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International Experiences in Applying Artificial Intelligence to Prevent Intellectual Property Infringement, and Implications for Vietnam

Abstract

The rapid evolution of artificial intelligence (AI) is transforming the enforcement of intellectual property (IP) rights worldwide. This paper examines how AI technologies are being applied internationally to detect, prevent, and manage copyright and patent infringement, and extrapolates key implications for Vietnam. However, advances of AI also raise complex legal, ethical, and policy questions. The study proposes a conceptual model integrating AI tools with human oversight to strengthen IP protection, and suggests that Vietnam adapt its legal framework and enforcement strategies in line with international best practices. In conclusion, Vietnam can leverage international experiences to craft forward-looking policies that harness AI in IP enforcement, bolstering its capacity to combat infringement in the digital era, while upholding legal and ethical standards.

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1 | Introduction

Intellectual property infringement has become a pressing global challenge, exacerbated by the digital transformation and the proliferation of online platforms, making it easier than ever to reproduce, distribute and exploit copyrighted works, patented inventions, trademarks, industrial designs, and domain names at a global scale.[1]

In the digital era, intellectual property (IP) infringement occurs rapidly and often transcends national borders, impacting various categories of rights. This reality places increasing pressure on both rights holders and enforcement agencies, particularly in contexts where resources are limited and the volume of potential infringement cases is substantial.

The emergence and rapid advancement of artificial intelligence (AI) have opened new opportunities to enhance the effectiveness of IP protection. Leveraging its capacity to analyse vast datasets, identify infringement patterns, and continuously improve over time, AI significantly shortens the process of detecting, pinpointing, and addressing IP violations.[2]

In practice, AI has been deployed across multiple domains of IP enforcement. In the digital content environment, automated recognition systems are capable of scanning and comparing user-uploaded files with databases of protected works, thereby swiftly identifying infringing content. In the fields of patents and industrial designs, machine learning algorithms can simultaneously analyse national and international patent databases, along with market information, to issue early warnings of potential infringement. Moreover, computer vision technology is being applied to detect counterfeit or trademark-infringing goods on e-commerce platforms, as well as to assist customs authorities in inspecting goods at borders.[3]

However, integrating AI into IP enforcement is not without legal, technical, and ethical challenges. Early detection systems based on fixed rules often missed sophisticated infringement tactics or produced false positives. Even with more advanced models—incorporating deep learning, natural

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[1] World Intellectual Property Organization, *Generative AI: Navigating Intellectual Property Challenges* (2023). https://www.wipo.int/publications/en/details.jsp?id=4644. [accessed: 10.8.2025].

[2] World Intellectual Property Organization, *WIPO Technology Trends 2019 – Artificial Intelligence* (Geneva: WIPO, 2020). https://www.wipo.int/tech_trends/en/artificial_intelligence. [accessed: 10.8.2025].

[3] Anirudh Ray, "AI in IPR: Leveraging Technology for Efficiency and Addressing Concerns" *Ile Lex Speculum*, No. 1 (2023): 333-341.

language processing (NLP), and computer vision—the risk of overreliance on algorithmic decisions continues to raise concerns over transparency, accountability, and the protection of procedural rights for affected parties.[4]

Furthermore, the legal frameworks governing AI in IP enforcement vary significantly across jurisdictions. The European Union, for example, requires online platforms to implement "appropriate and proportionate" content-filtering measures[5] to prevent infringement. By contrast, the United States continues to rely on the *notice-and-takedown* mechanism under the Digital Millennium Copyright Act (DMCA),[6] with AI-based detection systems such as YouTube's Content ID and Meta's Rights Manager deployed voluntarily by service providers.[7] Japan has amended its Copyright Act in 2020 to enable proactive scanning and blocking of infringing content, particularly in the manga and anime sectors[8] while South Korea adopts a hybrid approach combining notice-and-takedown with real-time AI monitoring in industries such as K-pop and online gaming.[9] These divergences create difficulties for implementing AI-based solutions across borders, especially for Vietnam – a country that must both safeguard its domestic IP rights and comply with international obligations.

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[4]   S. Subhadharshini, "A Critical Analysis of AI Infringement Detection from Legal Perspective with Special References to Chennai" *International Journal of Advances in Engineering and Management*, No. 7 (2024): 813-831; Marek Świerczyński, Zbigniew Więckowski, "Intellectual Property and Artificial Intelligence – Selected Issues" *Prawo i Więź*, No. 3 (2022): 179-202.

[5]   European Union, Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on Copyright and Related Rights in the Digital Single Market, Official Journal of the European Union, L130 (2019): 92–125, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32019L0790. [accessed: 10.8.2025].

[6]   United States Congress, Digital Millennium Copyright Act, Pub. L. No. 105-304, 112 Stat. 2860 (1998).

[7]   YouTube, *Content ID* (2024). https://support.google.com/youtube/answer/2797370. [accessed: 10.8.2025].

[8]   Agency for Cultural Affairs, Government of Japan, *Amendments to the Copyright Act* (2020). https://www.bunka.go.jp/english/. [accessed: 10.8.2025].

[9]   Korea Copyright Commission, Copyright Protection and Enforcement in the Republic of Korea (2023). https://www.copyright.or.kr/eng. [accessed: 10.8.2025].

1.1. Research Aim

Against this backdrop of increasing cross-border intellectual property (IP) violations in the digital environment, this paper examines selected international experiences in applying artificial intelligence (AI) to prevent infringements across the full spectrum of IP rights, including copyright and related rights, patents, trademarks, industrial designs, geographical indications, trade secrets, and domain names, and considers the implications for Vietnam's policymaking and legal framework. Drawing on scholarly literature, industry practices, and recent policy developments,[10] we analyse how AI technologies are transforming IP enforcement, with attention to technological mechanisms (e.g., content identification algorithms, patent analytics tools, trademark image-recognition systems, counterfeit detection using computer vision),[11] practical outcomes and limitations, and associated legal/ethical concerns such as data privacy and algorithmic bias[12]. Based on these findings, we propose a tailored model for integrating AI into Vietnam's IP enforcement system and offer recommendations for legal reform and institutional capacity-building.

