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Practical Dilemmas, Ethical Risks and Human-Machine Collaboration Pathways for AI-Empowered Legal Translation

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Abstract: The rapid iteration of generative artificial intelligence (AI) and neural machine translation has brought efficiency innovation to legal translation practice, while posing new challenges to the conversion of legal English terminology, transmission of concepts across legal system and translation quality control. Different from general text translation, legal translation features dual attributes of linguistic transformation and transplantation of legal cultural connotations. AI translation has inherent limitations in the accurate matching of legal terms, disambiguation of legal senses of polysemous words, reproduction of legal stylistic features, and reconstruction of legal logic. It also gives rise to multiple ethical risks including translation distortion, data bias, algorithmic black-box effects, technological alienation and blurred accountability. Against the backdrop of global expansion of cross-border commercial transactions and international judicial cooperation, indigenous Chinese rule-of-law discourse requires reliable translation output to eliminate cross-jurisdictional misunderstandings. Nevertheless, off-the-shelf large language model outputs frequently produce superficially fluent yet legally inaccurate renderings, a phenomenon known as model hallucination, which aggravates risks in high-stakes legal scenarios. Drawing on empirical cases of legal terminology translation, this paper figures out the strengths and practical bottlenecks of artificial intelligence applied to legal translation, analyzes the root causes of translation dilemmas, and constructs a human-machine collaborative workflow adapted to legal translation scenarios. Optimization suggestions are put forward from the dimensions of talent cultivation, industrial norms, technical supervision and terminology database construction, so as to facilitate the accurate cross-cultural communication of indigenous Chinese rule-of-law concepts.

Keywords: Legal English; Legal Translation; Artificial Intelligence; Human-machine Collaboration; Machine Translation.

1. Introduction

1.1. Research Background

With the continuous advancement of China's foreign-related rule-of-law development, cross-border economic and trade activities, international arbitration and transnational judicial proceedings have been on the rise, generating surging demand for the translation of legal texts. Chinese-English legal translation has become a vital carrier for the international communication of China's rule-of-law discourse[1]. Generative artificial intelligence driven by large model has gradually penetrated and deeply intervened in legal translation practice, further expanding the generative capacity of machine translation in the legal domain[2].

In the global language service market, legal translation assignments range from large volume contract bundles, corporate due diligence documents to national statutory instruments. Many language service providers adopt generative AI tools to shorten turnaround cycles and reduce operational costs, which creates strong practical incentives for the widespread deployment of machine translation outputs. However, scholars repeatedly warn that productivity gains cannot override quality requirements for legal texts, where even a single mistranslated term may lead to contractual invalidity, tort liabilities or distorted judicial interpretations[8].

Nevertheless, legal translation is far more than simple interlingual conversion; it represents a dual transformation across legal systems and cultures. It should not only deliver linguistic information but also guarantee the faithful transplantation of legal concepts and institutional connotations. Empirical studies have shown that even mainstream AI translation tools produce incorrect translations, conceptual mismatches and stylistic defects when handling legal terms and complex statutory provisions. Fully automatic translation cannot satisfy quality requirements for high-risk legal scenarios[8]. In the age of artificial intelligence, human-machine collaborative translation has become a mainstream paradigm for pragmatic texts. Machines undertake more text processing tasks, whereas human translators focus on terminology database construction, post-editing and professional judgment[3]. However, existing academic research mostly concentrates on quantitative evaluation of machine translation output. Comprehensive discussions on the internal generation mechanism of legal English terminology, decision-making discrepancies between human and machine translators, and ethical risks introduced by AI intervention remain insufficient. Systematic research based on empirical cases is therefore warranted.

1.2. Literature Review

Overseas scholars have conducted early research on the performance of machine translation in specialized domains. Analyses of errors in legal text machine translation indicate that machine translation systems for general purpose struggle with professional terms embedded in specific legal traditions and are prone to literal translation. Contexts of foreign legal institutions lie beyond the processing capacity of ordinary neural machine translation systems[4]. Some scholars have set four tiers of human-machine intervention intensity for

controlled comparative experiments. Their findings confirm that translation quality improves with increased human input. Even optimized by prompts and bilingual terminology lists, AI output still falls short of professional human translations, with major weaknesses in legal term rendering and complex legal syntactic processing[5]. In parallel, overseas studies on translation technology ethics address data copyright, diminished translator subjectivity and accountability for high-risk translation scenarios[5].

