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# **COGNIZANCE CONUNDRUM: ARTIFICIAL INTELLIGENCE'S INTRICATE IMPLICATIONS ON GEOGRAPHICAL INDICATION TAGS AND COPYRIGHT DISTRIBUTION SYSTEMS IN THE CONTEMPORARY EPOCH.**

AUTHORED BY - AMARTYA JAYBHAYE

The epoch of contemporaneity, the artificial intelligence contrivance has attained an exceedingly noteworthy efficacy. Whether engrossed in the faithful emulation of an entity in a mode that eludes identification with its primordial provenance or in the origination of entirely unprecedented and imaginative artefacts predicated upon the information upon which it has undergone training. In the purview of Geographical Indication (GI) designations, the ascertaining of whether the content or commodity has undergone genesis authentically or with the facilitation of artificial intelligence exacerbates in complexity.

The utilization of artificial intelligence begets a consequential peril to GI designations and the regime of copyright dispensation. Artificial intelligence possesses the aptitude to beguile the statutes of copyright, imparting a formidable challenge in discerning the nexus of a given entity to GI designations. At present, this apprehension is predominantly germane to digitized productions, albeit there exists an imminent prospect that its purview will imminently encompass the formulation of corporeal commodities, encompassing habiliments, periodicals, ceramics, and sundry paraphernalia traditionally affiliated with GI designations, inclusive of variegated categories of agrarian produce, comestibles, vinous and spirituous potations, artisanship, and industrial artefacts. This treatise finds its limitations circumscribed within the present constraints imposed by the practical application of artificial intelligence (AI), with the nascent aspect of its impact on Geographical Indication (GI) tags yet to attain full fruition. However, the exegesis herein endeavors to proffer a meticulous scrutiny of the plausible ramifications wrought by AI upon the intricate domain of GI tags.

**Keywords:** Artificial Intelligence, Geographical Indication Tags, Copyright Distribution System, Digital Content, Intellectual Property, Creative Artefacts

## INTRODUCTION

In the contemporary epoch, the advent of artificial intelligence (AI) has brought about a paradigm shift across various sectors, including the realm of Geographical Indication (GI) tags and copyright distribution systems. This treatise delves into the intricate implications of AI's burgeoning influence, exploring its potential to both disrupt and enhance the established frameworks that govern these domains. The discourse navigates through the profound significance of GI tags as potent talismans safeguarding the economic sanctum of local communities and the challenges posed by AI's capacity to emulate and originate products that bear resemblance to GI-tagged commodities. The treatise also envisions the potential role of AI in the enforcement of GI tags and proposes a strategic policy framework aimed at mitigating AI's effects and preserving the sanctity of GI tags.

### **The Role of Artificial Intelligence in Geographical Indication Tagged Products**

ESOTERIC SIGNIFIERS, THE PROFOUND SIGNIFICANCE OF GEOGRAPHICAL INDICATION (GI) TAGS: GI tags are potent talismans safeguarding the economic sanctum of local communities.<sup>1</sup> They act as bulwarks against the rapacious forces of globalization, shielding unique cultural products from the homogenizing maw of mass production.<sup>2</sup> By demarcating geographical provenance and enshrining inherent qualities, GI tags valorize the custodians of traditional knowledge, preventing their marginalization in the cutthroat marketplace.<sup>3</sup> GI tags ensure that monetary and economic gains generated by these products circulate within the local economy.<sup>4</sup> Instead of profits being siphoned away by external interests, GI-tagged products contribute to the growth and development of the communities where they originate.<sup>5</sup> This cyclical movement of economic resources fosters local entrepreneurship, supports livelihoods, and enhances overall economic resilience. In essence, GI tags encapsulate the principle of economic localization, whereby the

<sup>1</sup> Kishore, K. (2018). Geographical Indications in Horticulture: An Indian perspective. *Www.academia.edu*. [https://www.academia.edu/82566525/Geographical\\_Indications\\_in\\_Horticulture\\_An\\_Indian\\_perspective](https://www.academia.edu/82566525/Geographical_Indications_in_Horticulture_An_Indian_perspective).