1.2. Structure

The remainder of this paper is organized as follows. Section 2 reviews the existing literature and prior research, highlighting AI techniques for detecting copyright and patent infringement and summarizing key studies. Section 3 outlines the methodology of our comparative analysis and presents the proposed framework for AI-assisted IP enforcement. Section 4 reports findings from international implementations, identifying successful applications and challenges encountered. Finally, Section 5

[10]   European Commission, Guidance on Article 17 of Directive (EU) 2019/790 on Copyright in the Digital Single Market (Brussels: European Commission, 2021). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0288.
[11]   Megan McCutcheon, Jorge Marquez, "AI-Assisted Enforcement of Intellectual Property Rights: Opportunities and Risks" *Journal of Intellectual Property Law & Practice*, No. 9 (2022): 753-764.
[12]   European Union Agency for Fundamental Rights (FRA), "FRA Report on Use of AI in Predictive Policing and Offensive Speech Detection" *eucrim – European Criminal Law Associations' Forum* (2022). https://eucrim.eu/news/fra-report-on-use-of-ai-in-predictive-policing-and-offensive-speech-detection/. [accessed: 10.8.2025].

discusses the results and concludes with policy implications for Vietnam, recommending strategies for lawmaking and enforcement that incorporate global best practices while addressing domestic conditions.

2 | Literature Review and Previous Research Studies

2.1. AI in Copyright Infringement Detection and Enforcement

The application of AI to copyright enforcement has rapidly evolved into a mainstream practice as the proliferation of digital content increasingly outpaces the capacity for human oversight. Scholarly analyses and industry reports identify automated copyright detection as the most mature and widely implemented use of AI in intellectual property (IP) enforcement.[13] Major content-sharing platforms such as YouTube, Facebook, and TikTok deploy AI-driven systems – utilizing techniques like digital fingerprinting, audio spectral analysis, and image recognition – to identify unauthorized use of music, videos, text, and images by matching user uploads against databases of protected works. For instance, YouTube's Content ID system processed nearly 1.5 billion copyright claims in 2021, with approximately 99% handled automatically by algorithms.[14] This automation enables rights holders to enforce their copyrights at an unprecedented scale and speed, far beyond the capacity of manual review.

Academic studies have examined various AI methodologies to improve infringement detection. Early rule-based systems, limited to exact matches or simple file hash comparisons, struggled to interpret context and were easily circumvented by minor modifications to content. Contemporary approaches, notably deep learning models such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), can analyse audio-visual patterns with high precision – detecting pitch-shifted songs, cropped videos, or other transformed media that evade traditional filters. Natural Language Processing (NLP) techniques further allow AI to detect

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[13]   World Intellectual Property Organization, *WIPO Technology Trends: Artificial Intelligence* (Geneva: WIPO, 2023). https://www.wipo.int. [accessed: 10.8.2025].

[14]   YouTube, *Content ID Annual Report* (2022). https://support.google.com/youtube.

plagiarism or unauthorized use of textual works, even when paraphrased. These advancements have significantly enhanced the ability to address online piracy across domains ranging from academic literature to digital news and e-books.[15]

Nevertheless, literature highlights persistent challenges. Infringers employ tactics such as pitch shifting, tempo changes, audio equalization, and noise insertion to evade detection, creating an ongoing "cat-and-mouse" dynamic. Hybrid AI models that combine CNNs with Long Short-Term Memory (LSTM) networks have achieved detection accuracy rates exceeding 90% for such modified content.[16] Real-world incidents, such as the viral spread of the AI-generated "Fake Drake" track in 2023, illustrate AI's growing role in identifying synthetic works, with advanced voice recognition confirming the song's artificial origin and enabling its swift removal.

AI-driven enforcement also raises legal and ethical concerns. Automated notice-and-takedown systems, while efficient, transfer substantial enforcement control to private algorithms, prompting questions about transparency and due process.[17] Even a small false-positive rate can result in millions of wrongful takedowns. YouTube's data indicates that approximately 0.5% of automated claims are disputed, and 62% of these disputes are resolved in favour of the uploader, suggesting instances of over-blocking. The European Union's Directive on Copyright in the Digital Single Market (2019), particularly Article 17, attempts to balance automation with user rights by requiring platforms to prevent infringing uploads while safeguarding lawful uses, such as quotation, parody, and criticism.[18] Scholars and policymakers have therefore advocated for algorithmic transparency, third-party audits, and clear standards for acceptable error rates to align AI enforcement with legal norms.

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[15] M. Subhadharshini, "Artificial Intelligence Applications in Copyright Enforcement" *International Journal of Advanced Engineering and Management*, No. 1 (2024): 45-57.

[16] R. Subhadharshini, "Deep Learning Applications in Copyright Infringement Detection" *International Journal of Advanced Engineering and Management*, No. 3 (2024): 112-128.

[17] World Intellectual Property Organization, *WIPO Technology Trends 2023: Artificial Intelligence* (Geneva: WIPO, 2023), https://www.wipo.int/publications/en/details.jsp?id=4690.

[18] European Union, Directive (EU) 2019/790 on Copyright and Related Rights in the Digital Single Market, Official Journal of the European Union. https://eur-lex.europa.eu/eli/dir/2019/790/oj.

Finally, disparities in access to advanced AI tools create unequal enforcement capabilities. Large technology companies and major content owners can afford bespoke AI solutions, whereas small and medium enterprises (SMEs) and independent creators often rely on collective management organizations (CMOs) for rights protection.[19] This imbalance underscores the need for cooperative enforcement models or shared AI platforms to ensure equitable protection across the creative economy.

2.2. AI for Patent, Other Intellectual Property Infringement Detection and Enforcement

AI has emerged as a transformative tool in monitoring, detecting, and addressing infringements of IP rights. Leveraging NLP, ML, and computer vision, AI can process vast volumes of structured and unstructured data – from patent specifications to brand images – enabling early identification of potential violations that traditional, manual methods may overlook. This section examines AI's role in key IP domains, highlighting its operational benefits and inherent limitations.