Recent LLM(Large Language Model)-oriented legal translation studies further point out that generative models may generate plausibly sounding but non-existent legal terms, namely hallucination, which is harder to identify than obvious lexical mistakes[17]. Meanwhile, human-in-the-loop frameworks are proposed for multilingual legal terminology mapping, emphasizing that AI can complete repetitive pre-processing tasks while human domain experts must take charge of conceptual validation[18]. In practical language service research, scholars also observe that post-editing workload does not always decrease with better raw machine translation quality; for under-resourced legal language pairs, flawed machine drafts may even increase cognitive burden for professional translators.

Domestic research falls into three major strands. First, some studies focus on the performance and technical bottlenecks of AI-powered legal translation. Zhang summarized four core difficulties of neural machine translation for legal texts: interlingual equivalence of legal terms, disambiguation of polysemous legal vocabulary, reproduction of legal stylistic registers, and reconstruction of legal logical relations. He refuted the "replacement thesis" claiming that machine translation would supersede human translators[6]. Wu and Zou carried out comparative tests on the English translation of 934 core legal terms in the Civil Code of the People's Republic of China across multiple machine translation platforms. Only approximately 26 % of machine-generated English renderings matched authoritative official terminology versions[7]. Machine systems frequently confuse concepts from civil law and common law traditions and adopt rigid literal translation for indigenous Chinese legal concepts, which may mislead target language readers. Wang and Cheng evaluated ChatGPT's performance in statutory text translation and identified conspicuous weaknesses in legal term treatment and long-complex legal sentence processing[8].

Second, some research centers on human-machine collaborative translation modes. Cui and Lei explored human-machine interactive translation strategies and highlighted the value of post-editing for specialized texts. Zhang summarized practical post-editing tactics for AI-assisted translation of local regulations, proposing workflows integrating terminology databases, prompt engineering and multi-level proofreading[10]. Reforms for talent education in legal translation have also been explored, arguing that legal English teaching should balance linguistic competence, jurisprudential knowledge and translation technology literacy while strengthening instruction on technological ethics.

Apart from empirical effectiveness research, domestic scholars also start to discuss retrieval augmented generation (RAG) as a promising technical enhancement approach for legal translation workflows. By retrieving authoritative bilingual glossaries and statutory parallel texts as contextual prompts, RAG can mitigate hallucination risks and improve terminological consistency without fully solving conceptual-mismatch problems caused by cross-system divergence. Still, such technical improvements cannot substitute comparative-law-driven human judgment on non-equivalent legal concepts.

Existing literature has separately addressed technical defects in AI-empowered legal translation and post-editing strategies. Few holistic analyses combine technical dilemma investigation with human-machine collaboration solutions from the perspective of legal English terminology. This research is expected to fill that gap to some extent.

Building on the literature review, this paper addresses the following research questions: What technical dilemmas does artificial intelligence encounter in legal English translation, and what are their underlying mechanisms? How can a full workflow of human-machine collaboration implementation strategy be constructed for legal English translation? Taking legal English terminology as the analytical entry point, this study develops a holistic human-machine collaboration framework including pre-during-post phases of translation.

This study integrates terminology science, translation equivalence theories and the analytical framework of translation technology ethics. It enriches theoretical research on AI-aided translation in specialized domains. Practically, it supplies actionable references for legal translators, language service enterprises and legal translation pedagogy, facilitating accurate international dissemination of Chinese legal concepts.

2. Core Concepts and Theoretical Foundations

2.1. Definition of Core Concepts

2.1.1. Legal English

Legal English denotes the specialized register employed in legislative instruments, judicial documents and contractual texts. It features sophisticated terminology systems, lengthy rigorous syntactic structures, strict modal verb conventions and concepts deeply rooted in particular legal cultures[11]. legal English terms can be divided into two categories: terms transplanted from continental law or common law jurisdictions into China's legal system, and indigenous Chinese legal notions such as rural land contractual management household and liability for harm caused by objects thrown from buildings. The latter lack the counterparts in English-language legal traditions and are susceptible to conceptual distortion in translation. legal English translation is not mere word-for-word substitution; it must reconcile linguistic form with underlying institutional connotations.

It should be noted that legal register characteristics are not limited to vocabulary. Syntactic conventions including stacked prepositional phrases, conditional subordinate clauses and complex nominalization jointly constitute the normative genre of legal writing[22]. AI models for general purpose are trained mostly on non-legal corpora; hence they tend to simplify complex syntactic structures or produce conversational-style outputs which break the solemnity required by statutory and contractual texts.