<sup>2</sup> Why Geographical Indications Matter to SMEs, *www.wipo.int*, <https://www.wipo.int/sme/en/geographical-indications.html>.

<sup>3</sup> Ruchi Pant, Protecting and promoting traditional knowledge in India: what role for geographical indications?, *www.iied.org*, <https://www.iied.org/16576iied> (last visited Feb 15, 2024).

<sup>4</sup> Dwijen Rangnekar, Geographical Indications A Review of Proposals at the TRIPS Council: Extending Article 23 to Products other than Wines and Spirits UNCTAD-ICTSD Project on IPRs and Sustainable Development Issue Paper No. 4 Intellectual Property Rights and Sustainable Development, (2003), [https://unctad.org/system/files/official-document/ictsd2003ipd4\\_en.pdf](https://unctad.org/system/files/official-document/ictsd2003ipd4_en.pdf).

<sup>5</sup> Chadha & Chadha Intellectual Property Law Firm - Ankita Sabharwal, *The economics of Geographical Indications*, Lexology (2022), <https://www.lexology.com/library/detail.aspx?g=f9ae3506-1f07-4e09-bd79-52da7887e611>.

benefits of economic activity are retained within the community of origin. This is crucial for maintaining socio-economic balance and preventing the concentration of wealth in the hands of a few. By promoting sustainable practices and empowering local producers, GI tags contribute to the long-term prosperity of communities.<sup>6</sup>The significance of GI tags becomes particularly evident in the context of globalization and increasing commercialization. In an interconnected world where market forces often prioritize profit over authenticity, GI tags serve as a bulwark against the homogenization of cultural products and the marginalization of local producers.<sup>7</sup> They provide consumers with assurance regarding the quality and provenance of products while also promoting fair trade practices.<sup>8</sup>

Moreover, GI tags contribute to the diversification of economic activities and the resilience of local economies. By highlighting the unique characteristics of products originating from specific regions, GI tags create opportunities for niche markets and specialty industries. This not only enhances economic sustainability but also fosters cultural pride and identity. GI tags are not merely regulatory instruments; they are potent symbols of cultural resistance and economic empowerment. They represent a paradigm shift towards a more equitable and sustainable global landscape, where communities thrive on the strength of their unique heritage and economic self-reliance. So, let us raise a toast to these unsung heroes, the GI tags,<sup>9</sup> for safeguarding the soul of local economies and preserving the tapestry of cultural diversity.<sup>10</sup>

ARTIFICIAL INTELLIGENCE AND GEOGRAPHICAL INDICATION TAGS: The burgeoning influence of Artificial Intelligence (AI) pervades various sectors,<sup>11</sup> including food and textiles and

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6 Malaysia Sarawak et al., CSSPO International Conference 2018: Towards Inclusive and Sustainable Agriculture Editors: Harmonizing Environmental, Social and Economic Dimensions: Is it Possible?, 52 E3S Web of Conferences (2018), <https://www.proceedings.com/content/040/040900webtoc.pdf>

7 Vandana Singh (Lawyer), *The Law of Geographical Indications: Rising Above the Horizon* (2017), [https://books.google.co.in/books/about/The\\_Law\\_of\\_Geographical\\_Indications.html?id=VSPoAQAACAAJ&redir\\_esc=y](https://books.google.co.in/books/about/The_Law_of_Geographical_Indications.html?id=VSPoAQAACAAJ&redir_esc=y)

8 Ana Guadalupe Valenzuela Zapata, *Author's personal copy Geographical indications, terroir, and socioeconomic and ecological sustainability: The case of tequila*, [www.academia.edu](http://www.academia.edu), [https://www.academia.edu/38970057/Authors\\_personal\\_copy\\_Geographical\\_indications\\_terroir\\_and\\_socioeconomic\\_and\\_ecological\\_sustainability\\_The\\_case\\_of\\_tequila](https://www.academia.edu/38970057/Authors_personal_copy_Geographical_indications_terroir_and_socioeconomic_and_ecological_sustainability_The_case_of_tequila).

9 Eva Gutierrez, *Geographical Indicators: A Unique European Perspective on Intellectual Property*, 29 *Hastings International and Comparative Law Review* 29 (2005), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/hasint29&div=9&id=&page=>.