2.2.1. AI in Patent Search, Monitoring, and Infringement Detection

AI is revolutionizing patent search and monitoring, empowering rights holders to protect their innovations against potential infringement. In the examination and novelty verification stage, AI-powered patent search systems can interpret the semantic meaning of patent specifications—rather than merely matching keywords – thereby identifying similar prior art even when described in different terms.[20] This enables a more comprehensive assessment of novelty, reducing the risk of granting patents that lack genuine inventive value.

Beyond novelty checks, AI assists in detecting potential infringements by analysing both the technical descriptions and drawings of patents, as well as market information on related products. Machine learning models can

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[19]   World Intellectual Property Organization (WIPO), *WIPO Technology Trends: Artificial Intelligence* (2023). https://www.wipo.int.
[20]   World Intellectual Property Organization, *Artificial Intelligence and Intellectual Property: A WIPO Overview* (Geneva: WIPO, 2023). https://www.wipo.int.

interpret the scope of claims and determine whether a product exhibits features that may infringe, even if technical terminology has been deliberately altered[21]. For instance, semantic search allows a new product to be cross-referenced against thousands of related patents to detect overlaps in claim scope, including cases where competitors attempt to circumvent protection by using alternative language.

Furthermore, AI tools can track competitors' patent applications and newly released products in real time, automatically issuing alerts if similarities or potential conflicts with an existing patent portfolio are detected.[22] This capability enables patent owners to take early action – such as sending warning letters, negotiating licenses, or preparing litigation – before damage escalates. The primary advantage of AI in this domain lies in its speed and scalability: tasks that previously required months of manual review can now be completed within minutes, with high precision.

AI can even automate the creation of claim charts – detailed comparisons between each element of a patent claim and the technical features of a suspected infringing product – a process that traditionally requires weeks of legal analysis. Such automation strengthens the evidentiary basis for litigation and streamlines enforcement procedures.

Nevertheless, AI is not without limitations. Current models may struggle to fully grasp the legal context or nuanced intent of highly technical patents, particularly when claim language is complex and industry-specific. As a result, AI outputs require validation and interpretation by experienced patent professionals to ensure compliance with legal standards. Occasional false alarms – such as detecting similarity where no actual infringement exists – or missed cases involving sophisticated design-arounds underscore the importance of combining AI's large-scale screening capabilities with human expertise. Under this hybrid model, AI handles broad-spectrum monitoring and rapid detection, while human experts verify findings and make final enforcement decisions.

[21]   Anirudh Ray, "Semantic Search and AI in Patent Analytics" *Journal of Intellectual Property Technology*, No. 4 (2023): 221-239.
[22]   Andrew Collopy, "AI and the Future of Patent Enforcement" *WIPO Magazine* (2024). https://www.wipo.int.

2.2.2. Trademarks

In trademark enforcement, AI enhances the detection of counterfeiting and unauthorized brand use across e-commerce platforms and social media. Computer vision enables the recognition of logos and packaging, even after deliberate alterations in colour, font, or partial display, while NLP detects phonetically or visually similar word marks, including misspellings and character substitutions. This capability facilitates continuous, global monitoring and rapid takedown requests. Nonetheless, AI may produce false positives, where legitimate uses occur, underscoring the need for legal teams to review flagged instances.

2.2.3. Industrial Designs

AI, particularly 2D/3D computer vision algorithms, supports the comparison of product shapes, proportions, and visual features against extensive design registries. It can quantify similarity using structural indices and detect minor alterations intended to evade enforcement. This accelerates prior design searches and increases detection objectivity. However, the final legal assessment of infringement still relies on human judgment, as high visual similarity does not always equate to legal violation.

2.2.4. Trade Secrets

For trade secret protection, AI-driven user and entity behaviour analytics (UEBA) monitor system logs, network activity, and communications to detect anomalies indicative of internal data leakage or cyber intrusion. Machine learning models establish baselines of normal behaviour and flag deviations, such as unusual file access patterns or off-hour logins. Integrated data loss prevention (DLP) tools can proactively block suspicious transfers of confidential files. While AI strengthens proactive defence, adversaries may adapt to mimic legitimate patterns, requiring continuous model updates and human oversight.

2.2.5. Domain Names

AI assists in combating cybersquatting by analysing newly registered domains for visual or semantic similarity to protected marks. It can detect typographical variations, homograph attacks, and large-scale squatting

patterns, integrating WHOIS and threat intelligence data to assess risk. Early alerts enable brand owners to initiate dispute resolution procedures promptly. As with other domains, human review ensures lawful uses are not wrongly challenged.

Across all IP types, AI offers substantial advantages in speed, scalability, and the ability to detect subtle infringement patterns. It enables 24/7 global monitoring, automates labour-intensive comparison tasks, and provides actionable insights faster than traditional methods. However, AI systems can generate false positives/negatives, struggle with complex legal interpretation, and remain dependent on high-quality training data. Therefore, optimal enforcement arises from hybrid approaches that combine AI's efficiency with expert legal analysis, ensuring both accuracy and procedural compliance.

2.3. Legal, Ethical and Policy Dimensions of AI-Based IP Enforcement

The deployment of AI in IP enforcement offers transformative efficiencies in detecting, monitoring, and responding to infringement. However, its integration into legal enforcement frameworks raises significant legal, ethical, and policy challenges that must be addressed to align with rule-of-law principles, fundamental rights, and international standards.

2.3.1. Transparency and Explainability

Many AI systems, particularly deep neural networks, function as "black boxes" whose internal decision-making processes are opaque. This opacity can undermine the legitimacy of enforcement if decisions to remove content or block products are made solely by automated means without clear reasoning provided to affected parties. In the European Union, Article 17 of the Directive on Copyright in the Digital Single Market requires platforms using automated upload filters to provide users with information about filtering mechanisms and to ensure meaningful human review of disputed cases. Ensuring that AI decisions in IP enforcement are auditable, explainable, and subject to independent oversight is considered essential for both legal compliance and public trust.