2.1.2. Legal Translation

Legal translation carries the dual property of linguistic transformation and legal system transformation. In the narrow sense, it refers to translating normative legislative documents. Broadly construed, it covers contracts, judicial instruments

and cross-border legal communications. Beyond linguistic accuracy, it pursues legal functional equivalence. Translators are expected to possess bilingual proficiency as well as comparative law expertise to distinguish institutional divergences across legal systems[6].

Legal translation equivalence is not absolute propositional identity but functional normative equivalence, which means translated texts should produce comparable legal effects within the receiving jurisdiction, rather than merely reproducing lexical correspondences. This theoretical standpoint sets important boundaries for evaluating machine translation outputs that surface-level lexical matching cannot be treated as sufficient proof of qualified legal translation.

2.1.3. AI-empowered Translation Technology

Machine translation has evolved through rule-based, example-based and statistical paradigms to current large model generative translation[12]. Neural machine translation systems adopt an encoder-decoder architecture and perform cross-lingual mapping through probability distributions trained on large-scale parallel bilingual corpora. Generative-AI translation is not confined to parallel-sentence matching. It accepts natural language prompts and produces multiple candidate translations. Nevertheless, it remains probability-driven based on training corpora and lacks genuine legal comprehension or normative reasoning capacity.

2.2. Theoretical Foundations

2.2.1. Modern Terminology Science

Feng defines terms as conventional symbolic representations of specialized concepts, distinguishing between signifier (linguistic form) and signified (underlying professional concept). Legal term translation essentially constitutes cross-lingual conceptual mapping rather than superficial symbol matching. Identical linguistic forms may correspond to divergent signifieds across legal traditions. Machine translation prioritizes matching signifiers while overlooking institutional discrepancies embedded in signifieds--a major source of mistranslation. Terminology practice pursues “one-term-one-concept” to prevent confusion. Given the strong ideographic nature of Chinese characters, the rationality behind term formation deserves special attention in translation practice[13].

For legal terminology, the concept-first principle implies that translators ought to reconstruct conceptual denotation and connotation before selecting target-language linguistic forms. Regrettably, most commercial machine translation systems operate in reverse order: they match surface linguistic tokens first and infer conceptual meaning from corpus co-occurrence statistics, which makes them vulnerable when handling conceptually-divergent cross-jurisdictional legal items.

2.2.2. Translation Equivalence Theory

Nida distinguishes formal equivalence from dynamic (functional) equivalence. Formal equivalence seeks surface-level one-to-one correspondence of linguistic signs. Functional equivalence emphasizes producing in target language receptors responses substantially equivalent to those experienced by source language readers[14]. Absolute static formal equivalence is rarely attainable for legal translation because numerous legal concepts lack exact counterparts in target language. Priority should therefore be assigned to legal functional equivalence instead of rigid literalism. Machine translation inherently gravitates toward formal matching and frequently neglects whether legal functional equivalence is achieved.

2.2.3. Four-dimensional Analytical Framework for Translation Technology Ethics

According to Wang, ethical risks induced by generative AI-enabled legal translation fall into four dimensions: translation ethics focusing on text quality, informational accuracy and ambiguity risks; data ethics concerning training data bias, privacy protection and intellectual property rights; technology ethics covering algorithmic black-box effects, algorithmic abuse and technological alienation together with translator subjectivity; and accountability ethics governing responsibilities of developers and end-users[2]. This four-dimensional framework underpins the risk analysis undertaken in this paper. This multi-dimensional framework transcends pure text quality criticism; it draws attention to practical social consequences caused by AI-assisted legal translation, such as degrading of translators’ translation competence, leakage of sensitive case materials and unclear liability distribution when mistranslations cause tangible losses.

3. Advantages and Practical Dilemmas of AI-Empowered Legal English Translation

3.1. Advantages of Artificial Intelligence in Legal English Translation

Compared with conventional human translation, artificial intelligence delivers three principal merits as follows[15]. First, high-speed bulk-text processing reduces temporal costs. Legal projects frequently involve voluminous case files and contracts. AI-empowered translation rapidly generates draft renderings, easing output-capacity constraints of human translators and satisfying urgent demands in foreign-related legal practice.

Second, AI systems deliver efficiency gains through the functionalities of translation memory and terminology database modules. Built-in translation memory and terminology modules can automatically detect recurrent phrases and fixed legal terms, guarantee intra-document terminological consistency, and cut down redundant human workload. Such capabilities render these tools particularly well-suited for the translation of serial statutes and standardized contractual documents.

Third, multi-version generation expands translators’ reference scope. Generative large models output alternative translations responding to prompts. Translators may delegate format adjustment, long sentence decomposition and basic polishing to AI and devote more cognitive resources to intricate concept analysis and translational decision-making.