10 James Manyika & Michael Spence, *The Coming AI Economic Revolution: Can Artificial Intelligence Reverse the Productivity Slowdown?*, 102 *Foreign Affairs* 70 (2023), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/fora102&div=106&id=&page=>.

11 Emily C. Credit, *Terroir v. Trademarks: The Debate over Geographical Indications and Expansions to the TRIPS Agreement*, 11 *Vanderbilt Journal of Entertainment and Technology Law* 425 (2008), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/vanep11&div=13&id=&page=>.

agriculture, raising pertinent concerns regarding the preservation of Geographical Indication (GI) tagged products.<sup>12</sup> These tags serve as pivotal markers of unique identity and quality inherent to specific regions, pivotal for safeguarding cultural legacies and bolstering economic advantages for producers.<sup>13</sup> However, the advent of AI introduces formidable challenges to this established framework.<sup>14</sup> Within the food domain, AI's capacity to sift through copious recipes and generate novel formulations resembling GI-tagged products threatens to erode their distinctiveness.<sup>15</sup> Consider, for instance, the possibility of AI concocting a brew akin to Darjeeling tea or Champagne,<sup>16</sup> both emblematic of their respective locales.<sup>17</sup> Though presently not an imminent peril, the progressive refinement of AI technology augurs a potentially disruptive trajectory. Analogously, the textile realm confronts akin quandaries. AI's analytical prowess extends to discerning patterns, hues, and motifs characteristic of GI-tagged textiles, enabling the replication of indigenous designs.<sup>18</sup> This prospect jeopardizes the economic viability of such products, exemplified by the potential mimicry of the intricate weaves of Banarasi sarees or the signature aesthetics of Harris Tweed.<sup>19</sup> Nevertheless, it behooves us to acknowledge that AI, while adept at emulating superficial attributes, remains incapable of encapsulating the artisanal finesse, cultural legacy, and historical narrative intrinsic to these products. The quintessence of GI-tagged items transcends mere physical attributes, embodying intangible values anchored in tradition and craftsmanship.

Furthermore, recourse to legal safeguards for GI-tagged products assumes paramount importance in mitigating this encroachment. Rigorous enforcement of GI rights serves as a bulwark against unauthorized utilization of GI designations, thereby ensuring the exclusivity of products

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12 Registration Of Geographical Indications In India - Trademark - India, [www.mondaq.com, https://www.mondaq.com/india/trademark/1043076/registration-of-geographical-indications-in-india](https://www.mondaq.com/india/trademark/1043076/registration-of-geographical-indications-in-india)

13 Chase DiBenedetto, *AI's exclusion of Indigenous voices is history repeating itself*, Mashable (2023), <https://mashable.com/article/ai-bias-live-transcription-indigenous-languages>.

14 Why GI-tags will earn you respect in global trade, BusinessLine (2021), <https://www.thehindubusinessline.com/opinion/why-gi-tags-will-earn-you-respect-in-global-trade/article36826600.ece>

15 AI: Why chefs are turning to artificial intelligence, BBC News, <https://www.bbc.com/news/business-59651077>.

16 Credit EC, 'Terroir v. Trademarks: The Debate over Geographical Indications and Expansions to the TRIPS Agreement' (2008) 11 *Vanderbilt Journal of Entertainment and Technology Law* 425 <<https://heinonline.org/HOL/LandingPage?handle=hein.journals/vanep11&div=13&id=&page=>>

17 Zoe Wood, *Waitrose turns to AI to create recipes for successful food products*, The Observer, Sep. 23, 2023, <https://www.theguardian.com/business/2023/sep/23/waitrose-turns-to-ai-to-create-recipes-for-successful-food-products>.

18 Tess McClure, *Supermarket AI meal planner app suggests recipe that would create chlorine gas*, The Guardian, Aug. 10, 2023, <https://www.theguardian.com/world/2023/aug/10/pak-n-save-savey-meal-bot-ai-app-malfunction-recipes>.