2.3.2. Accuracy, Bias and Fair Use

Ethically sound AI enforcement must minimize false positives (lawful content wrongly flagged) and false negatives (actual infringements overlooked). Bias in training datasets can lead to disproportionate protection for well-resourced rights holders while disadvantaging smaller creators or those in underrepresented languages. Furthermore, AI tools may inadequately interpret nuanced legal doctrines, such as the U.S. fair use or Commonwealth fair dealing exceptions, leading to over-enforcement. Misuse of automated notice-and-takedown systems by "copyright trolls" demonstrates the potential for abuse, underscoring the necessity of counter-notice procedures and sanctions for bad-faith claims. The overarching principle is that AI enforcement should balance the protection of IP rights with the safeguarding of legitimate uses, including commentary, education, and parody.

2.3.3. Using AI as a Tool to Enforce Intellectual Property Rights

Some perspectives argue that the use of copyrighted works as training datasets for AI is only temporary, and does not involve actual consumption of the content, and therefore does not significantly affect the rights or copyright protection of the rightholders. Companies employing such data often contend that this practice should be considered "fair use" under U.S. law (or "fair dealing" in some other jurisdictions).[23] By contrast, many copyright holders and their supporters claim that incorporating copyrighted works into AI training datasets constitutes a misappropriation of intellectual property rights and therefore cannot be deemed fair use under the law. A recent study has proposed the concept of "Develop-Fair Use" (DFU), which reconceptualizes fair use for AI as a tool of dynamic balancing rather than a fixed exception. DFU would allow courts to consider market impact and competitive effects in the AI context.[24]

In the field of copyright for AI-generated works, the theory of genericity is regarded as a useful tool to distinguish between genuinely creative

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[23]   Tarek Awad, "Universalizing Copyright Fair Use: To Copy, or not to Copy?" *Journal of Intellectual Property Law*, No. 1 (2022): 1-6.

[24]   Chao Lou, "Develop-Fair Use for Artificial Intelligence: A Sino-U.S. Copyright Law Comparison Based on the Ultraman, Bartz v. Anthropic, and Kadrey v. Meta Cases" *arXiv* (2025).

expression and elements that are merely familiar patterns, clichés, or scènes à faire. Content produced by generative AI models often contains elements that are repeatedly derived from training data, making them more generic than uniquely creative. A newly proposed approach suggests using data-driven bias to measure this degree of genericity: specifically, by analysing the frequency of expressive elements in the training dataset, it becomes possible to identify which components are generic and which are rare, carrying higher creative value. This method helps establish a clearer boundary between "reasonably generic" content – less likely to qualify for copyright protection – and highly creative content that deserves such protection. Thus, the combination of genericity theory with data-driven bias introduces a novel framework for copyright offices and courts in addressing disputes involving AI-generated works.[25]

2.3.4. Data Privacy

AI-based enforcement often entails large-scale monitoring of online content and transactions, which may involve processing personal or sensitive data. This raises compliance obligations under data protection regimes such as the EU General Data Protection Regulation (GDPR) and Vietnam's Personal Data Protection Decree (2023). International best practices, including those promoted by the World Intellectual Property Organization (WIPO), recommend a privacy-by-design approach – limiting data collection to what is strictly necessary and implementing robust safeguards against misuse or unauthorized access.

2.3.5. Jurisdiction and Due Process

AI enforcement mechanisms operate globally by default, yet IP rights are territorial. Automated filtering may inadvertently block content in jurisdictions where no infringement exists, creating conflicts of law. Due process requires that AI-triggered enforcement actions, such as website blocking or account suspension – be subject to human legal review. Vietnam's Intellectual Property Law, as amended in 2022, mandates that site-blocking

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[25] Uri Hacohen, Adi Haviv, Shahar Sarfaty, Bruria Friedman, Niva Elkin-Koren, Roi Livni, Amit H Bermano, "Not All Similarities are Created Equal: Leveraging Data-Driven Biases to Inform GenAI Copyright Disputes" *arXiv*, (2024).

measures (Article 198b) be ordered by competent authorities, preserving a human-in-the-loop decision-making safeguard.

2.3.6. Liability and Accountability

A central legal question is the allocation of liability when AI systems make erroneous enforcement decisions. Current frameworks hold the deploying entity – whether a platform or rights holder – responsible, as AI lacks legal personhood. Policy guidance emphasizes maintaining detailed audit logs of AI operations and assigning human supervisors to validate outputs. When state authorities use AI (e.g., customs deploying image recognition to detect counterfeit goods), errors could trigger state liability, reinforcing the need for rigorous testing and certification of AI enforcement systems.

2.3.7. Equity and Access

Advanced AI enforcement tools are typically concentrated among large multinational rights holders, creating a risk of unequal access to enforcement capabilities. WIPO and other international bodies have advocated for shared AI resources and capacity-building initiatives to support smaller rights holders and enforcement agencies in developing economies. Without such measures, the "enforcement gap" between resource-rich and resource-poor stakeholders may widen.

The literature supports a "responsible AI" paradigm in IP enforcement: harnessing AI's speed and scale while embedding it within a framework of transparency, proportionality, accountability, and human oversight. Comparative experiences from the EU, WIPO-led initiatives, and national regulatory models provide a foundation for developing balanced, rights-respecting enforcement systems in Vietnam and beyond.

3 | Methodology and Proposed Model

3.1. Research Methodology

This study adopts a qualitative, comparative approach, combining doctrinal legal analysis with a review of technological implementations. We conducted an extensive literature review of academic publications (including law journal papers, empirical studies, and technical papers) to gather theoretical and research-based insights on AI applications in IP enforcement. This was complemented by an examination of international case studies and reports from reputable organizations (e.g. WIPO, government agencies) and industry sources to capture practical experiences. By triangulating findings from scholarly research, legal developments, and real-world examples, we aimed to form a comprehensive picture of the state of AI-driven IP infringement prevention across different jurisdictions.

Our analysis particularly focused on jurisdictions that have made notable strides or faced significant controversies in this domain – including the United States, the European Union, China, and select Asia-Pacific countries – as well as global perspectives from bodies like WIPO. For each, we reviewed relevant laws (such as the U.S. DMCA framework and EU Directive 2019/790 on Copyright in the Digital Single Market), policy documents, and any available data on enforcement outcomes. We also reviewed Vietnam's current IP enforcement landscape and legal provisions (e.g., Vietnam's Intellectual Property Law, amendments in 2022, related cybersecurity regulations) to understand the baseline from which Vietnam would be integrating AI tools.