It is worth emphasizing that these strengths are instrumental rather than substantive. AI excels at repetitive, mechanical information-processing assignments. It cannot independently complete conceptual interpretation, value judgment or cross-jurisdictional comparative analysis. Therefore, these technological merits should be understood as efficiency boosting auxiliary capacity, not evidence supporting autonomous high-risk legal translation deployment.

3.2. Practical Dilemmas of AI-Empowered Legal English Translation

Notwithstanding efficiency gains, legal translation work

relies heavily on comparative law insights and institutional understanding. Current technology exhibits multiple inherent limitations.

3.2.1. Dilemmas in Legal Terminology Translation

Legal terms in Chinese law can be classified as foreign sourced legal terminology or indigenous China-specific terms. Machine translation demonstrates notable defects in both categories.

(1) Foreign-sourced legal terminology in Chinese law

Foreign-sourced legal terminology refers to legal terms in Chinese law which result from cross-border legal transplantation. For example, Prescription of action (lawsuit limitation) is a civil-law concept adopted within Chinese legal system. Baidu Translation renders it statute of limitations for litigation; DeepL outputs statute of limitations (predominantly US common law usage); DeepSeek yields limitation of actions (common law in Commonwealth usage). The authoritative Terminology of the Civil Code recommends extinctive prescription/prescriptive period (civil-law formulations). These variants originate from divergent legal traditions. Machine systems select outputs based on corpus frequency without grasping the institutional meaning of the term within Chinese civil law and fail to discriminate conceptual gaps between common law and civil law traditions. Another example concerns contributory negligence. Baidu Translation produces the literal misrendering negligent killing by parsing individual characters, completely misinterpreting this tort law concept, whereas DeepSeek correctly outputs contributory negligence. Machine translation often decomposes compound legal terms into ordinary lexical units and performs literal translation, ignoring holistic professional signification.

(2) Indigenous legal terminology with Chinese Characteristics

Indigenous legal terminology with Chinese Characteristics are those legal terms with Chinese origins. The mechanical literal translation of those legal terms are prone to cause institutional misinterpretation. For instance, Rural land contractual management household constitutes a unique civil subject under Chinese civil law. Baidu Translation, DeepL and DeepSeek all modify the head noun with rural. DeepL's rural contractors can be misconstrued in target language contexts as contractors undertaking commercial projects in rural areas, distorting the civil-subject meaning intended by Chinese civil law. The official translation released by the the Civil Code of PRC. is lease-holding farm household , which avoids such misreading. Machine systems merely concatenate morphemes and lack awareness of the background of China's unique civil law institutions, hence literal translations risk misleading target language audiences.

3.2.2. Disambiguation of Polysemous Words

Polysemous-word disambiguation refers to the inadequate context-sensitive sense selection, which often poses challenges in identifying the legal meaning of polysemous words in specific context. Numerous lexical items carry both everyday and specialized legal meanings. Machine translation struggles to select context-appropriate legal senses. In the contract law sentence "The parties shall hold the Closing at Seller's Office", Closing legally means "closing (transaction settlement)". Google Translation outputs "shut-down", Bing yields "closing ceremony", and Tencent Translation approximates "settlement", still falling short of professional contractual register requirements. In Chinese courtroom discourse "意见" ("opinion") actually denotes "objection". Machine translation regularly outputs the ordinary-sense opinion and distorts procedural courtroom meaning. AI models lack deep situational comprehension of legal contexts and tend to select high-frequency general language readings over less-frequent specialized legal senses.

3.2.3. Reproduction of Legal Register and Stylistic Nuance

Legal texts maintain strict hierarchies of illocutionary force encoded by modal expressions of prohibition and obligation. Chinese modal markers "不得" (may-not /shall-not) and "必须" (must) correspond to English shall / may / must with graded illocutionary strength. For the constitutional provision "Citizens of the People's Republic of China, when exercising their freedoms and rights, shall not impair the interests of the state, society and collective, and the lawful freedoms and rights of other citizens", multiple machine translation platforms uniformly deploy shall not. Considering legislative intent, may not would represent a more balanced rendering. Contractual obligations conventionally employ shall, yet machine systems frequently default to must. Such confusions between statutory law and contractual registers undermine the authoritative stylistic quality of legal texts.

