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GENERATIVE AI AND COPYRIGHT LAW: A COMPARATIVE ANALYSIS OF OWNERSHIP RIGHTS IN CONTENT PRODUCED BY LARGE LANGUAGE MODELS

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Abstract

The rapid proliferation of Large Language Models (LLMs) and multi-modal generative artificial intelligence systems has fundamentally disrupted international intellectual property law, challenging the foundational assumption that expressive creation is an exclusively human endeavour. This review article presents a comprehensive comparative analysis of ownership rights in AI-generated and AI-assisted content across four major jurisdictions: the United States, China, the United Kingdom, and the European Union. Drawing upon recent judicial rulings, administrative guidance, and statutory frameworks, the analysis examines how divergent philosophical foundations ranging from strict anthropocentric human authorship requirements to pragmatic economic incentive models are fragmenting the global legal landscape. The United States maintains a rigid human authorship doctrine, denying copyright protection to autonomous machine outputs while extending limited protection to human-authored elements in hybrid works. China has emerged as a notable exception, with courts vesting copyright in users who demonstrate iterative creative choice through prompt engineering. The United Kingdom's Computer-Generated Works framework statutorily allocates ownership to the person making necessary arrangements, while the European Union rejects copyrightability for pure AI outputs lacking human intellectual creation. The article further explores the dual risk paradigm confronting enterprises: downstream asset unprotectability and upstream infringement liability. It proposes corporate compliance protocols, including prompt logging, source code scanning, human creative intervention, and upstream data verification, to mitigate legal exposure. The analysis concludes that regulatory arbitrage opportunities and cross-border enforcement challenges necessitate a harmonised international approach to AI-generated content governance.

1. INTRODUCTION

The rapid evolution and widespread commercial deployment of Large Language Models (LLMs) and multi-modal generative artificial intelligence (AI) systems have created a fundamental disruption in international intellectual property law. Generative models, such as OpenAI's GPT-4, Anthropic's Claude, Midjourney, and Stable Diffusion, operate by analyzing vast corpora of human-created data to generate complex text,

software code, visual media, and musical compositions. This capacity to produce expressive material at scale challenges the foundational premise of historical copyright regimes: the assumption that expressive creation is an exclusively human endeavour (Tu et al., 2024).

The central legal challenge emerging across global jurisdictions concerns the ownership and protectability of outputs generated by or with the assistance of artificial intelligence. When an individual prompts a machine to produce a literary work, a visual design, or a line of computer code, a multi-layered legal inquiry arises: Does the resulting output qualify for copyright protection? If so, who holds the exclusive rights the AI software developer, the user who constructed the prompt, or the enterprise deploying the system? Alternatively, does pure machine output enter the public domain immediately upon generation (Chen et al., 2024).

This review article presents an exhaustive comparative analysis of the legal frameworks governing ownership rights in AI-generated and AI-assisted content across the United States, China, the United Kingdom, and the European Union. By evaluating recent judicial rulings, administrative guidance, and statutory frameworks, this analysis illustrates how differing philosophical foundations ranging from strict anthropocentric human authorship requirements to pragmatic economic incentive models are fragmenting the global legal landscape (Akhtar, 2024).