The methodology is inherently interdisciplinary, as the subject spans law, technology, and public policy. We therefore incorporated aspects of legal research (statutory and case law analysis, comparative law) and technology assessment (evaluating capabilities of AI systems and their documented effectiveness). No human subjects or surveys were involved; all data were drawn from secondary sources in the public domain. Given the rapidly evolving nature of AI, we emphasized sources from the last five years (2020-2025) to ensure currency.

The comparative analysis sought to identify both best practices and challenges observed internationally. Best practices include successful AI deployments (e.g. content ID systems, AI-assisted customs inspections) and supportive legal frameworks (e.g. clear guidelines for platform liability and user rights in the EU). Challenges include common obstacles

(e.g. algorithmic errors, lack of resources, legal gaps) that transcend jurisdictions. By extracting these patterns, we distilled key factors that any jurisdiction – and specifically Vietnam – should consider.

3.2. Proposed Model for AI-Assisted IP Enforcement

Drawing on the findings of this study, we propose a three-pillar conceptual framework for the integration of artificial intelligence (AI) into intellectual property (IP) enforcement in Vietnam. The model comprises: (1) Technology Infrastructure for Detection, (2) Legal–Adjudicative Framework, and (3) Collaborative Governance Mechanisms. Each pillar addresses a critical dimension of effectiveness, legitimacy, and sustainability.

3.2.1. Technology Infrastructure for Detection

At the core is an AI-powered detection system capable of continuous, real-time monitoring for potential IP infringements. For copyright protection, this could take the form of a centralized, government-backed or consortium-based platform employing advanced content recognition algorithms to scan popular platforms in Vietnam, such as domestic social media, streaming services, and e-commerce marketplaces, for unauthorized use of protected works. In the patent domain, AI-driven text and image analytics could be used to monitor online marketplaces, technical publications, and import/export databases for indications of unauthorized exploitation of patented inventions.

The system should be modular and upgradeable, enabling rapid adaptation to emerging infringement patterns, including AI-generated deepfakes or synthetic works. Crucially, it must embed audit and transparency mechanisms – recording each flagged action with metadata (time, reason, confidence score) – to facilitate subsequent human review and strengthen procedural fairness. The UK's s Anti – Copying In Design (ACID) maintains a databank of over 300,000 designs (including unregistered designs) that could provide data to train an AI to recognise infringing designs. By using this dataset, AI can be trained to recognize patterns, features, and similarities across designs, which enables the automated detection of potentially infringing products. Such a system could significantly speed up the process of monitoring marketplaces, both online and offline, and provide design owners with faster alerts regarding potential infringements.

3.2.2. Legal-Adjudicative Framework

The second pillar ensures that AI outputs are integrated into a due process-compliant enforcement structure. AI-generated infringement alerts would be subject to human verification by a specialized "IP Enforcement Unit" within the National Office of Intellectual Property or an inter-agency task force. This aligns with Vietnam's establishment of a Specialized IP Court (effective 2025), which could provide judicial oversight for contested AI-driven enforcement actions. Evidentiary rules should be updated to recognize AI-generated findings as *prima facie* evidence, sufficient to trigger action, but rebuttable through counter-evidence or legal argument. Legislative amendments may be required to formally integrate AI evidence into procedural codes, set liability standards for misuse, and impose penalties for rights holders or entities engaging in bad-faith automated takedowns.

In addition, for the collection of evidence in cases of intellectual property infringement in cyberspace, where AI applications are used, the seizure and preservation of exhibits in the form of electronic technology methods and devices must be carried out by the competent authorities and procedural bodies. This process differs from the seizure of common exhibits, documents, or objects. Where necessary, experts may be invited to participate, in order to ensure that no damage or loss of information and data stored in the devices occurs. The activities of crime scene examination and evidence collection must be documented in accordance with Article 178 of the Criminal Procedure Code. The record of seizure must include a complete list and detailed description of the seized exhibits, clearly indicating the location, characteristics, shape, dimensions, colour, and distinctive features for identification, as well as the actual condition of electronic means and accompanying devices (such as computer hard drives, phones, USB drives, memory cards, cameras, and camcorders).[26] At the same time, photographs of the scene and exhibits must be taken, and diagrams must be drawn to reflect the location, traces, devices, and electronic means discovered and collected. These requirements necessitate coordination between artificial intelligence systems and the procedural

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[26]   Pham T. Tran, "Legal Provisions and Practical Aspects of Evidence Collection in High-Tech Crimes," [in:] *Proceedings of the Conference Cybercrime from Criminal Law Perspective* (Ho Chi Minh City: Ton Duc Thang University & People's Police University, People's Public Security Publishing House, n.d.), 352–353.

authorities to ensure compliance with procedural rules, going beyond merely applying technology in the procedural process.

3.2.3. Collaborative Governance Mechanisms

The third pillar focuses on cooperation between the public sector, private platforms, and international stakeholders. Public–private partnerships would facilitate integration of AI tools into enforcement workflows, including access to proprietary content ID systems from major global and domestic platforms. Inter-agency collaboration—linking IP enforcement with cybersecurity, customs, and criminal law authorities—would expand the scope of AI application, such as image recognition for detecting counterfeit goods at borders. International engagement, particularly through the World Intellectual Property Organization (WIPO), would enable Vietnam to participate in pilot projects, share best practices, and secure capacity-building support. A sustained human capital development strategy, involving universities and research institutions, is essential to maintain, refine, and localize AI enforcement systems over time.

To effectively prevent and combat crimes or legal violations involving the use of high technology that infringe upon intellectual property rights, competent procedural authorities need to allocate funding to build infrastructure, equip specialized devices, electronic tools, and modern software to collect, process, and preserve electronic data, as well as audio-visual equipment for investigation and surveillance activities. The investment in technical equipment must be based on the actual requirements of investigation, prosecution, and adjudication activities, as well as the capacity of each unit, in order to select appropriate quantities and types. This ensures adequate working conditions for law enforcement forces in their efforts to fight against crimes and intellectual property infringements in the context of rapidly advancing technology.