3.2.4. Judgment and Reconstruction of Legal Logical Relations

Statutory provisions embed intricate logical relations of division of labour, mutual restraint, causation and conditionality. The Criminal Procedure Law clause "People's courts, people's procuratorates and public-security organs, in handling criminal cases, shall divide their work, cooperate with one another, and restrict one another" is rendered by machine translation engines as divide their responsibilities / be responsible for the division of labour. These outputs capture only surface-level lexical meaning and obscure the core logical nuance: each organ assumes respective duties while dividing functions. Machine translation excels at surface syntactic conversion yet poorly parses underlying power relation and procedural logic structures in legal provisions.

3.3. Causes of Dilemmas of AI-Empowered Legal Translation

Three layers of underlying causes account for the observed practical dilemmas. The first is algorithmic technical causes. Neural-machine translation systems operate essentially by probabilistic mapping. Generative large models perform advanced probabilistic "intelligent guessing". Models possess no comparative law knowledge and do not understand where each legal concept sits within a holistic conceptual legal system. They learn linguistic patterns exclusively from training corpora without institutional-level comprehension[15].

Even when equipped with retrieval augmented generation modules, large language models merely retrieve external text snippets; they cannot autonomously carry out comparative law analysis to distinguish superficial lexical similarity from substantive concept divergence. Probabilistic generation also means that identical source text inputs may produce inconsistent term renderings across separate inference runs, threatening terminological consistency across long legal document sets.

Second come the constraints corpus resource. High-quality

Chinese-English parallel legal corpora are unevenly distributed. Authoritative bilingual resources for indigenous Chinese legal concepts remain scarce. Mistranslated machine generated texts are fed back into training datasets, creating self-reinforcing error loops. Wu and Zou warn that failure to screen defective machine translation output before reincorporating it into training material aggravates terminological confusion[7].

Most publicly available bilingual legal corpora concentrate on statutes and major codes; fewer high-quality parallel resources exist for local regulations, judicial interpretations and typical case document materials. Underrepresented text genres further weaken model performance on diversified legal translation assignments.

The intrinsic characteristics of legal translation objects lie third. Legal terms are embedded within their respective legal traditions. Many legal concepts lack exact cross-lingual symbolic equivalents. Some Chinese legal terms transplanted from foreign traditions bear superficial resemblances to source language notions but carry altered institutional connotations. indigenous Chinese legal concepts occupy no pre-existing slots within target language conceptual systems. Their translation demands creative conceptual reconstruction, a task beyond current machine capabilities.

4. Multi-Dimensional Ethical Risks of Generative-AI Intervention in Legal Translation

Legal translation bears direct implications for the definition of rights and obligations; any translational deviation may trigger tangible legal consequences. The large-scale deployment of generative AI has given rise to four-fold ethical risks: translation ethics, data ethics, technology ethics and accountability ethics.

4.1. Ethical Risks of Translation

Translation ethics risks mainly refers to the distortion of legal information and ambiguity hazards. Mistranslated terms and AI-induced hallucinations lead to misinterpretation of legal concepts. Suffering from the "hallucination phenomenon", large language models may fabricate term definitions or fictitious equivalent expressions when adequate supporting corpora are unavailable. Such outputs appear fluent and professionally worded on the surface yet contain fundamentally erroneous concepts, which may trigger interpretive divergences over transnational contracts and international treaties and even provoke foreign-related legal disputes[16]. Empirical research conducted by Song demonstrates that ChatGPT exhibits conspicuous deficiencies in handling legal terms and syntactic structures. Under certain scenarios, its BLEU scores are even inferior to those yielded by conventional neural machine translation systems[17].

Also, generative AI systems may produce translational biases when processing fuzzy legal expressions. Legal texts are replete with flexible formulations such as "reasonable" and "appropriate", whose interpretive criteria diverge across different legal jurisdictions. Artificial intelligence often fails to capture the subtle semantic nuances inherent in these indeterminate legal phrases. When rendering such content, AI models tend to either over-specify or over-generalize source text meanings. This outcome can erode the intended discretionary latitude within statutory provisions and create potential grounds for interpretive disputes concerning international treaties and cross-border arbitration[18].

4.2. Ethical Risks of Data

Data ethics risks means the training-data bias and the vulnerabilities of privacy security[2]. Training datasets can introduce multiple forms of bias into model outputs. These encompass historical bias (cultural and ideological prejudices inherited from legacy translation samples), emergent bias (value-laden tendencies spontaneously amplified as models process textual inputs), and class-imbalance bias (deteriorating output quality stemming from insufficient training instances for low-resource legal languages and indigenous Chinese legal concepts. When training corpora are not kept up-to-date, AI models may draw on translations sourced from repealed legislative instruments and generate outputs that contradict China's currently enforced laws.