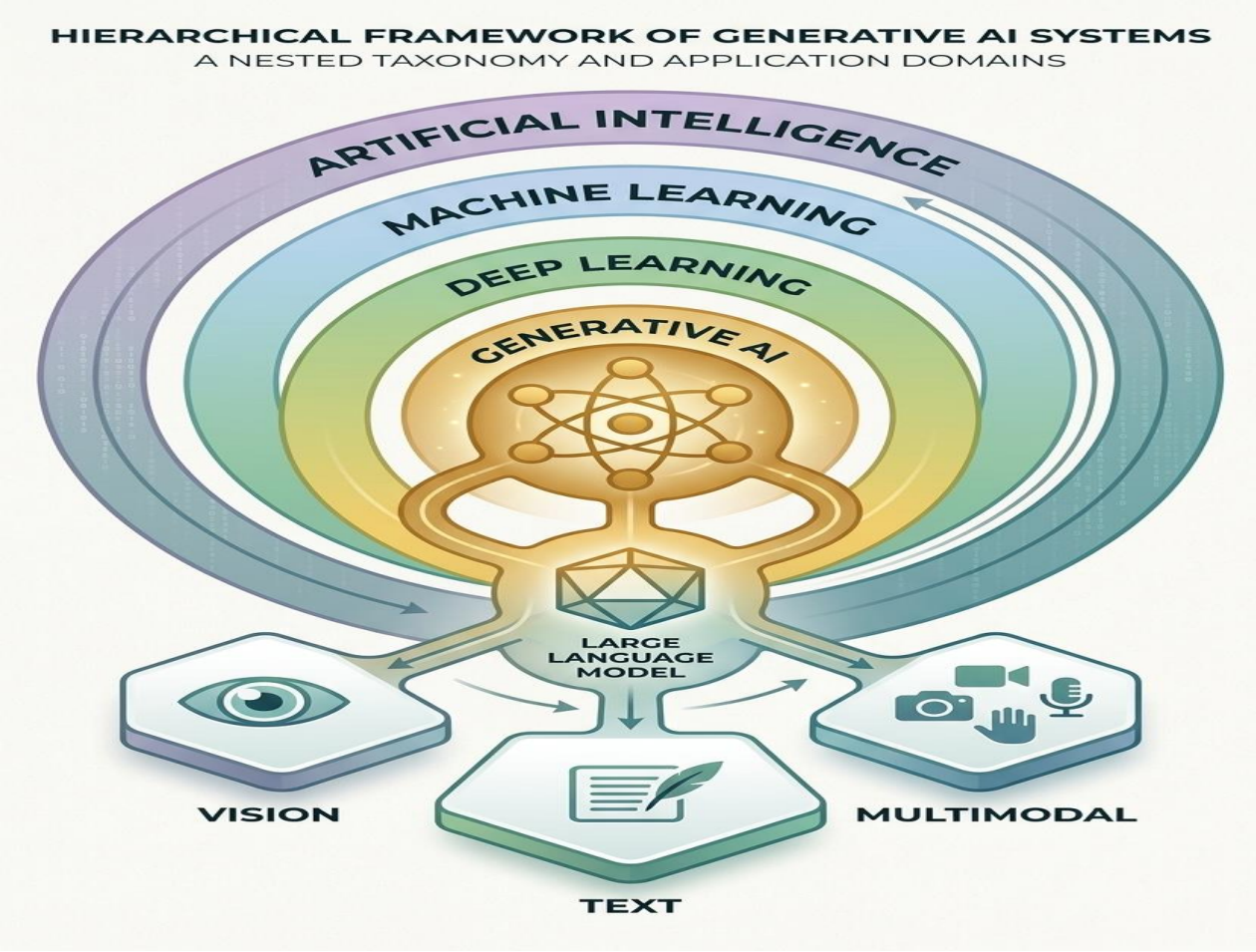


Figure 1: Hierarchical Taxonomy of Generative Artificial Intelligence Systems and Multi-Modal Output Applications.

2. Theoretical Foundations of Copyright and Machine Outputs

To understand the contemporary legal friction surrounding generative AI outputs, one must examine the theoretical imperatives that undergird copyright jurisprudence. Modern copyright systems are historically divided into two primary traditions: the Anglo-American utilitarian approach and the Continental European natural rights (*droit d'auteur*) framework. The utilitarian tradition, rooted in the U.S. Constitution's Intellectual Property Clause, views copyright as a pragmatic incentive mechanism designed to encourage the creation of intellectual works for public benefit (Hadi et al., 2023). Conversely, the civil law tradition views copyright as an extension of the author's personality, granting both economic rights and inalienable moral rights (*droit moral*) to protect the creative bond between the author and the work. Despite their structural differences, both traditions historically required a nexus of human agency, intellectual creation, and personal reflection (Wang et al., 2024).

In traditional creative workflows, technological tools such as cameras, word processors, or digital paintbrushes execute the precise expressive directives of the human operator. Generative AI disrupts this continuum by inserting an autonomous probabilistic layer between human intent and expressive execution (Carolan et al., 2024). Large Language Models operate through statistical pattern recognition, predicting token distributions based on training parameters rather than exercising conscious intent, aesthetic judgment, or emotional expression. Consequently, when a user enters a natural language prompt, the system independently determines the expressive elements such as syntactic structure, tone, color composition, or melodic progression without direct human intervention in the execution phase (Taha, 2026). This dynamic creates a profound legal dichotomy regarding the concept of original authorship:

