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Deanship of Scientific Research

Quantifying AI's Role in Conflict Resolution: Assessing Its Potency in Mediation and Peacekeeping

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Abstract

Objectives: This research evaluates AI's efficacy in conflict resolution, focusing on mediation and peacekeeping. It comprehensively assesses AI's role through metrics, real-world applications, and comparative analysis with traditional methods, while also exploring ethical considerations, legal frameworks, and future trends.

Methods: Employing a multidisciplinary approach, this study conducts a comprehensive literature review across fields like computer science, political science, and ethics. It synthesizes insights from existing research, empirical evidence, and practical experiences to understand AI's complexities in conflict resolution.

Results: AI's potential in conflict resolution is vast, but ethical concerns and reliability must be addressed for sustainable peacebuilding. AI can analyze vast data, identify root causes, and suggest solutions, but biases in data and accountability concerns must be addressed to harness AI's potential fully**.**

Conclusions: AI integration in conflict resolution requires a balanced approach considering ethical, legal, and technical aspects. Future trends suggest research, interdisciplinary collaboration, and clear guidelines for responsible use.

Keywords: Conflict resolution metrics, real-world applications, ethical considerations, legal frameworks, future trends.

تحديد دورالذكاء الاصطناعي في حل النزاعات: تقييم فعاليته في الوساطة وحفظ السلام

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ملخّص

الأهداف: يقيّم هذا البحث فعالية الذكاء الاصطناعي في حل النزاعات، مع التركيز على التوسط وحفظ السلام. وكما يقيّم دور الذكاء الاصطناعي تقييماً شاملاً من خلال المقاييس والتطبيقات الواقعية والتحليل المقارن مع الأساليب التقليدية، بالإضافة إلى اكتشاف الاعتبارات الأخلاقية والأطر القانونية والاتجاهات المستقبلية.

المنهجية: باستخدام نهج متعدد التخصصات، تجري هذه الدراسة مراجعة شاملة للأدبيات في مجالات مثل علوم الحاسوب والعلوم السياسية والأخلاق. وهي تجمع رؤى من البحوث القائمة والأدلة التجريبية والتجارب العملية لفهم تعقيدات الذكاء الاصطناعي في حل النزاعات.

النتائج: إن إمكانات الذكاء الاصطناعي في حل النزاعات هائلة، ولكن يجب معالجة المخاوف الأخلاقية والموثوقية من أجل بناء السلام المستدام. يمكن للذكاء الاصطناعي تحليل البيانات الهائلة، وتحديد الأسباب الجذرية، واقتراح الحلول، ولكن يجب معالجة التحيزات في البيانات والمخاوف المتعلقة بالمساءلة لتسخير إمكانات الذكاء الاصطناعي بشكل كامل.

الاستنتاجات: يتطلب دمج الذكاء الاصطناعي في حل النزاعات نهجًا متوازنًا يراعي الجوانب الأخلاقية والقانونية والتقنية. تقترح الاتجاهات المستقبلية إجراء البحوث والتعاون متعدد التخصصات ووضع مبادئ توجيهية واضحة للاستخدام المسؤول.

الكلمات الدالة: مقاييس حل النزاعات؛ تطبيقات واقعية؛ اعتبارات أخلاقية؛ أطر قانونية؛ اتجاهات مستقبلية.

Introduction

An Introduction to the Role of AI in Conflict Resolution

The British Columbia Civil Resolution Tribunal has proven that combining human judgment with AI technology can produce the best ideas to help resolve conflicts (Ermakova & Frolova, 2022; Zeleznikow, 2021) through predictive data-based modeling (Feijóo et al., 2020; Georgiadou et al., 2020). For politicians, artificial intelligence (AI) is a loyal partner in making the right decisions, anticipating disputes, and encouraging sustainability, transparency, compliance with regulations, and moral business practices in overcoming social problems. (Zhao & Gómez Fariñas, 2023).