19 Tanya Sharma, *Geographical Indication (GI) Tags of Andhra Pradesh*, The IP Press (2021), <https://www.theippress.com/2021/05/27/geographical-indication-gi-tags-of-andhra-pradesh/>

originating from designated locales.<sup>20</sup> AI poses a cogent threat to the sanctity of GI-tagged products, it does not constitute an insurmountable obstacle.<sup>21</sup> By orchestrating a judicious amalgam of technological advancement, reverence for tradition, and legal fortification, stakeholders can navigate this conundrum and perpetuate the enduring significance of GI designations.

### **“Envisioning AI’s possible Role in the enforcement of GI Tags”**

The potential application of Artificial Intelligence (AI) in the enforcement of Geographical Indications (GI) tags signifies a paradigm shift from conventional, resource-intensive bureaucratic mechanisms to a streamlined, efficacious system. AI's intrinsic capacity to process vast datasets and discern patterns presents a formidable tool for validating the authenticity and legality of GI-tagged commodities. Through meticulous analysis, AI can scrutinize product attributes such as flavor, texture, hue, and design, juxtaposing them against established benchmarks of GI-endorsed items. Any notable deviations could prompt identification of potentially counterfeit goods. Furthermore, AI offers automation capabilities for ascertaining product provenance.<sup>22</sup> By parsing data encompassing producer locale, raw material sourcing, and manufacturing procedures, AI can ascertain the veracity of a product's claim to originate from the specified GI-designated region. This automation not only expedites the verification process but also mitigates the susceptibility to corrupt practices and bureaucratic impediments. By circumventing manual inspections prone to human error and manipulation, AI engenders a transparent, impartial, and efficient validation framework.<sup>23</sup>

The efficacy of AI in intellectual property protection, exemplified by its adeptness in detecting plagiarism and expediting patent processing, underscores its utility in safeguarding GI tags. Leveraging sophisticated algorithms, AI can scour extensive textual repositories to flag instances of content appropriation, thus fortifying intellectual property rights. Similarly, in the realm of GI

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<sup>20</sup> Yashna Walia & Shreya Kumar, *THE SUCCESS AND FAILURE OF GI TAG IN INDIA: A CRITICAL ANALYSIS OF THE WORKING OF GEOGRAPHICAL INDICATIONS OF GOODS (REGISTRATION AND PROTECTION) ACT, 1999*, 1 Journal of Academic Innovation and Research in Intellectual Property Assets (E-JAIRIPA 232 (2020), <https://cnlu.ac.in/storage/2022/08/15-Yashna-Walia-and-Shreya-Kumar.pdf> (last visited Feb 25, 2024).

<sup>21</sup> Can artificial intelligence create a decent dinner?, BBC News, Sep. 7, 2020, <https://www.bbc.com/news/business-53794472>.

<sup>22</sup> Shlomit Yanisky Ravid & Xiaoqiong Liu, When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era, 39 Cardozo Law Review 2215 (2017), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/cdozo39&div=70&id=&page=> (last visited Apr 30, 2024).

<sup>23</sup> FIVE notable applications of legal AI in India, indiaai.gov.in, <https://indiaai.gov.in/article/five-notable-applications-of-legal-ai-in-india>.

tags, AI's surveillance of digital marketplaces can unearth products falsely purporting GI affiliation, thereby safeguarding the interests of legitimate stakeholders. Nevertheless, the integration of AI in GI tag enforcement is not devoid of challenges. The efficacy of AI algorithms hinges on the quality and comprehensiveness of the underlying data. Consequently, meticulous curation of accurate dataset becomes imperative to harness AI's potential fully. Moreover, while AI can flag potential infringements, human oversight remains indispensable for corroborating infractions and instituting requisite remedial measures. Inherent challenges, AI epitomizes a potent instrument for fortifying GI tag enforcement mechanisms. By harnessing AI's analytical prowess, societies can preserve the cultural heritage and economic dividends intrinsic to GI tags, while ensuring consumers' access to authentic, premium-quality products.<sup>24</sup>