- **The Idea-Expression Dichotomy**: Copyright protects the specific original expression of an idea, not the idea itself. In generative AI workflows, legal authorities increasingly view natural language prompts as mere conceptual ideas or commissioning instructions, leaving the expressive execution entirely to the probabilistic algorithms of the machine (Elmahjub, 2025).
- **Rejection of the "Sweat of the Brow" Doctrine**: Groundbreaking precedents, such as the United States Supreme Court ruling in *Feist Publications v. Rural Telephone Service Co.* and similar decisions in international courts, explicitly rejected the notion that sheer labor, computational power, or financial expenditure alone can justify copyright protection. A work must display a minimum spark of human creative originality to trigger statutory protection (Hugenholtz, 2025).

3. The United States Jurisprudential and Administrative Framework

3.1 The Human Authorship Doctrine and Judicial Precedents

United States copyright law maintains a strict anthropocentric standard, consistently holding that copyright protection requires human authorship. This principle was definitively affirmed in *Thaler v. Perlmutter*, where Dr. Stephen Thaler sought copyright registration for a visual artwork titled "A Recent Entrance to Paradise," explicitly identifying his autonomous AI system, the "Creativity Machine," as the sole author (Lim & Yu, 2024).

The U.S. District Court for the District of Columbia affirmed the Copyright Office's refusal to register the work, ruling that human authorship is a bedrock requirement of copyright law. The court noted that while copyright law is flexible enough to adapt to new artistic tools, it has never extended to works produced by new forms of technology operating absent any guiding human creative hand (Donahue, 2026). Following subsequent appeals, the principle remains firmly entrenched: autonomous machine outputs cannot hold copyright, nor can a human claim ownership over a work simply by virtue of owning or creating the underlying AI system. This judicial rationale draws directly from long-standing precedents excluding non-human entities from authorship, including judicial rulings denying copyright protection to photography executed autonomously by animals (*Naruto v. Slater*) or

literary texts attributed to non-human spiritual entities (Orfanidis, 2026).

3.2 US Copyright Office Registration Guidance and Policy Reports

In response to the proliferation of consumer-facing LLMs and text-to-image generators, the United States Copyright Office (USCO) issued formal policy statements and policy reports detailing the operational boundaries of registrability for works incorporating AI-generated content. The USCO's administrative framework establishes a clear analytical hierarchy for evaluating registrability (Bhatia & Sharma, 2026). When a work is produced entirely by artificial intelligence in response to natural language prompts, registration is refused because the traditional elements of authorship are determined and executed by the technology rather than the human user. Prompts are characterized as commissioning instructions analogous to instructing an architect or commissioned artist, where the resulting expression belongs to the executed entity rather than the instigator (Akin, 2025).

In contrast, hybrid or AI-assisted works that combine human creation with AI-generated outputs remain eligible for registration, provided the human author exercised sufficient creative control, selection, or arrangement. However, copyright protection extends exclusively to the human-authored elements, while the underlying AI-generated components must be disclaimed in the registration application (Ylikallio, 2025).

A foundational administrative precedent highlighting this distinction is the USCO's review of the graphic novel *Zarya of the Dawn* by Kristina Kashtanova. The Office recognized copyright protection for the human-authored text and the creative selection, coordination, and arrangement of the images within the graphic novel (Li, 2026). However, it explicitly canceled and reissued the registration to disclaim protection over the individual visual images generated by Midjourney, concluding that the prompt inputs did not give the user sufficient control over the final visual expression. The USCO reaffirmed these principles in Part 2 of its comprehensive *Report on Copyright and Artificial Intelligence*, maintaining that prompt engineering does not satisfy the requisite threshold of human creative control unless paired with substantial manual editing, creative selection, or physical alteration (Myrén, 2025).

4. The Chinese Judicial Model: User Input as Creative Authorship

4.1 Li Yunkai v. Liu Yuanchun and the Judicial Narrative

In stark contrast to the strict non-copyrightability stance observed in the United States, the judiciary in the People's Republic of China has emerged as a major global exception by granting copyright protection directly to AI-generated images based on user prompt configurations (Gibbons & Wang, 2007)

In November 2023, the Beijing Internet Court delivered a landmark ruling in *Li Yunkai v. Liu Yuanchun*. The plaintiff used the open-source image generation platform Stable Diffusion, applying a specialized fine-tuned model to generate an artistic image of a woman, which he subsequently published on social media. The defendant re-posted the image without authorization and removed the original watermark (Osborn, 2024).

