

OPEN PEER REVIEW

Opportunities and Challenges of Using Artificial Intelligence in the Pre-election Phase with an Emphasis on Iran's Legal and Electoral System

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1. Round 1

1.1. Reviewer 1

Reviewer:

The introductory paragraph lists “the dissemination of fake news and misleading information, the activity of fake user accounts, the use of bots and trolls, the production of deepfake content, and the possibility of cyber interventions” as major electoral threats, but these phenomena are analytically distinct and involve different regulatory problems. The manuscript should clarify the taxonomy of threats before discussing AI-based responses. For example, disinformation concerns the informational environment; bots and coordinated inauthentic behavior concern network manipulation; deepfakes concern synthetic media; and cyber intervention concerns the confidentiality, integrity, or availability of electoral infrastructure. Treating all of these under a single technological-threat category risks obscuring the different legal interests, evidentiary thresholds, regulatory authorities, and proportionality tests applicable to each phenomenon.

The sentence stating that “Among the various stages of the electoral process, the pre-election stage is particularly important and sensitive” identifies the manuscript's core temporal focus, but the term “pre-election stage” is never given a sufficiently precise operational definition. The authors should specify where this stage begins and ends and which activities fall within its boundaries. For example, does it begin with the formal announcement of elections, candidate registration, voter registration, or the commencement of campaigning, and does it end at the opening of polling stations? This clarification is essential because several applications discussed later—such as voter information, monitoring misinformation, and identifying bots—may continue during election day and even after voting. A clear temporal definition would substantially improve the internal coherence and scope of the article.

In the paragraph stating that “the legitimacy of AI-based technologies in electoral governance depends not only on their technical efficiency but also on their conformity with the legal principles governing public-sector AI,” the manuscript identifies

an important normative proposition but does not develop a sufficiently explicit analytical framework. The authors should transform transparency, accountability, human oversight, explainability, privacy, equality, and contestability into clearly defined evaluative criteria that are subsequently applied consistently to each AI application examined in the article. At present, these principles recur throughout the manuscript but function largely as recurring themes rather than as components of a systematic legal test. A matrix or explicit analytical model connecting each AI application to the relevant public-law principles would make the study considerably more rigorous.

In the paragraph beginning “On the other hand, the use of artificial intelligence in the pre-election phase can also be considered from the perspective of realizing the right to political participation and the right to self-determination,” the relationship between individual political participation and “self-determination” requires doctrinal clarification. Self-determination has specific meanings in international law and may refer to peoples rather than simply individual voter autonomy. If the authors intend to use “self-determination” in the domestic constitutional sense of popular sovereignty or political autonomy, this should be expressly explained. Otherwise, the manuscript risks conflating collective self-determination, democratic sovereignty, individual electoral rights, and informed voter autonomy. A more precise conceptual distinction would improve both the public-law analysis and the manuscript’s human-rights terminology.

In the section “Conceptual Definition and System-Oriented Approach,” the sentence describing AI as “systems that rely on data and computational methods to perform tasks that, in conventional settings, would have been considered to require human analysis” remains too broad for a legal article focused on electoral governance. This definition may encompass ordinary rule-based software, statistical tools, and conventional database systems. The authors should adopt a more discriminating working definition and distinguish, at minimum, rule-based automation, machine learning, predictive systems, natural language processing, biometric recognition, recommender systems, generative AI, and large language models. Such distinctions are legally significant because explainability, risk, autonomy, data requirements, and error characteristics differ substantially across these technologies.

In the paragraph beginning “Third: Uniformity and impartiality in implementation,” the manuscript states that AI systems “can apply uniform and objective criteria to all registrants” if trained on unbiased data. This formulation should be revised because “unbiased data” is rarely a realistic binary condition, and uniform treatment does not necessarily produce substantive fairness. The authors should distinguish consistency from fairness and explain that algorithmic systems may reproduce structural disparities even when applying the same formal decision rule. The analysis would benefit from incorporating concepts such as representational bias, measurement bias, historical bias, proxy discrimination, disparate impact, and fairness trade-offs, particularly where electoral eligibility or access to political participation is affected.

