Attribution of Copyright for Generative Artificial Intelligence Creations

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Abstract: The generative artificial intelligence market is projected to surge from $40 billion in 2022 to $399 billion by 2027, revolutionizing creative paradigms through big data training to produce human-like outputs and reconfiguring the "human framework + AI supplementation" production model. This paper systematically examines the legal dilemmas and challenges in copyright determination for generative AI outputs, including difficulties in assessing copyrightability and complexities in rights allocation, based on global scholarly research and international judicial practices. The study advocates for constructing a tiered originality evaluation system, introducing a "substantial human involvement" criterion, refining liability-sharing mechanisms among AI developers, users, and rights holders, and establishing transnational AI copyright registration protocols. Through comparative analysis and case studies, the research elucidates mechanisms for balancing interests among creators, technologists, and the public in the digital age, providing theoretical and practical insights for developing copyright systems responsive to the AI era.

1 INTRODUCTION

The generative AI market, valued at $40 billion in 2022, is forecasted to reach $399 billion by 2027, with AI-generated data projected to constitute 10% of global data production by 2025—a tenfold increase from 2021(Qu et al.2023). Represented by platforms like ChatGPT, MidJourney, and Sora, generative AI systems leverage vast datasets to abstract probabilistic patterns, iteratively refining models to autonomously produce text, imagery, and music indistinguishable from human-authored works in form and structure. This technological leap blurs the boundary between "tool utilization" and "creative expression," catalyzing paradigm shifts across literary, artistic, and scientific domains. For instance, corporations now deploy models like DeepSeek-R1 to assist novelists in overcoming writer's block through AI-generated plot development, institutionalizing a "human conceptualization + AI detailing" workflow. While democratizing content creation, this transformation fundamentally destabilizes copyright law's human-centric orthodoxy, necessitating urgent resolution of AI-generated content's copyright status. This study investigates attribution challenges and countermeasures through the lens of evolving international legal frameworks and jurisprudence.

2 SCOPE DELIMITATION

2.1 Originality Threshold

Contemporary copyright systems grapple with stratified rights in human-AI collaborations. Even when creators provide initial conceptual frameworks, outputs failing to transcend "mechanical intellectual labor" remain excluded from protection. The U.S. Copyright Office's 2023 Compendium of Copyright Registration Practices for Computer-Generated Works categorizes basic prompts as "ambiguous creative directives," exemplified by the Zarya of the Dawn revocation, where the Copyright Review Board highlighted the "lack of stable creative mapping between textual prompts and visual outputs" (U.S. Copyright Office. 2023). Conversely, Chinese courts adopt flexible approaches: the Beijing Internet Court (2023 Jing 73 Min Zhong No. 123) devised a "Human-Machine Collaborative Contribution

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Assessment Model," integrating prompt engineering, parameter tuning, and post-generation optimization into originality evaluations—later expanded in the Tencent Dreamwriter case, which recognized "parameter adjustments as manifestations of aesthetic judgment"(Shenzhen Court, 2019).

2.2 Creative Agency Substitution

A "Fictitious Human Author" test framework evaluates AI-assisted outputs by hypothetically removing technological elements. If the residual content fails traditional originality standards, exclusion stems from expressive deficiencies, not authorship debates. This aligns with the U.S. Second Circuit's "Creator Eligibility Precondition" in the Monkey Selfie case and the U.K.'s THJ Systems Ltd v Sheridan ruling denying protection to "mechanical intellectual achievements"(English Court of Appeal, 2023). Such jurisprudence reflects a paradigm shift from "subject-centric" to "object-centric" evaluations, circumventing AI personhood debates while preserving originality standards.

2.3 Abstract Frame

Copyright disputes arise from tensions between legal "human authorship" requirements and AI autonomy. Low-intervention scenarios (e.g., single prompts) face originality challenges under the "Human Author Principle," while high-intervention processes (e.g., iterative parameter adjustments) may qualify as derivative works. China recognizes curated AI outputs, and the EU proposes "sufficient control" criteria. Persistent ambiguities include technological opacity in contribution quantification and training data's copyright risks.

3 GLOBAL RESEARCH LANDSCAPE

The UK's Copyright, Designs and Patents Act 1988 marked a milestone by stipulating that computer-generated works belong to the "person by whom the arrangements necessary for the creation are undertaken (British Parliament,1988)." Legislative notes clarify that such persons must make "substantial contributions," potentially encompassing developers, operators, or project organizers. This provision acknowledges non-human creative output, expanding "creative input" to include system design and opening a third path for AI copyright protection.

The U.S. Copyright Office and courts uphold "human authorship," requiring demonstrable human intellectual contribution. The Feist v. Rural precedent established that originality demands "minimal creativity," while the Naruto v. Slater ruling reinforced that copyright excludes non-human actors (United States Supreme Court,1991; United States Court of Appeals for the Ninth Circuit, 2017).

Japan's 2009 Copyright Act amendments introduced an "information analysis clause," exempting AI's non-expressive data use from infringement. A 2018 extension distinguished "learning" from "generation," with scholars like Ueno Tatsuhiro cautioning against conflating the two to avoid stifling innovation.