Generative-AI translation workflows carry risks of privacy breaches and disputes of intellectual property. Legal translation materials often comprise trade secrets, case-specific confidential data, and personally identifiable private information. Some translation tools store user-submitted texts on cloud servers to support iterative model retraining. In the absence of robust data desensitization protocols, sensitive information faces substantial risks of disclosure. Furthermore, high-quality bilingual translations authored by human translators are sometimes scraped and incorporated into training datasets without explicit authorization, thereby triggering intellectual property controversies surrounding AI-generated translation outputs[2].

4.3. Ethical Risks of Technology

Technology ethics risks tend to be algorithmic black-box and technological-alienation crises. Generative-AI translation systems entail risks arising from algorithmic black-box effects and algorithmic abuse. Large language models feature opaque internal parameters and decision-making workflows, which gives rise to the well-documented algorithmic black-box problem[20]. Commercial actors can manipulate translation outputs through prompt engineering or fine-tuning techniques to deliberately privilege interpretive positions aligned with a specific legal system, thereby distorting the original semantic meaning of legal texts. When translational errors occur, external stakeholders face substantial obstacles in tracing their root causes. This circumstance hinders error rectification and accountability procedures and compromises the impartiality of foreign-related legal activities.

The adoption of generative-AI translation may trigger diminished translator subjectivity and technological alienation. Technological alienation is reflected in the role transformation of translators: they risk being downgraded from authoritative translation decision-makers to superficial overseers of AI-generated outputs. Chronic over-reliance on artificial intelligence tools lowers translators' exposure to hands-on practice involving legal term analysis and legal logical reasoning, which gradually erodes their linguistic acuity and professional judgement. If translators cede core translational decision-making power to machines, technological logic may come to dominate translation practices. This dynamic ultimately undermines both the quality and institutional capacity for the international dissemination of China's rule-of-law discourse[5].

4.4. Ethical Risks of Accountability

Accountability ethics risks can be categorized into two dimensions: the responsibilities of technology developers and those of end-users. From the developer perspective, AI developers may give rise to intellectual property and data security hazards during the collection of bilingual legal training data. This risk emerges when they skip sufficient copyright and privacy assessments and directly train models on unauthorized legal documents. Where models produce substantial erroneous legal outputs due to inadequate vertical domain risk alignment in the training phase, developers should assume corresponding upstream liabilities. Even so, fine-grained industrial specifications that delineate the scope of developers' obligations remain largely unavailable[2].

From the end-user perspective, relevant stakeholders include legal translators, legal practitioners, corporate legal counsels, and other involved parties. Translators who deploy unvetted AI-generated outputs without conducting terminological verification and proofreading may impose tangible losses on their clients in the event of incorrect translation. Within multiparty collaborative translation projects, errors propagate cumulatively across successive AI invocations. When adverse incidents arise, it becomes extraordinarily challenging to identify the responsible procedural link. While the "user-liability" principle is sound in theory, its practical enforcement encounters considerable barriers under the scenarios of complex team collaboration[21].

5. Human-Machine Collaboration Optimization Pathways for AI-Empowered Legal Translation

Despite rapid technological advances, artificial intelligence cannot replace expert human judgment. A realistic alternative lies in institutionalized human-machine collaboration. Machines undertake bulk-text pre-processing, draft-translation and formatting work. Human translators retain overriding authority for legal concept analysis, translational decision-making and final-quality validation. The two parties complement rather than substitute for one another[3]. Four dimensions of improvement are elaborated below: translation-practice workflows, industrial system arrangements, talent training reform, and industry-academia-research collaborative innovation.

5.1. Constructing a Full Workflow of Human-Machine Collaboration Mode for Legal Translation

Within translation practice, this paper proposes to implement a three-stage workflow: pre-translation preparation, human-machine interaction during translation, multidimensional post-translation proofreading. Thus a three-tier verification mechanism is established.

5.1.1. Pre-translation Preparation

In the pre-translation phase, terminological foundations and technical tools are supposed to be well-prepared. The central pre-translation task is to build an authoritative and dynamically-updated bilingual legal English terminology database. Translators ought to distinguish foreign-sourced legal terms from indigenous Chinese legal concept entries. Each terminological entry should be annotated with its corresponding legal system background and applicable jurisdictions. Project-specific terminology lists need to be imported into the machine translation workflow to constrain potential output variants. Furthermore, translators must conduct risk-level assessments for individual translation assignments. High-risk documents — including commercial contracts, judicial instruments, and international treaties — must never depend on unvetted raw generative AI outputs. To mitigate risks stemming from model hallucinations, practitioners should develop customized prompts that stipulate stylistic register requirements, terminological standards, and prohibitions on unauthorized additions or omissions of legal meaning.