In the paragraph on “Civil and criminal liability arising from errors,” the question “Who is responsible for an erroneous output produced by an AI system?” is highly relevant, but the analysis should not treat liability as arising only after a wrong final outcome. The manuscript should also consider liability for defective procurement, inadequate model validation, negligent dataset selection, insufficient cybersecurity, failure to monitor model performance, and failure to provide human review. Furthermore, the authors should distinguish between the liability of public authorities and that of private technology providers. Because the electoral authority retains public-law obligations even when technology is outsourced, contractual delegation should not be assumed to transfer constitutional or administrative responsibility to vendors.

Authors revised the manuscript and uploaded the document.

1.2. Reviewer 2

Reviewer:

In the paragraph under “Determinant Legal Features in Governance Applications,” the formulation “The greater the system’s contribution to the output, the more complex the design of mechanisms for attribution and responsibility becomes” is theoretically important but underdeveloped. The manuscript should distinguish at least four forms of responsibility: institutional administrative responsibility, civil liability, criminal liability, and technical/vendor responsibility. It should also differentiate AI used merely for administrative assistance from AI that produces recommendations with substantial practical influence and

AI that effectively determines outcomes. This distinction is especially important in electoral administration because formally retaining a human official as the final decision-maker does not necessarily constitute meaningful human control if the official routinely follows opaque algorithmic recommendations.

In the paragraph defining the electoral system as “the legal-institutional framework of electoral administration,” the manuscript provides a useful broad definition but should clarify the distinction between the “electoral system” in the political-science sense and “electoral administration” in the institutional-governance sense. In comparative electoral studies, “electoral system” often refers specifically to rules translating votes into seats, such as proportional representation or plurality systems. Because the manuscript instead uses the term to encompass registration, campaigning, administration, monitoring, cybersecurity, and complaints, the authors should explicitly acknowledge this terminological choice and perhaps adopt “electoral governance system” or “electoral administration framework” where appropriate. This would prevent conceptual ambiguity for interdisciplinary readers.

In the paragraph on “Transparency of the Electoral Process,” the statement that AI inputs, “processing logic, and outputs” must be traceable requires greater legal and technical nuance. Complete disclosure of model architecture or source code is not always necessary for meaningful legal transparency, nor is it always compatible with cybersecurity, intellectual property protection, or system integrity. The manuscript should differentiate transparency toward the public, transparency toward affected persons, transparency toward supervisory bodies, and technical auditability by qualified experts. It should also distinguish explanation of an individual decision from disclosure of the complete algorithm. Such distinctions would enable a more sophisticated proportionality analysis rather than treating transparency as an undifferentiated obligation.

In the paragraph on “Ensuring the Speed, Accuracy, and Integrity of Electoral Processes and Results,” the manuscript tends to present efficiency improvements as presumptive benefits of AI. The authors should be more cautious about assuming that automation necessarily improves accuracy, speed, or cost-effectiveness. AI systems may introduce new forms of error, false positives, model drift, integration failures, data-quality problems, cybersecurity vulnerabilities, and substantial procurement or maintenance costs. I recommend revising this section to distinguish hypothesized benefits from empirically established benefits and to identify the conditions under which efficiency claims would be valid, such as validated datasets, external testing, acceptable false-positive and false-negative rates, redundancy, human review, and independent audit.

In the registration and verification section, the sentence listing “identification documents, educational certificates, criminal records, security inquiries, etc.” raises an important legal issue that should be addressed much more directly: not all data that are technically available to electoral authorities are necessarily lawful, necessary, or proportionate for algorithmic processing. The authors should distinguish legal eligibility criteria from data that merely correlate with eligibility or perceived risk. An AI system should not expand the substantive criteria for eligibility indirectly by incorporating variables that the law does not authorize decision-makers to consider. This is particularly significant for machine-learning systems because proxy variables may introduce de facto criteria that are absent from electoral legislation.

The paragraph claiming that “in the 2020 Brazilian presidential election, the use of a biometric fingerprint-matching system in more than 70% of polling stations reportedly led to a substantial reduction in reports of identity fraud” requires careful factual verification and revision. Brazil did not hold a presidential election in 2020; its presidential election occurred in 2018 and subsequently in 2022, while municipal elections were held in 2020. This is a material factual problem because the example is used as empirical evidence supporting biometric verification. The authors should verify the election, year, percentage of biometric coverage, outcome measure, and original source before retaining this example. More generally, all numerical claims concerning foreign electoral experiences should be supported by primary electoral-authority reports or robust empirical studies rather than broad secondary sources.

Authors revised the manuscript and uploaded the document.

2. Revised

Editor’s decision: Accepted.

Editor in Chief’s decision: Accepted.