AI's position significantly impacts the UN's Sustainable Development Goals and global sustainability. Still, in conflict resolution, real efforts are needed to eliminate bias in building trust (Liengpunsakul, 2021). The brotherhood of Blockchain and AI protects against dangers in improving network security, and vulnerability management that must be accompanied by a call for a moral governance framework (Dafoe et al., 2020) which at the same time encourages communication toward peaceful solutions by closing gaps in understanding. AI, which can evaluate large amounts of data, extract complex patterns, describe the future, and implement conflict resolution will encourage international cooperation and understanding.

While traditional models may overestimate risk during downturns due to poor dynamic interdependencies, AI algorithms can foresee changes in the market (Bing Hu, 2023; Secinaro et al., 2021). By offering insights, forecasting results, and resolving conflicts, artificial intelligence (AI) is altering mediation and peacekeeping techniques, including online dispute resolution (Candeias, 2023). AI technologies, from machine learning to natural language processing (Beysolow II, 2018), offer unprecedented capabilities in analyzing vast datasets and recognizing patterns (Nikolaidis et al., 2022). Growing awareness of AI's ability to improve dispute resolution reflects the technology's growing prominence in the world (Lovejoy et al., 2022; Pokhriyal & Koebe, 2023).

Continuous advancements in AI highlight its potential to enhance mediation and peacekeeping efforts (Olsher, 2015). AI's computational abilities, combined with its aptitude for identifying vulnerabilities and anomalies through pattern recognition, greatly accelerate conflict resolution efforts (Abedin et al., 2023; M. Arana-Catania, 2021; Pizzi et al., 2020; Pokhriyal & Koebe, 2023; Report, 2020; Rudawska, 2019). It assists in predictive modeling for conflict resolution, necessitating a balanced approach to preserve human expertise and oversight, while addressing complexities and ethical considerations (Bilich et al., 2023; Yankoski et al., 2021).

Human oversight remains essential to ensure accountability in crisis decision-making (Devitt et al., 2023; Jensen et al., 2020; Linkov et al., 2020). despite its great potential, AI has limitations compared to other transformative technologies such as electricity or the internal combustion engine (Hochschild, 2019; MSNBC, 2018), careful consideration is needed about its role in overcoming global challenges, including achieving the UN Sustainable Development Goals. in 2030 (Hochschild, 2019).

Addressing social issues requires taking justice, uncertainty, legal issues, conflicts of interest, privacy, culture, and trust seriously while mediating conflicts, both between humans and software agents (Baarslag et al., 2017), to resolve competing interests, negotiation processes are extensively studied by AI and multi-agent systems. They are formalized through domain models, preferences, and interaction protocols (Marsa-Maestre et al., 2014). To improve tactics for offers, opponents, and acceptances, intelligent negotiation agents are now being developed (Baarslag et al., 2016; RAZEGHI et al., 2020). Please note that the ANAC tournament every year tests negotiation skills with new challenges, encouraging collaboration in areas such as politics and business to resolve disputes in today's multicultural world. (Aydoğan et al., 2020; Jonker et al., 2017).

Research across diverse fields, including social science (Grossmann et al., 2023; Xu et al., 2024), anthropology (Richardson, 2015), psychology (Abrams, 2023), mathematics (Kutyniok, 2023), biology (Aydoğan et al., 2021), and more recently, the importance of dispute resolution has fueled the development of artificial intelligence (Aydoğan et al., 2021; Hsu & Chaudhary, 2023). Furthermore, studies try to shed light on the moral questions raised by using AI to settle disputes (Candeias, 2023). Deliberate scrutiny of issues related to bias, transparency, accountability (Esmaeilzadeh & Vaezi, 2022), and unforeseen impacts AI integration must comply with international laws and ethical standards (Devitt et al., 2023; ICRC, 2022; Pizzi et al., 2020), and human rights (Raith, 2023). Achieving confidence in AI-powered dispute resolution

techniques requires striking a balance between scientific advancement and morality.