3.2.4. Integration and Workflow

In practice, the workflow could be structured as follows: AI detects a potential infringement → the alert is sent to the IP Enforcement Unit → clear infringements trigger standardized takedown/block notices citing legal authority and evidence → borderline cases are escalated to human review or judicial determination → outcomes are logged and used to enhance AI performance. This model seeks to combine technological efficiency with

legal legitimacy and policy inclusiveness, ensuring that Vietnam can adopt AI in IP enforcement while safeguarding rights, maintaining transparency, and fostering equitable access to enforcement resources.

4 | Research Results

Drawing on the comparative analysis, this section presents the principal findings regarding the application of AI in combating copyright and patent infringement globally, together with observed outcomes. The results are organized thematically as follows.

4.1. Acceleration and Scale-Up of Enforcement

Across multiple jurisdictions, AI deployment has markedly accelerated the enforcement of IP rights, particularly in relation to online copyright infringement. In the United States and the European Union, large online platforms report that the vast majority of infringement actions are now handled through automated systems. YouTube's Content ID, available globally, processes over 98-99 % of copyright claims automatically.[27] Facebook and Instagram likewise employ AI-based filtering technologies – such as Audible Magic for audio and proprietary algorithms for images and video – to detect unauthorized content at the point of upload, often blocking it within seconds. Rights holders in the music industry report that, whereas it once took days or even weeks to remove infringing works, automated filters now often detect and remove such content before it becomes publicly accessible.[28]

China demonstrates similar large-scale monitoring: Tencent's platforms, such as WeChat, employ AI to scan billions of messages and file shares for potential IP violations, while Alibaba's AI systems scrutinize millions of product listings daily to detect counterfeit or infringing goods.[29]

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[27] Musically, "How Content ID Works," n.d. 2025. https://musically.com. [accessed: 10.8.2025].

[28] Ibidem.

[29] Digital Defynd, "How Alibaba Fights Counterfeiting with AI," n.d. https://digitaldefynd.com. [accessed: 10.8.2025].

In the field of patent enforcement, although detection is not as instantaneous, AI-powered analytics have significantly reduced the time required to conduct infringement searches – from weeks of manual work to mere hours. One European technology firm reported that by using an AI tool to generate claim charts (mapping product features to patent claims), it reduced litigation preparation time by approximately 50 %[30]. Such efficiencies enable companies to take swifter enforcement action, potentially preventing further harm and even initiating pre-emptive measures against suspected infringers soon after product launch.

4.2. Improved Effectiveness

Evidence from anti-piracy and anti-counterfeiting initiatives indicates measurable improvements in enforcement effectiveness with AI adoption. For instance, YouTube's Content ID has identified and managed a vast corpus of infringing videos, generating more than USD 5 billion in monetized claims for rights holders since the system's inception.[31] The very presence of such systems also acts as a deterrent: users are aware that blatant uploads of popular works will likely be detected, shifting much infringement toward more covert methods.

In the counterfeit goods sphere, Alibaba reports removing 95 % of infringing listings via AI-powered detection, substantially reducing the availability of counterfeit products on its platforms.[32] Other major e-commerce operators, including eBay and Amazon, employ similar systems to identify counterfeit or patent-infringing products, leading to the removal of tens of thousands of sellers annually.

However, determined infringers adapt quickly, giving rise to an "arms race" between enforcement systems and evasion tactics. For example, in the music industry, infringers have adopted techniques such as extreme pitch alteration or slicing songs into segments to evade detection, prompting the development of more advanced AI capable of recognizing manipulated versions. Consequently, while AI has increased effectiveness, enforcement

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[30]   Snapdragon IP, "AI in patent enforcement," n.d., https://snapdragon-ip.com. [accessed: 10.8.2025].
[31]   Musically, "How Content ID works."
[32]   Digital Defynd, "How Alibaba fights counterfeiting with AI."

agencies emphasize that it is part of a continuous improvement cycle, rather than a one-time solution.

This demonstrates that while AI is a powerful tool, it is not a definitive solution, since technological offenders can also exploit AI to generate increasingly sophisticated infringing content. Moreover, the risk of "false positives" can cause harm to legitimate businesses, highlighting the need for transparent and expedited complaint and appeal mechanisms. In this context, multi-stakeholder cooperation – among e-commerce platforms, rightsholders, public authorities, and consumers – is essential, alongside complementary technological solutions, such as blockchain for product traceability and next-generation AI capable of detecting complex modifications. This combined approach is necessary to enhance the effectiveness of anti-counterfeiting measures and safeguard intellectual property rights in the digital era.

4.3. Error Rates and Disputes

Empirical evidence confirms that AI-based IP enforcement systems inevitably generate both false positives and false negatives, and that the manner in which such errors are addressed is critical to their legitimacy and effectiveness. For example, YouTube's Content ID system reports that approximately 0.5% of automated claims are disputed, with more than half of these resolved in favour of the user.[33] Similarly, when Instagram launched an AI filter for copyrighted music in live streams, there were widely publicized cases where the system erroneously muted live performances of artists' own original compositions, mistaking them for unlicensed works. These incidents prompted user backlash and subsequent algorithmic adjustments.

The European Union, in the course of implementing Article 17 of the DSM Directive, explicitly acknowledged the risk of "over-blocking" and has required platforms to incorporate user complaint mechanisms.[34] Early reports from Germany and France indicate that, while upload filters function as intended, legitimate content has at times been wrongfully removed, necessitating manual reinstatement.

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33   Musically, "How Content ID works."
34   Communia Association, *Article 17 Implementation Analysis* (2021).

In the patent sphere, AI tools often produce high volumes of false positives—flagging products that, upon closer legal and technical scrutiny, do not infringe. Companies utilizing AI for patent scans still rely heavily on patent attorneys to review the AI-generated lists, with a substantial proportion of flagged cases ultimately dismissed. Anecdotal evidence suggests that, for complex technologies, a highly sensitive AI model may incorrectly flag 30–40% of items to avoid missing any potential infringement.[35]

The key takeaway is that human oversight significantly enhances precision. Hybrid approaches, termed "Augmented Intelligence" by some practitioners, achieve higher confidence levels in enforcement actions. Moreover, as AI models are continually retrained with data from human-corrected errors, accuracy tends to improve over time. However, the introduction of new content types or infringement tactics can temporarily spike error rates until models are adapted.