The Beijing Internet Court held that the AI-generated image qualified as a work of fine art under Chinese Copyright Law, vesting original authorship and copyright ownership directly in the human prompt author. The court based its rationale on three core determinations:

- **Iterative Creative Choice**: The plaintiff did not merely input a simple prompt; he entered dozens of detailed positive and negative prompt keywords, selected specific parameter weights, adjusted fine-tuning models, and continuously tweaked stylistic attributes across multiple generation cycles.
- **Personal Aesthetic Expression**: The court concluded that these detailed inputs reflected the plaintiff's subjective aesthetic judgment, personal choices, and creative vision.
- **Tool Theory of AI**: The court classified the generative AI model as an instrument or tool of creation analogous to a camera or digital painting software rather than an independent legal subject or autonomous creator (Izyumenko, 2023).

4.2 Divergence from Academic Narratives and Subsequent Case Law

The *Li Yunkai* decision represented a major judicial departure from prevailing Chinese academic narratives, which historically maintained that AI outputs lack original human creation and should reside in the public domain. However, subsequent rulings have solidified this pragmatic judicial narrative. For instance, in *Lin v. Gauss Inflatable*, the Changshu People's Court similarly affirmed copyright protection for a visual output generated via Midjourney, reinforcing the principle that users who actively shape model outputs through iterative prompting and selection hold valid copyright ownership (Mukherjee & Chang, 2024).

This legal approach reflects China's broader national IP strategy and industrial policy. By granting legal protection to AI-assisted and AI-generated outputs, Chinese courts aim to incentivize commercial investments in AI application ecosystems, empower local digital content creators, and facilitate market liquidity in AI-generated content assets (Mohanty et al., 2025).

5. The United Kingdom's Computer-Generated Works Framework

5.1 Statutory Mechanics of Section 9(3) CDPA 1988

The United Kingdom occupies a unique position in global copyright jurisprudence due to its statutory protection for "computer-generated works" (CGWs), enacted decades prior to the advent of modern LLMs. Under Section 9(3) of the Copyright, Designs and Patents Act 1988 (CDPA), in the case of a literary, dramatic, musical, or artistic work which is computer-generated, the author is defined as the person by whom the arrangements necessary for the creation of the work are undertaken. Section 178 of the CDPA further defines a computer-generated work as one created by a computer in circumstances such that there is no human author of the work (Klobucnik, 2024).

This statutory scheme creates a legal fiction that resolves the human authorship dilemma through three distinct legal mechanisms:

1. **Deemed Authorship**: The law explicitly acknowledges that the output lacks a natural human author in the traditional sense, yet it creates a legal entity the person who "made the arrangements necessary" to hold economic rights.
2. **Abbreviated Term of Protection**: Unlike standard human-authored works, which enjoy copyright protection for the author's life plus 70 years, computer-generated works under Section 9(3) receive a shorter protection period of 50 years from the end of the calendar year in which the work was made.
3. **Absence of Moral Rights**: Works created under Section 9(3) do not attract moral rights, such as the right of attribution or the right to object to derogatory treatment, as moral rights are inherently linked to natural human personhood (Drury, 2025).

5.2 Policy Re-evaluations in the Age of Large Language Models

While Section 9(3) was originally designed for early algorithmic software, such as automated weather report generators or computer-assisted geometry engines, its application to deep-learning neural networks and probabilistic LLMs introduces severe operational ambiguity. The primary legal challenge revolves around identifying who precisely undertakes the "arrangements necessary" for an LLM's output. Legal scholars debate whether this title belongs to the software developer that designed the model architecture and funded computational training, the fine-tuning entity that curated the instruction dataset, or the end-user who composed the prompt and initiated the generation run (Paproki et al., 2025).

In official public consultations and technical policy reviews, the UK Intellectual Property Office (UKIPO) has evaluated whether Section 9(3) should be retained, amended, or repealed. Critics argue that granting automatic 50-year economic monopolies over raw computer outputs risks flooding the market with unoriginal synthetic content, thereby diluting the commercial value of human creation. Conversely, proponents contend that Section 9(3) provides direct statutory certainty

that attracts AI development capital to the UK market (Ball et al., 2017).

