trends. We will also explore how social values influence and are influenced by these dynamics.

Relationship between Technological Development, Regulatory Policies, and Consumer Trends: The introduction of AI into the fashion industry is not just a technological issue but also interacts with regulatory policies and consumer trends. Authors like Sundararajan (2017) have examined how technological innovation can alter market dynamics, requiring new forms of regulation and adaptation by businesses. This is particularly true in fashion, where AI can change how consumers interact with brands and make purchasing decisions. Regulatory policies must, therefore, balance promoting innovation with protecting consumers and ensuring fair practices.

Impact of Social Values on the Evolution of AI in Fashion: Social values play a fundamental role in the adaptation and acceptance of AI technologies in the fashion industry. According to Auty and Elliott (2001), cultural and social values influence not only consumer choices but also the direction of technological development. In the context of fashion, this means that consumer expectations regarding sustainability, ethics, and diversity can guide the evolution of AI towards applications that reflect these values. Additionally, public perception of AI can influence how companies implement it in their business and design strategies.
How AI is shaping and being shaped by the social and regulatory environment in the fashion industry is an open issue. We will analyze how a balance between innovation, regulation, and social values is essential for a sustainable and acceptable evolution of AI in fashion.

Conclusions

The future perspective for constructive dialogue and responsible evolution of AI in Fashion:
Looking ahead, it is essential to promote a constructive dialogue among all stakeholders involved – designers, fashion brands, consumers, regulators, and AI developers. As suggested by West et al. (2019), such a dialogue should aim for a responsible evolution of AI in the fashion industry, where decisions are made considering both technological innovation and its social and moral consequences. A collaborative and multidisciplinary approach will be crucial to ensure that AI in fashion develops in a way that is beneficial for society as a whole.
We believe a balance between technological innovation and ethics is important: As highlighted

22 Resta, G. Op. cit.
23 Catanzariti, M. Op. cit.

in our analysis, finding a balance between the technological advancement offered by AI and the ethical implications that arise is crucial. Authors like Floridi and Cowls (2019) have emphasized the importance of an ethical approach to technology, ensuring that innovation is guided not only by technological progress but also by moral and social considerations. In the fashion industry, this means implementing AI in ways that respect human rights, promote diversity, and ensure fair and sustainable practices.

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