### AI and Agriculture

AI and Agriculture: In the era of the fourth industrial revolution, characterized by the fusion of digital technologies and the physical world, Artificial Intelligence (AI) and Machine Learning (ML) have emerged as disruptive forces reshaping the agricultural landscape. These technologies wield the power to decipher complex biological data, thereby facilitating the emulation and augmentation of natural elements in agricultural production. Leveraging AI and ML, scientists can scrutinize the genetic composition of crops, discerning pivotal traits like sweetness, texture, and nutritional value.<sup>25</sup> By unraveling the genetic markers underpinning these traits, predictive models can be constructed to forecast the repercussions of genetic alterations, thus enabling the simulation of desired outcomes. This paradigm shift extends to the realm of genetic modification, where biotechnologists harness AI insights to engineer crops endowed with desired attributes.<sup>26</sup> Through precise gene editing techniques such as CRISPR-Cas9, tailored modifications can be effected within a plant's genome, ensuring the manifestation of intended traits. In this context, proprietors of AI technologies wield the agency to delineate specific traits for augmentation or introduction in crops, thereby catalyzing a paradigmatic shift in agricultural production.<sup>27</sup> This transformative journey, however, is not devoid of challenges.

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<sup>24</sup> Nicole Yamane, *Artificial Intelligence in the Legal Field and the Indispensable Human Element Legal Ethics Demands*, (2020), <https://www.law.georgetown.edu/legal-ethics-journal/wp-content/uploads/sites/24/2020/09/GT-GJLE200038.pdf>.

<sup>25</sup> Rosana Cavalcante & Silva, *Artificial Intelligence in Agriculture: Benefits, Challenges, and Trends*, 13 *Applied sciences* 7405 (2023).

<sup>26</sup> Amit Sood, Rajendra Kumar Sharma & Amit Kumar Bhardwaj, *Artificial intelligence research in agriculture: a review*, ahead-of-print *Online Information Review* (2021).

<sup>27</sup> Amy L. Stein, *Artificial Intelligence and Climate Change*, 37 *Yale Journal on Regulation* 890 (2020), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/yjor37&div=24&id=&page=>.

Drawing parallels to the historical precedent of the Industrial Revolution, wherein mechanization supplanted artisanal craftsmanship, the advent of AI and ML portends a similar trajectory of disruption within the agricultural domain.<sup>28</sup> The confluence of these technologies threatens to marginalize traditional agrarian practices, akin to the displacement experienced by artisans during the Industrial Revolution.<sup>29</sup> Furthermore, the utilitarian ethos driving this AI revolution engenders a digital divide, exacerbating economic disparities and fostering discrimination.<sup>30</sup> Much like the socioeconomic cleavages engendered by the Industrial Revolution, the proliferation of AI-driven agricultural advancements engenders a dichotomy between technological haves and have-nots. This digital schism permeates economic strata, accentuating existing disparities and engendering inequities in access to AI-driven agricultural innovations. Moreover, the specter of economic exploitation looms large, reminiscent of the exploitation endured by laborers during the Industrial Revolution. The commodification of AI-driven agricultural products risks entrenching monopolistic practices, perpetuating economic hegemony, and disenfranchising marginalized stakeholders.

Amidst the transformative potential of AI and ML in agriculture, ethical considerations loom large, mirroring the ethical quandaries precipitated by the Industrial Revolution. The ability to manipulate the genetic fabric of living organisms raises ethical dilemmas regarding the extent of human intervention in natural processes. Pertinent ethical concerns encompass the preservation of biodiversity, the sanctity of natural ecosystems, and the safeguarding of genetic integrity. Moreover, the commodification of AI-driven agricultural products engenders ethical quandaries surrounding equitable access and distributive justice.<sup>31</sup> This necessitates the formulation of robust regulatory frameworks and policy interventions to navigate the ethical labyrinth inherent to AI-driven agricultural innovations. Concurrently, the economic ramifications of AI-driven agricultural advancements necessitate proactive measures to mitigate adverse impacts and foster inclusive growth.

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28 Ariel Ezrachi & Maurice E. Stucke, *Artificial Intelligence & Collusion: When Computers Inhibit Competition*, 2017 *University of Illinois Law Review* 1775 (2017), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/unillr2017&div=59&id=&page=>.