6. European Union Legal Regime and Transparency Mandates

6.1 Originality Standards under the DSM Directive

The legal regime of the European Union, grounded in civil law principles, firmly rejects copyright protection for outputs generated autonomously by AI systems. Under established Court of Justice of the European Union (CJEU) jurisprudence, such as *Infopaq* and *Painer*, a work is eligible for copyright protection only if it is original in the sense that it constitutes the author's own intellectual creation. To meet this threshold, the work must directly express the natural author's personality, reflecting free and creative choices during its execution (Gaffar & Albarashdi, 2025). Under the EU Directive on Copyright in the Digital Single Market (DSM Directive 2019/790), pure AI outputs that reflect algorithmic execution rather than direct human creative choices fail the originality test. Consequently, when an enterprise or individual enters a prompt into an LLM and receives an unedited output, that output falls immediately into the public domain across all EU member states. Protection can only be claimed over subsequent human manual edits or complex creative arrangements that independently meet the CJEU standard (Hugenholtz & Quintais, 2021).

6.2 The EU AI Act and Text and Data Mining Regulations

While European copyright law strictly limits output copyrightability, the EU has established comprehensive regulatory frameworks addressing the upstream training of generative AI systems through Regulation (EU) 2024/1689 (The EU AI Act). Article 53 of the EU AI Act imposes strict copyright compliance and transparency mandates on all providers of General Purpose AI (GPAI) models operating within the EU market (Wang & Xie, 2026).

GPAI developers must draw up and make publicly available a sufficiently detailed summary of the content and data used to train their models, identifying copyrighted materials. Furthermore, under Article 4 of the DSM Directive, rights holders possess the statutory right to formally opt out of having their online works mined for commercial Text and Data Mining (TDM). GPAI providers must implement state-of-the-art technological mechanisms to respect these machine-readable opt-out declarations. This legal framework establishes a strict asymmetry: while commercial AI developers face high compliance requirements regarding the copyrighted works used to train their models, the synthetic outputs generated by those models remain unprotectable under copyright law (Papadopoulou, 2026).

7. Comparative Synthesis

The legal frameworks governing generative AI outputs diverge significantly across major international jurisdictions. Table 1 provides a direct comparative synthesis of the statutory bases, human authorship requirements, copyright statuses of pure and hybrid outputs, legal treatment of prompts, and key regulatory provisions across the United States, China, the United Kingdom, and the European Union (Husnain, 2025).

Table 1: Comparative Jurisdictional Frameworks for AI Outputs and Prompts

Jurisdiction	Primary Legal Basis / Precedent	Human Authorship Required?	Status of Pure AI Outputs (Prompts Only)	Status of Hybrid / AI-Assisted Content	Treatment of Natural Language Prompts	Key Regulatory / Statutory Provisions
United States	*Thaler v. Perlmutter*; USCO Guidance & AI Report Part 2	Yes (Bedrock requirement)	**Public Domain** (Unregisterable)	**Protected** exclusively for human-authored elements/arrangements	Unprotectable ideas/instructions; insufficient creative control	17 U.S.C. § 102/107; USCO March 2023 Guidance
China	*Li Yunkai v. Liu Yuanchun* (Beijing Internet Court)	Yes (Inferred via creative user manipulation)	**Copyrightable** if prompts demonstrate personal aesthetic choice	**Protected** as works of fine art or software	Recognized as creative tools reflecting subjective choices	Chinese Copyright Law Art. 3; AIGC Interim Measures
United Kingdom	Copyright, Designs and Patents Act (CDPA) 1988 Sec. 9(3)	No (Statutory legal fiction for CGWs)	**Protected** for 50 years (Vested in "person making arrangements")	**Protected** under standard human rules or CGW rules	May constitute "arrangements necessary" for creation	CDPA 1988 Sec. 9(3) & Sec. 178
European Union	CJEU *Infopaq / Painer*; DSM Directive 2019/790	Yes ("Author's own intellectual creation")	**Public Domain** (Lacks free and creative human choices)	**Protected** only where human elements meet CJEU originality test	Insufficient to constitute personal expression	DSM Directive Art. 1, 4; EU AI Act (Reg 2024/1689) Art. 53

Comparing these global frameworks reveals distinct structural implications for international intellectual property management. In the United States and the European Union, prompt engineering is treated under the idea-expression dichotomy as an unprotectable specification because the machine determines the output probabilistically. In China, detailed prompt sequencing and parameter adjustments are recognized as the core creative act, effectively blurring the traditional boundary between an idea's specification and its execution (Kumar & Yadav, 2024).