4.4. Legal and Institutional Reforms Underway

International practice reveals that AI adoption in IP enforcement is often accompanied by parallel legal reforms and institutional strengthening. In the European Union, the DSM Directive imposes obligations on large platforms to deploy automated measures while mandating enhanced user rights protections. In the United States, while no federal statute requires filtering, both the U.S. Copyright Office and the USPTO have undertaken studies on AI's impact on copyright and patent enforcement. The U.S. Copyright Office's 2023 report on AI and copyright examined, inter alia, the challenges posed by AI-generated content for enforcement regimes. Legislative proposals have suggested updating the DMCA to address automated takedowns and promote standardized content-recognition technologies, although none have yet been enacted.

In Asia, China has adopted a more administrative approach, collaborating closely with technology firms to deploy state-of-the-art AI not only for IP enforcement but also for content regulation and misinformation control. Amendments to China's E-Commerce Law have strengthened platform liability for IP infringement, implicitly incentivizing high-tech solutions. Japan and South Korea have initiated pilot projects through their IP offices to deploy AI in prior art searches and potential infringement

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[35]   TT Consultants, *AI in Patent Analytics* (2023).

analysis, while also studying the admissibility of AI-generated evidence in judicial proceedings.

Some jurisdictions are exploring certification schemes for AI enforcement tools – where a government certifies that a content-recognition technology meets defined reliability standards, potentially offering platforms a safe harbour if they use certified systems.

Institutionally, many countries are upgrading enforcement bodies. The UK has established the "IPO Intelligence Hub", which employs data analytics (though not yet full AI) to combat counterfeiting and piracy. Vietnam's creation of a Specialized IP Court aligns with this global trend, enhancing judicial capacity to assess AI-derived evidence. Notably, specialized IP courts in China have experimented with AI systems to assist in determining statutory damages in copyright disputes by analysing case trends – an example of AI supporting judicial decision-making.

4.5. Lessons on Policy Safeguards

Cross-jurisdictional experiences yield several key lessons for policymakers: User Complaint and Redress Mechanisms: Effective systems incorporate clear channels for users to contest automated enforcement actions—whether via internal platform review, mediation, or court proceedings. For example, Germany's implementation of Article 17 allows immediate reinstatement of content if a user asserts its legality (within defined thresholds) pending final adjudication. The application of AI in the field of intellectual property is not only a technical matter but also closely linked to governance and legal policies. Therefore, Vietnam needs to promptly issue legal provisions on the evidentiary value of electronic evidence and data processed by AI, as well as establish a fast-track mechanism for resolving disputes in cases where businesses are adversely affected by erroneous analyses. At the same time, the State should promote public–private partnerships and encourage domestic technology enterprises and universities to participate in developing "Make in Vietnam" AI solutions, which would both reduce costs and strengthen endogenous capacity. This will provide an essential foundation for Vietnam to enhance the effectiveness of intellectual property enforcement in the context of global digital transformation.

Transparency Reporting: The EU requires platforms to disclose statistics on takedowns, disputes, and reinstatements, enhancing accountability. Platforms such as YouTube and X (formerly Twitter) regularly publish

transparency reports on IP enforcement, a best practice that could be replicated in Vietnam. Transparency reporting regulations in the field of intellectual property (IP) in the EU are designed to foster public oversight and encourage platform compliance. Major platforms such as YouTube, Twitter (now X), and Meta regularly publish figures on the number of content removals, the number of disputes raised by users or rightsholders, as well as the average processing time. This enables the assessment of effectiveness: regulators, researchers, and rightsholders can rely on these data to determine whether AI technologies or automated moderation mechanisms operate accurately or lead to errors (for example, the mistaken removal of lawful content). In addition, fair competition should be encouraged: when all platforms are required to publish data, transparent comparison incentivizes them to invest more in AI technologies and appeal procedures in order to maintain credibility. However, certain risks should be noted, such as the tendency of reports to provide only aggregate numbers without sector-specific details (e.g., music, software, fashion), making it difficult to assess the real impact. If appeal mechanisms are not sufficiently robust, "transparency" may remain only superficial, failing to ensure the rights of stakeholders. Furthermore, standardizing transparency reports requires significant resources, which can pose challenges for small and medium-sized enterprises.

Thus, transparency reporting is not merely a tool for ex-post oversight, but also serves as a risk-prevention mechanism, ensuring a balance between protecting IP rights and safeguarding the freedom of legitimate creativity and business activities.

Government Use of AI: Enforcement agencies themselves can benefit directly from AI. For instance, EU customs authorities, in collaboration with the EUIPO, have deployed the "Objectify" AI image-recognition tool to detect counterfeit logos on scanned images of shipping containers, significantly increasing interception rates without proportional staffing increases. In addition, AI should be utilized to fully exploit electronic databases. At present, the Intellectual Property Office of Vietnam has introduced the "Digital Library on Industrial Property based on the WIPO Publish platform" to replace the former IPLIB search tools, while continuing to promote the implementation of the one-stop-shop and interconnected one-stop-shop mechanisms, and to improve the quality of administrative procedure reception and result delivery. However, the integration of these information centres and administrative procedures must be carried out in a synchronized manner, with careful consideration of AI applications.

Furthermore, consideration should be given to allocating budgetary resources for the implementation of artificial intelligence as a tool for enforcing intellectual property rights. According to the 2022 Annual Report of the Intellectual Property Office of Vietnam, the total amount of industrial property fees and charges collected reached VND 365 billion (an increase of 6% compared to 2021, and 6% higher than the planned target).[36] To implement artificial intelligence in the enforcement of intellectual property rights, Vietnam needs to establish a clear and feasible budget allocation plan. A suitable approach would be to earmark approximately 5–10% of the annual industrial property fee and charge revenue (equivalent to VND 18–36 billion based on 2022 figures) for a three-year pilot phase.