For high-risk projects, practitioners may combine customized terminology libraries with retrieval augmented generation techniques. Authoritative bilingual term entries and selected parallel text fragments are stored in vector databases. During translation inference, the system retrieves relevant reference materials as prompt context before generating target language text. Nonetheless, retrieval outputs themselves still require human verification because retrieved materials may contain obsolete or inappropriate expressions of jurisdiction.

5.1.2. During Translation

During translation phase, AI can be used to help generate the translation drafts of legal texts. Human translators subsequently conduct targeted intervention after AI produces draft translations. Translators avoid unfocused full-text polishing and instead prioritize four high-risk intervention points:

(i) accuracy of legal terminology: to verify jurisdictional appropriateness for both transplanted and indigenous concepts;

(ii) disambiguation of polysemous word: to confirm selection of legal rather than everyday lexical senses;

(iii) translation of legal modal verb: to check whether shall / may / must match the document's textual genre;

(iv) intra-textual legal logical relations: to validate representations of division of labour, mutual restraint and causal conditional structures.

Once the human intervention of AI-generated translation was finished, the revised versions and editing trails should be preserved as material for subsequent terminology-database iteration. This type of targeted intervention model differs from traditional full-text post-editing. Instead of revising every sentence uniformly, translators allocate cognitive resources to error-prone high-risk spots identified by professional legal translation knowledge, which helps optimise human resources allocation for large-scale legal translation projects.

5.1.3. Post-translation Editing

Post-translation proofreading proceeds along linguistic quality and legal validity dimensions. Differentiated treatments for distinct term categories should be adopted. For foreign-sourced legal terms, translators are expected to verify established target jurisdiction usage and distinguish British- versus American-common law variants; for indigenous Chinese legal concepts, they are expected to examine whether literal translations mislead target language audiences, and add explanatory footnotes where institution-specific background is required; for polysemous legal vocabulary, repeatedly crosscheck senses against contextual constraints[10].

In addition, high-risk legal texts should adopt three-tier proofreading: AI-assisted intra-document terminological

consistency inspection; peer-review by professional legal translators; and joint final validation by jurists and senior legal translators for major importance assignments. Expert validated revised renderings can feed iteratively back into internal terminology databases, which further forming closed loop improvement.

5.2. Refining Technical Ethics Codes and Regulatory Mechanisms for Legal Translation

With regard of industrial regulations, application codes of practice and compliance guidelines for AI-assisted legal translation should be formulated as follows: clarifying the usage boundaries across different legal scenarios; and distinguishing reference-only information-acquisition tasks from the production of formally binding legal document production. Formally effective legal instruments must never deploy AI-generated output without complete human proofreading. Classification of legislative texts, commercial contracts and foreign-related judicial documents should also be made as high-risk translation scenarios mandating full human intervention.

Second, supervision should be strengthened over training corpora for legal translation AI systems. AI vendors are required to audit corpus provenance, to enforce data-anonymization protocols, purge outdated and biased legal material, and implement update mechanisms synchronized with China's legislative revisions to prevent distortions caused by obsolete provisions.

Thirdly, the accountability allocation mechanisms for AI augmented translation should be clarified. Technology developers should be assigned compliance-related duties for training data governance. Human translators are expected to bear primary responsibility for delivered translations, mandate traceable workflow logging for team-based translation projects, preserving prompts, initial drafts and revision trails to facilitate retrospective accountability assignment[2].

At present, international translation industry associations have not yet formed unified standards on AI-assisted legal translation liability allocation. Therefore, language service enterprises ought to formulate internal operating specifications, explicitly recording the proportion of AI adoption, human review procedures and responsible persons for each translation deliverable, so as to provide evidence basis once translation-caused disputes emerge.

5.3. Re-moulding the Talent-Development System for Legal Translation

When it comes to talent training, new educational program for foreign-related legal translation professionals should be launched[11]. First, higher-education institutions should integrate modules on legal translation technology ethics into teaching. Within legal English courses and legal translation curricula, educators ought to incorporate teaching content concerning translation technology ethics, data protection protocols, and the recognition of AI-generated risks. By deploying real world case studies of legal mistranslations, instructors can foster students' awareness of translator subjectivity and help them guard against excessive reliance on artificial-intelligence tools.

Universities also need to establish a three-dimensional competency framework consisting of legal English linguistic proficiency, comparative law expertise, and hands-on translation technology capabilities. Instruction should extend beyond mere linguistic training and deliver foundational comparative law knowledge that equips students to identify conceptual divergences across different legal jurisdictions. Practical training exercises ought to cover prompt-engineering techniques, post-editing of AI-generated translations, and the curation and maintenance of bilingual legal terminology databases.