This disparity creates opportunities for regulatory arbitrage in global digital assets. Multinationals generating commercial software or corporate

assets using LLMs face fragmented protection profiles. An AI-assisted commercial code base or graphic design created via prompt-based workflows may be completely unprotectable and freely copiable in the United States and Europe, while simultaneously holding enforceable copyright protection in China and statutory CGW protection in the United Kingdom (Akin, 2025).

Furthermore, cross-border asset enforcement presents complex choice-of-law challenges. Under conflict-of-laws principles governing intellectual property, such as the Second Circuit's precedent in *Itar-Tass Russian News Agency v. Russian Kurier, Inc.*, foreign courts evaluate copyright ownership based on the law of the country with the most significant relationship to the creation. A US court faced with an asset created in China under *Li Yunkai* principles may confront a jurisdictional conflict between recognizing foreign-acquired ownership rights and enforcing local public policy requirements for human authorship (Halwachi, 2024).

8. Strategic Implications, Corporate Risk, and Best Practices

8.1 The Dual Risk Paradigm: Upstream Liability vs. Downstream Unprotectability

Enterprises deploying LLMs and generative AI tools in core operations encounter a dual legal exposure that complicates corporate asset management. Downstream asset vulnerability arises when a company uses unedited LLM outputs for flagship software, brand assets, or commercial products, placing those assets in the public domain across major markets such as the US and EU. Competitors can duplicate, perform, and distribute these assets without triggering copyright infringement (Trapova, 2023).

Concurrently, enterprises face upstream infringement liability. Even if an output appears novel, the underlying model may have been trained on copyrighted material without authorization, exposing the developer and potentially commercial end-users to secondary infringement claims. High-stakes litigations, such as *The New York Times Co. v. Microsoft Corp. & OpenAI* and *Thomson Reuters v. Ross Intelligence*, highlight the commercial risk of model outputs reproducing training data (Oppedal, 2024).

Beyond copyright, state-level persona protections further complicate corporate risk profiles. For example, California's AB 2602 and AB 1836 establish strict consent requirements for AI-generated digital replicas of natural persons in performance and entertainment industries, adding statutory privacy and publicity liabilities to enterprise workflows (Hubert, 2024).