29 Russ Pearlman, *Recognizing Artificial Intelligence (AI) as Authors and Investors under U.S. Intellectual Property Law*, 24 *Richmond Journal of Law & Technology* 1 (2017), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/jolt24&div=8&id=&page=>.

30 Atilla Kasap, *Copyright and Creative Artificial Intelligence (AI) Systems: A Twenty-First Century Approach to Authorship of AI-Generated Works in the United States*, 19 *Wake Forest Journal of Business and Intellectual Property Law* 335 (2018), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/wakfinp19&div=24&id=&page=>.

31 James Manyika & Michael Spence, *The Coming AI Economic Revolution: Can Artificial Intelligence Reverse the Productivity Slowdown?*, 102 *Foreign Affairs* 70 (2023), <https://heinonline.org/HOL/LandingPage?handle=hein.journals/fora102&div=106&id=&page=>.

The advent of AI and ML heralds a transformative epoch in agriculture, akin to the paradigmatic shifts precipitated by the Industrial Revolution. These technologies empower stakeholders to mimic and augment natural elements in agricultural production, precipitating a renaissance in genetic modification and crop engineering. Nonetheless, the disruptive potential of AI and ML necessitates careful consideration of ethical, economic, and regulatory imperatives. Drawing from the historical analog of the Industrial Revolution, stakeholders must navigate the tumultuous waters of technological advancement with prudence and foresight. Only through proactive measures can the transformative potential of AI-driven agricultural innovations be harnessed for the collective good, fostering inclusive growth and equitable development.

### **Food and AI**

The integration of artificial intelligence (AI) into the gastronomic sector represents a significant paradigm shift, reminiscent of the transformative impact of past innovations such as refrigeration and synthetic flavor enhancements. AI's capability in machine learning algorithms enables the emulation of organoleptic properties, offering a diverse range of synthetic substitutes and artificial essences. This technological advancement has captured the attention of major players within the food industry, providing them with unprecedented opportunities to utilize AI in various applications, including the recreation of geographically-indicative (GI) labeled delicacies like Darjeeling tea or rasgulla. However, the advent of AI also presents a formidable challenge to the exclusivity of GI-tagged culinary offerings, akin to how refrigeration and artificial flavorings revolutionized the culinary landscape. The adeptness of AI in replicating organoleptic attributes has profound implications for the food industry. By leveraging machine learning algorithms, companies can create synthetic alternatives and artificial essences that closely mimic the taste and aroma of natural ingredients. This not only opens up new avenues for innovation but also presents opportunities to overcome limitations related to seasonality, availability, and geographical constraints. Furthermore, the recreation of geographically-indicative (GI) labeled consumables using AI technology poses a challenge to the traditional notion of culinary exclusivity. Just as refrigeration and artificial flavorings democratized access to certain foods, AI stands poised to democratize global gastronomic experiences by synthesizing delicacies like Neapolitan pizza, Swiss chocolate, or Camembert cheese.

Despite the potential benefits, the integration of AI into the gastronomic sector also raises ethical and cultural considerations. The commodification of traditional cuisines and the displacement of artisanal methods by mass-produced alternatives could lead to the loss of culinary diversity and

authenticity. Moreover, the reliance on AI-driven solutions may exacerbate existing inequalities within the food industry, favoring large corporations over smaller producers and artisans. Therefore, it is imperative to strike a balance between technological advancement and the preservation of culinary heritage. The assimilation of artificial intelligence (AI) into the gastronomic domain heralds a transformative epoch, akin to past innovations such as refrigeration and synthetic flavor enhancements. AI's ability to replicate organoleptic properties and recreate geographically-indicative (GI) labeled consumables has significant implications for the future of the food industry. While it offers unprecedented opportunities for innovation and accessibility, it also raises ethical and cultural concerns that must be addressed. Ultimately, the successful integration of AI into the gastronomic sector will require a careful balance between technological advancement, culinary tradition, and societal values.