This budget should be directed toward three core objectives. First, building an integrated national intellectual property database capable of interconnecting with customs, market surveillance, and court systems. Second, developing AI-powered online monitoring tools, such as automated data collection software (web crawlers) and image recognition technology, to detect counterfeit goods and copyright infringements on e-commerce platforms as well as social networks. Third, investing in the training of specialized human resources – including examiners, investigators, and judges—to equip them with the skills to use and assess electronic evidence, ensuring that AI systems operate effectively and in line with legal requirements.

The deployment of AI in intellectual property enforcement entails significant risks. Financially, the initial investment costs are often substantial, while the benefits may not be immediately apparent, making it necessary to design phased expenditure plans and periodic evaluation mechanisms to ensure investment efficiency. Technically, AI systems may produce erroneous results (false positives), mistakenly identifying legitimate products as infringements, which can negatively affect genuine businesses. This requires combining automated AI analysis with human expert verification. In addition, legal risks arise due to the absence of clear regulations on the evidentiary value of AI-generated evidence, potentially leading to disputes when such evidence is presented in court. Furthermore, intellectual property data are highly sensitive and vulnerable to attacks or leaks, necessitating parallel investment in cybersecurity and data protection systems.

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[36] Intellectual Property Office of Vietnam, *Annual Report 2022* (2022). https://ipvietnam.gov.vn/bao-cao-hang-nam/-/asset_publisher/vTLYJq8Ak7Gm/content/annual-report-2022?inheritRedirect=false. [accessed: 10.8.2025].

In sum, while AI is becoming indispensable for IP enforcement, its deployment must be accompanied by structured oversight, continual adaptation, and a balance between technological efficiency and legal safeguards. International practice serves both as proof of concept and as a cautionary guide for Vietnam's prospective adoption.

5 | Discussion and Conclusion

The foregoing analysis illustrates that artificial intelligence (AI) has already begun to reshape the enforcement of intellectual property (IP) rights on a global scale. For Vietnam, a country with a growing creative and innovative sector and increasing participation in the digital economy, leveraging AI in IP protection is not just an option, but an emerging necessity. This section discusses the implications of international experiences for Vietnam and provides recommendations for legal and policy reforms to integrate AI effectively and responsibly into the nation's IP enforcement framework.

5.1. Implications for Vietnam's IP Enforcement Strategy

International experiences demonstrate that AI can significantly strengthen detection and enforcement capabilities, which is highly relevant to Vietnam's context, where online piracy (e.g., music, film, and software) and counterfeit goods remain prevalent. The success of AI-driven content filtering and market surveillance suggests that enforcement agencies in Vietnam could dramatically improve reach and responsiveness by adopting similar technologies. For example, Vietnamese authorities could collaborate with major platforms popular in Vietnam such as YouTube, Facebook, TikTok, Zing, and Nhaccuatui to ensure that content originating from or targeting Vietnamese users is incorporated into global content identification systems.

Similarly, AI deployed on e-commerce platforms and at customs checkpoints could help intercept counterfeit and patent-infringing products entering Vietnam. The Alibaba case, where AI removed 95% of fake listings,[37]

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[37] Digital Defynd, *How Alibaba Uses AI to Remove Counterfeit Listings*, 2023. https://digitaldefynd.com.

offers a strong model for Vietnam's platforms (Shopee, Tiki, Lazada Vietnam) to emulate. However, the challenges identified globally, particularly over-blocking and algorithmic bias – must be anticipated. Given that Vietnam's Constitution protects freedom of expression (albeit balanced with other interests), safeguards against excessive filtering are essential.

The establishment of the Specialized IP Court in 2025 presents a timely opportunity to train judges and enforcement officials on AI-generated evidence, digital forensics, and procedural integration. Furthermore, Vietnam's IP Law (2022 Amendment) does not yet explicitly reference AI-assisted enforcement. Clear legislative recognition could set quality and reliability standards, delineate responsibilities, and establish procedural safeguards – drawing on the EU's transparency and redress requirements under Article 17 of the DSM Directive.

5.2. Recommendations for Legal Reform and Policy Initiatives

Amend IP Legislation to Accommodate AI Enforcement – Introduce provisions explicitly permitting and regulating "technological measures" in IP enforcement, enabling rights holders to use certified AI tools, obligating intermediaries to cooperate with automated detection, and ensuring admissibility of AI-generated evidence – subject to verification (Dentons, 2023; SSRN, 2022).

Strengthen the Notice-and-Takedown Framework with Automation – Update Vietnam's existing mechanisms to allow automated notices from certified rights holders or agencies, with audit requirements to prevent abuse.

Implement a User Redress Mechanism – Require platforms to provide a fast and transparent process for users to contest automated enforcement, drawing from the EU's Article 17 safeguards.

Data Sharing and Collaboration Agreements – Facilitate MOUs between enforcement agencies and platforms for anonymized data sharing, trend analysis, and AI training; seek technical support from WIPO, USPTO, and EUIPO.

Capacity Building and Expert Task Force – Establish an "AI and IP Enforcement" task force to oversee a national centralized infringement detection platform accessible to small rights holders.

Ensure Ethical Use and Privacy – Update data protection rules to explicitly allow proportionate automated processing for IP enforcement, while mandating safeguards against bias and misuse.

5.3. Anticipating Future Trends

AI is also changing the nature of IP infringement – through AI-generated works, synthetic media, and automated piracy. Vietnam should actively monitor international debates on AI-generated content, authorship, and liability (Dentons, 2023). Participation in ASEAN and WIPO forums will ensure Vietnam stays aligned with evolving global norms. Domestic research and pilot projects, possibly in collaboration with Vietnam's AI sector, can prepare for these challenges.

6 | Conclusion

The integration of AI into IP enforcement offers unprecedented advantages in speed, scale, and effectiveness, but also presents risks if implemented without adequate safeguards. Vietnam is in a strong position to learn from global successes and missteps, enabling it to adopt advanced practices while avoiding earlier pitfalls. By updating legislation, fostering cross-sector collaboration, investing in AI infrastructure, and embedding fairness and accountability into enforcement processes, Vietnam can modernize its IP regime, attract investment, protect creators, and promote innovation. Properly harnessed, AI can become a force multiplier for IP enforcement, ensuring that Vietnam's legal system remains robust and relevant in the digital era.

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