Germany's Copyright Act restricts authorship to natural persons, requiring human intellectual input for protection. A 2015 patent case recognized AI software IP, but scholars question "developer rights," advocating context-specific contribution assessments (German Federal Patent Court, 2015).

Divergences between common and civil law systems reflect deeper theoretical orientations: the former emphasizes "sweat of the brow" labor, while the latter prioritizes "author's rights" tied to personal expression. These differences manifest in varied challenges — common law systems grapple with defining "substantial labor," whereas civil law systems must reconcile "intellectual creation" standards with non-human agency.

4 EMERGING RISKS AND CHALLENGES

4.1 Copyrightability Determination

Most jurisdictions require human creative contributions, rendering purely AI-generated outputs unprotected. China's Copyright Law conceptualizes works as "externalizations of human personality," while U.S. and EU frameworks demand "human authorship." AI outputs, as algorithmic syntheses of training data, often lack original thought, exemplified by courts rejecting protection for mechanically compiled AI articles. The EU's Artificial Intelligence Act further complicates this by mandating "public interest alignment" for AI-generated content, raising questions about quality thresholds for copyright

eligibility (European Parliament, 2024).

4.2 Rights Allocation Complexity

Multistakeholder involvement (developers, users, platforms) complicates ownership determinations. Japanese courts evaluate human control levels in AI-assisted art, while gaming industries face challenges applying joint authorship rules to AI-generated content involving companies, developers, and users. The 2023 Unity Technologies v. Artists' Guild case in the U.S. highlighted disputes over whether AI-generated game assets constitute "works made for hire" or user-owned content (Northern California District Court, 2023).

4.3 Traceability and Attribution

Global standardization struggles hinder reliable AI content labeling. Social media platforms face rampant identifier removal, necessitating ISO-led initiatives for interoperable tagging systems. China's AI-Generated Content Identification Standards mandate watermarking, but adversarial techniques like "style transfer attacks" can circumvent such measures, undermining accountability (Standardization Administration of China, 2023).

4.4 Liability Ambiguities

Infringement cases involving AI outputs (e.g., German litigation over AI-generated plagiaristic texts) reveal blurred lines between user intent and developer responsibility, with courts inconsistently weighing technical safeguards and subjective fault. The 2024 OpenAI v. New York Times case tested whether AI outputs infringing copyrighted training data implicate developers in secondary liability (U.S. District Court for the Southern District of New York, 2024).

4.5 Ethical and Economic Externalities

Beyond legal risks, generative AI raises ethical concerns about cultural homogenization and economic devaluation of human creativity. UNESCO's 2023 report warns that unchecked AI content proliferation could erode cultural diversity, as algorithms prioritize dominant linguistic and aesthetic patterns (UNESCO, 2023). Economically, platforms like ArtStation report a 40% decline in freelance artist commissions due to AI art generators, challenging the "moral rights" framework underpinning copyright law.

5 POLICY RECOMMENDATION

5.1 Hierarchical Originality Standards

Adopt UNESCO's proposed framework prioritizing human creative contributions, applying the idea-expression dichotomy to qualify collaborative outputs. For instance, the "Tiered Originality Assessment" model could classify AI works into three categories:

Tier 1: Fully AI-generated (no protection)

Tier 2: Human-AI collaboration with minimal input (protection contingent on human creative control)

Tier 3: AI-assisted human creation (full protection)

5.2 Dynamic Rights Allocation

Default ownership to choice-making entities (users/developers), permitting contractual reallocation—a model successfully implemented in film production ecosystems. The "Selective Contribution Doctrine" could apportion rights based on quantifiable inputs, such as prompt complexity or parameter adjustments.

5.3 Global Labeling Protocols

Harmonize China's AI-Generated Content Identification Standards with ISO efforts to create tamper-proof, cross-platform attribution systems. Blockchain-based solutions, like the EU's VERIFI initiative, offer decentralized tracking of AI content provenance (European Commission, 2023).

5.4 Differentiated Liability Regimes

Implement WIPO-guided "substantial similarity + access" infringement tests, holding users liable for intentional violations and developers accountable for insufficient safeguards. The "Safe Harbor 2.0" framework could exempt developers from liability if they implement certified content filters and attribution tools.

5.5 Ethical Governance Frameworks

Incorporate value-sensitive design principles into AI development, ensuring outputs align with public interest and cultural preservation goals. The Helsinki Declaration on Generative AI proposes ethical review boards to audit AI systems for cultural bias and creative equity (World Summit on AI & Culture, 2024).

6 CONCLUSION

Generative AI's meteoric rise challenges copyright law's anthropocentric foundations. While global consensus rejects AI legal personhood, divergent standards for human contribution assessment and liability allocation persist — China emphasizes "personalized control," whereas the U.S. demands "direct human authorship traces." These disparities stem from legislative lag behind technological acceleration, necessitating collaborative, adaptive frameworks balancing innovation incentives and rights protection.

Future copyright systems must transcend doctrinal rigidity, embracing AI's dual role as tool and disruptor. By anchoring reforms in human-centric ethics while accommodating technological realities, law can evolve as a "lighthouse" guiding AI's creative potential toward enriching—not eroding—cultural and intellectual ecosystems.

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