## AI AND TEXTILE

The infusion of Artificial Intelligence (AI) into the textile production domain heralds a profound transformation, catalyzing enhancements across efficiency, quality, and innovation paradigms. The integration of AI methodologies, encompassing machine learning, neural networks, and data analytics, pervades myriad stages of textile fabrication, ranging from yarn inception to the final garment culmination, thereby facilitating heightened operational efficacy and product refinement.<sup>32</sup> AI finds application in fabric pattern scrutiny, exemplified by platforms like Cognex's ViDi, which adeptly discern fabric intricacies pertinent to weaving, knitting, braiding, finishing, and printing. This automated scrutiny mitigates human fallibility, accelerating the pace of quality assurance endeavors.<sup>33</sup> Concurrently, AI-driven defect identification mechanisms serve to pinpoint imperfections in textiles, ensuring the propagation of only pristine products to subsequent manufacturing phases.<sup>34</sup> A formidable challenge in textile fabrication pertains to chromatic synchronization and formulation precision. AI algorithms excel in this domain by assimilating extensive datasets to prognosticate optimal color matches and formulations, thereby engendering consistency and accuracy in color reproduction across diverse textile batches. AI's pattern recognition prowess transcends mere quality control precincts to encompass garment

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32 Raghav Bharadwaj, Artificial Intelligence in the Textile Industry – Current and Future Applications | Emerj, Emerj (2019), <https://emerj.com/ai-sector-overviews/artificial-intelligence-in-the-textile-industry-current-and-future-applications/>.

33 How Artificial Intelligence Is Transforming the Textile Industry, IoT For All (2021), <https://www.iotforall.com/how-artificial-intelligence-is-transforming-the-textile-industry>.

34 Kistamah, N. (2024), "The Applications of Artificial Intelligence in the Textile Industry", Fowdur, T.P., Rosunee, S., Ah King, R.T.F., Jeetah, P. and Gooroochurn, M. (Ed.) Artificial Intelligence, Engineering Systems and Sustainable Development, Emerald Publishing Limited, Leeds, pp. 257-269. <https://doi.org/10.1108/978-1-83753-540-820241020>

manufacturing domains. By assimilating and cognizing patterns, AI contributes to precise and efficient fabric cutting, thus curbing wastage and expediting garment assembly processes. AI systems undertake comprehensive analyses of operational data to streamline manufacturing processes, encompassing prognostication of machinery malfunctions, scheduling of maintenance activities, and optimization of inventory management protocols, thereby fostering seamless production workflows and attenuating downtime occurrences.<sup>35</sup>

In the realm of quality control, AI's adeptness in image processing emerges as pivotal. Through scrutinizing images of textiles, AI discerns imperfections imperceptible to the human eye, ensuring that only superlative-quality textiles permeate the market sphere. AI assumes a pivotal role in supply chain governance by prognosticating demand trends, optimizing inventory levels, and curtailing lead times. This augurs well for aligning production endeavors with market exigencies whilst concurrently curtailing inventory-related overheads. Foresight reveals a panorama of prodigious prospects vis-à-vis AI's integration into textile production. Envisioned realms encompass fully automated production lines, smart textiles interfaced with Internet of Things (IoT) peripherals, and personalized garment fabrication predicated upon individualized customer data. Moreover, the potential harnessing of AI for mitigating environmental impacts through resource optimization and waste mitigation represents an auspicious trajectory. The confluence of AI with textile production inaugurates a watershed epoch characterized by unparalleled precision, efficiency, and ingenuity. As AI's evolution persists, anticipations burgeon for even more transformative impacts upon the textile industry, endowing it with heightened competitiveness and sustainability within the global milieu. However, a caveat looms pertaining to the replication of GI (Geographical Indication) tagged products in textile format, wherein AI's capacity for replication might imperil the authenticity and distinctiveness of such products, potentially relegating them to generic status.