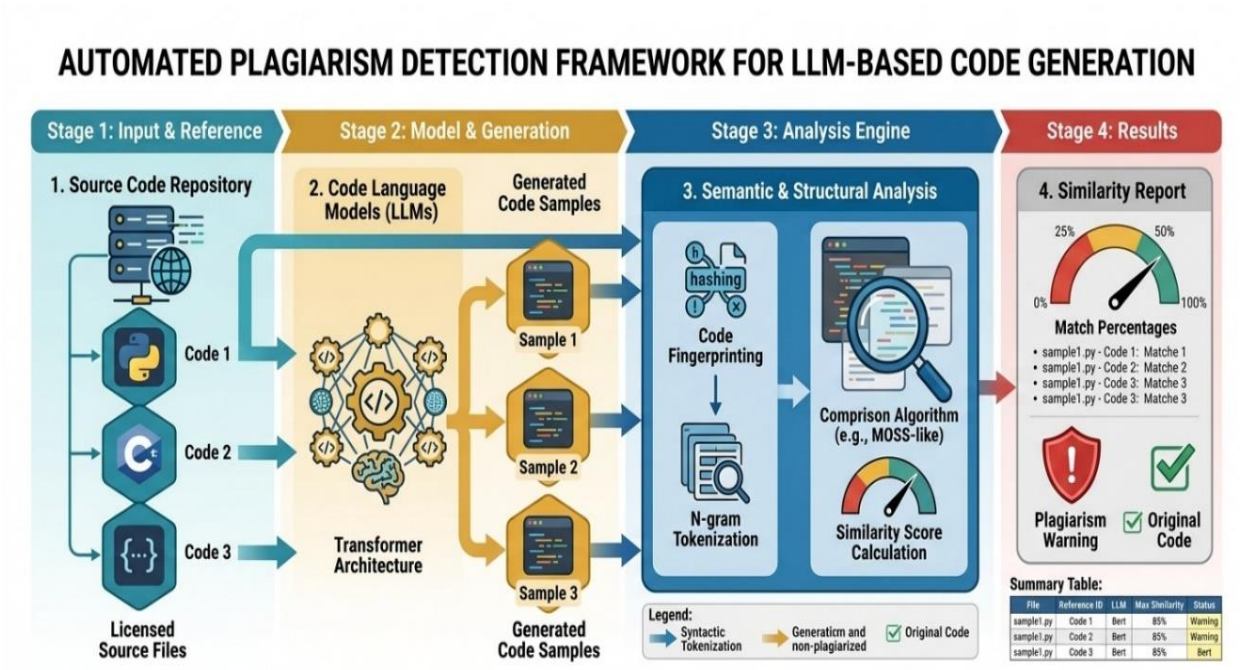


Figure 2: End-to-End Automated Plagiarism Detection Framework for LLM-Generated Source Code Across Multi-Stage Analysis Pipelines.

8.2 Corporate Compliance Protocols

To mitigate upstream liability and protect downstream asset enforceability, enterprises must adopt structured compliance workflows. Table 2 outlines the operational stages, specific compliance actions, and legal risk mitigation strategies required for corporate AI asset governance (Oržekauskaitė, 2025).

Table 2: Corporate AI Asset Compliance and Risk Mitigation Framework

Workflow Stage	Operational Compliance Action	Legal Risk Mitigation Purpose	Primary Relevant Regulations / Case Law
Output Ingestion & Logging	Maintain timestamped prompt logs, parameter configurations, seed numbers, and session histories	Establishes evidentiary record of human prompt manipulation and creative iterations	USCO Registration Guidance; *Li Yunkai v. Liu Yuanchun* [cite: 1, 3, 18]
Source Code Scanning	Deploy Software Composition Analysis (SCA) tools to scan generated code against open-source repositories	Prevents open-source license contamination (e.g., GPL/AGPL) and third-party copyright claims	*Thomson Reuters v. Ross Intelligence*; General IP compliance
Human Creative Intervention	Require human creators to manually rewrite text, modify code, or manually alter visual outputs	Ensures output contains sufficient human authorship to trigger statutory copyright	*Zarya of the Dawn*; USCO AI Report Part 2
Upstream Data Verification	Verify vendor license terms and enforce machine-readable TDM opt-outs under EU framework	Shields enterprise from secondary liability and	EU DSM Directive Art. 4; EU AI Act Art. 53

		protects proprietary data from model training	

Implementing these protocols ensures that organizations document human creative input at every production stage. Engineering and creative teams should maintain version histories containing timestamped prompts, parameter settings, session logs, manual edits, and rejected output iterations. This documentation provides the requisite evidentiary record to establish human creative contribution in USCO registration proceedings or judicial actions (Hadi et al., 2023).

In software development, companies using automated code generators must mandate SCA scanning to detect similarities to open-source software licenses and prevent restrictive licensing contamination. Furthermore, standard operating procedures should mandate human-in-the-loop creative intervention, requiring human authors to rewrite, rearrange, or manually refine AI-generated outputs to ensure that the final work contains independent human expression satisfying USCO and CJEU standards (Myrén, 2025).

Conclusion

This review has demonstrated that the legal frameworks governing ownership rights in AI-generated and AI-assisted content are profoundly fragmented across the United States, China, the United Kingdom, and the European Union. These divergences stem from deeply embedded philosophical traditions: the Anglo-American utilitarian emphasis on economic incentives, the Continental European natural rights doctrine of authorial personality, and China's pragmatic industrial policy favouring AI ecosystem development. The United States and the European Union treat natural language prompts as unprotectable ideas, denying copyright to purely machine-generated outputs. In contrast, China recognises detailed prompt engineering as a core creative act, while the United Kingdom's statutory fiction vests ownership in the person making necessary arrangements. These inconsistencies create significant opportunities for regulatory arbitrage, whereby AI-generated assets may be freely copiable in some jurisdictions while enjoying enforceable protection in others. Multinational enterprises face a dual risk paradigm: downstream asset unprotectability and upstream infringement liability arising from unauthorised training data. To navigate this uncertain terrain, organisations must adopt structured compliance protocols, including timestamped prompt logging, source code scanning, mandatory human creative intervention, and upstream data verification. Ultimately, the absence of international harmonisation threatens legal certainty and innovation. A coordinated global framework is urgently needed to balance incentives for AI development with the protection of human creativity and the public domain.

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