Thirdly, academic institutions should innovate project-based immersive pedagogical approaches. Universities can form cooperative partnerships with legal technology enterprises and foreign-affiliated law firms to bring authentic legal translation projects into classroom teaching. Educators can design simulation activities for the full-cycle human-machine collaboration workflow spanning pre-translation, during-translation and post-translation stages. Such hands-on activities enable learners to accumulate practical experience in detecting flaws within AI-produced translations and to develop robust risk-assessment awareness.

In AI-empowered legal translation, it is critical to avoid two extreme tendencies: neither demonizing AI tools nor uncritically worshiping machine outputs. Teaching should guide students to treat generative AI translation as an auxiliary tool rather than an authoritative reference source, and strengthen students' awareness of verifying AI-generated translation of legal term against authoritative printed or official resources.

5.4. Industry-University-Research Collaboration for International Communication of China's Rule-of-Law

With regard of the academic and technological development front, research institutions should foster interdisciplinary collaboration that bridges translation studies, jurisprudence, and computer science. They ought to develop specialized quality evaluation metrics for legal translation, moving beyond generic evaluation indicators such as BLEU. These metrics shall incorporate assessment criteria that measure fidelity to the meaning of legal concepts as well as contextual appropriateness for target legal system environments.

Relevant stakeholders should jointly construct authoritative bilingual corpora dedicated to indigenous Chinese legal concepts. Jurists and legal translation specialists can be convened to validate terminological entries extracted from legislative instruments including the Civil Code of the People's Republic of China and the newly-revised Company Law of the People's Republic of China. The resulting publicly reusable, high-quality bilingual resources can alleviate shortages of training materials for indigenous Chinese legal concepts and enhance AI translation performance at the data source level.

Stakeholders ought to encourage the development of auxiliary tools tailored for legal translation scenarios. Development priorities should centre on utilities that augment human translators' capabilities, instead of pursuing fully autonomous machine translation solutions. Representative examples comprise terminological-consistency-checking modules, domain-specific prompt templates for legal translation, and error-alert utilities designed for post-editing workflows.

Interdisciplinary cooperation should also advance research on specialized evaluation frameworks for legal translation. Conventional automatic metrics such as BLEU compute

surface-level textual overlap against reference translations, yet they cannot assess the accuracy of cross-jurisdictional legal concept transfer. Accordingly, composite evaluation frameworks ought to integrate automatic indicators with manual expert scoring that prioritizes conceptual fidelity and jurisdictional appropriateness

6. Conclusion

AI-driven translation substantially improves processing efficiency for legal English texts and delivers prominent advantages in bulk-draft generation and terminology memory reuse. Nevertheless, it cannot supersede human translators under existing technical conditions. Constrained by probability-driven algorithmic logic, uneven legal parallel corpus resources, and the inherent non-equivalence of concepts across legal systems, AI displays enduring limitations in cross-jurisdictional legal term mapping, the disambiguation of legal senses for polysemous words, legal register reproduction, and legal-logical reconstruction. The widespread adoption of AI also brings about ethical hazards, including translational distortion and ambiguity, data bias and privacy-security risks, algorithmic black-box concerns, the technological alienation of translators, and blurred accountability boundaries.

Legal translation should adhere to human-machine collaboration principles centred on "machine-enabled efficiency, human-led decision-making". A closed-loop human-machine collaboration workflow of pre-during-post translation should be implemented in translation practice. The industry needs improved technical ethics standards, data-supervision frameworks and accountability mechanisms. Educational systems should revamp the three-dimensional competency model for legal translation practitioners. Industry-academia-research partnerships should advance the construction of bilingual terminology resources for indigenous Chinese legal concepts. Multi-faceted coordination balances translation efficiency with fidelity to legal concept meaning and supports the international dissemination of China's rule-of-law.

Large language model technologies continue to evolve. Domain-specific fine-tuning and Retrieval-Augmented Generation (RAG) will further enhance AI performance on legal translation tasks. Given that legal translation bears direct consequences for the allocation of rights and obligation and demands high conceptual fidelity, human translators' comparative law insights, institutional comprehension and final instance professional judgment will remain irreplaceable for the foreseeable future. Future scholarship ought to continuously monitor emerging risks accompanying new large model technologies, iteratively refine human-machine collaboration paradigms for legal translation, and explore models better suited to the practical requirements of foreign-related-rule-of-law communication

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