### **“Strategic Policy Development in the Wake of AI Advancements, Mitigating AI’s Effects: A Framework for GI Tag Preservation”**

The burgeoning advancements in Artificial Intelligence (AI) pose profound challenges, particularly concerning the conservation of Geographical Indications (GI) tags, pivotal in identifying the provenance of products and their idiosyncratic attributes tethered to specific

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<sup>35</sup>Sikka, M.P., Sarkar, A. and Garg, S. (2024), "Artificial intelligence (AI) in textile industry operational modernization", *Research Journal of Textile and Apparel*, Vol. 28 No. 1, pp. 67-83. <https://doi.org/10.1108/RJTA-04-2021-0046>

locales.<sup>36</sup> As AI continues its inexorable march, it becomes imperative to formulate astute policies aimed at mitigating potential adverse effects, particularly with regards to the preservation of GI tags.<sup>37</sup>

The potential of AI to replicate products raises existential concerns, potentially jeopardizing the intrinsic value and authenticity of GI-tagged products. Consider, for instance, the scenario wherein AI is adeptly employed to fabricate wine mimicking the taste and quality of a GI-tagged wine originating from a distinct region. While this technological feat is undeniably impressive, its ramifications could entail a dilution of the original product's uniqueness, thereby imperiling the livelihoods of traditional producers.<sup>38</sup>

In light of these apprehensions, we proffer a comprehensive policy framework poised to harness AI as a tool for enforcement and regulation while steadfastly safeguarding the sanctity of GI tags. This framework is delineated by the following strategic imperatives:

**AI Surveillance and Authentication:** Pioneering AI systems geared towards the continual surveillance and authentication of GI-tagged products. These systems would be tasked with scrutinizing product attributes and juxtaposing them against an extensive database of GI-tagged products, thereby ensuring veracity and authenticity. **Regulatory Vigilance:** Instituting stringent regulatory measures governing the utilization of AI in replicating GI-tagged products. Such measures may encompass mandating explicit labeling of AI-fabricated products and imposing punitive sanctions for instances of misrepresentation. **Stakeholder Inclusion:** Advocating for active stakeholder engagement, inclusive of traditional producers, in the policy formulation process. The invaluable insights garnered from these stakeholders serve to inform regulations that not only safeguard their interests but also foster an ecosystem conducive to technological innovation. **Public Awareness Campaigns:** Spearheading comprehensive public awareness campaigns elucidating the intrinsic value of authentic GI-tagged products and elucidating the potential ramifications of AI-fabricated alternatives. A discerning public, armed with pertinent information, is empowered to make informed decisions that buttress traditional producers.

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36 How is AI Used in Decision-Making?, ConverSight, <https://conversight.ai/blog/how-is-ai-used-in-decision-making/> (last visited Feb 25, 2024).

37 Brie Reece ✨, *How Integrating AI Elevates Every Company's Trajectory*, Women in Technology (2023), <https://medium.com/womenintechology/how-integrating-ai-elevates-every-companys-trajectory-38403c99924d>

38 IP and Frontier Technologies, [www.wipo.int](http://www.wipo.int), <https://www.wipo.int/about-ip/en/frontier-technologies/ai-and-ip.html>.

International Collaboration: Fostering synergistic collaborations with international entities to promulgate global standards and regulations. Such collaborative endeavors serve as a bulwark against the illicit proliferation of AI-fabricated GI-tagged products across disparate geographies.

The advent of AI heralds unprecedented opportunities, it behooves us to navigate these advancements judiciously, particularly in the context of GI tags. By charting a course guided by strategic policy formulation, wherein AI is wielded as a regulatory instrument, we can efficaciously uphold the integrity of GI tags whilst safeguarding the cultural heritage and economic vitality underpinning traditional producers.

### CONCLUSION

The advent of AI presents both unprecedented opportunities and profound challenges, particularly in the context of GI tags. While AI's potential to replicate products raises existential concerns, it also offers a potent instrument for fortifying GI tag enforcement mechanisms. By harnessing AI's analytical prowess and instituting stringent regulatory measures, societies can navigate this conundrum and perpetuate the enduring significance of GI designations. This treatise underscores the need for a judicious amalgam of technological advancement, reverence for tradition, and legal fortification to efficaciously uphold the integrity of GI tags whilst safeguarding the cultural heritage and economic vitality underpinning traditional producers. As AI continues its inexorable march, it behooves us to navigate these advancements judiciously, charting a course guided by strategic policy formulation, wherein AI is wielded as a regulatory instrument. The discourse thus concludes with an optimistic outlook towards a future where AI and GI tags coexist, fostering an ecosystem that upholds authenticity, preserves cultural diversity, and promotes economic resilience.