This study explores AI's role in conflict resolution, evaluating case studies and addressing ethical concerns. It advocates for a nuanced approach to fostering peace in a technologically advanced society. It explores AI's potential in early warning systems, mediation, and post-conflict reconstruction. In this context, researchers offer a simple model as an illustration in Figure 1 below:

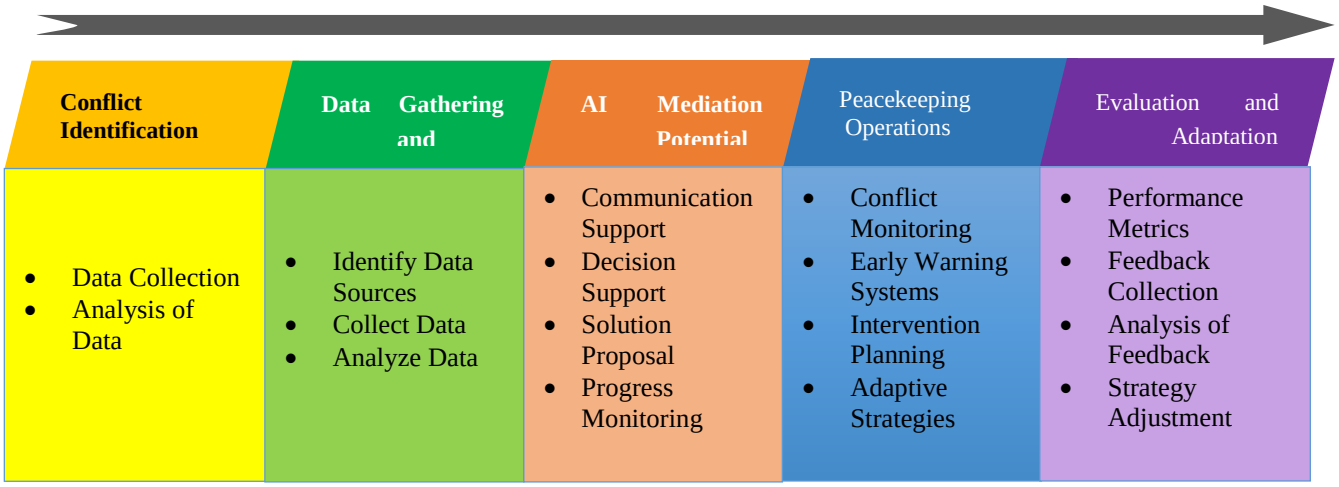


Figure 1. Role Of AI In Conflict Resolution, Assessing Potential In Mediation, and Peacekeeping:

Explanation:

❖ Conflict Identification: This stage involves identifying conflicts or potential areas of tension that require resolution.

➢ Data Collection: This phase involves gathering data from various sources such as news reports, social media, historical records, and field observations.

➢ Analysis of Data: The collected data is analyzed to identify patterns, trends, and conflict indicators. Techniques such as natural language processing, machine learning, and predictive analytics may be employed to derive insights from the data.

❖ Data Gathering and Analysis: AI systems collect and analyze relevant data related to the conflict, including historical data, current events, and sentiment analysis.

➢ Identify Data Sources: This phase involves identifying relevant sources of data that can provide insights into the conflict. These sources may include social media, news reports, government documents, academic research, and field reports.

➢ Collect Data: Once the data sources are identified, the next step is to collect the data. This may involve accessing online databases, conducting surveys, interviewing stakeholders, or utilizing automated data collection tools.

➢ Analyze Data: After collecting the data, it is analyzed using various techniques such as statistical analysis, machine learning, natural language processing, and sentiment analysis. The goal is to extract meaningful insights, identify patterns, and understand the underlying dynamics of the conflict.

❖ AI Mediation Potential: AI systems explore their potential role in mediation by facilitating communication, proposing solutions, and monitoring progress during negotiations.

➢ Communication Support: AI systems assist in facilitating communication between conflicting parties by providing language translation services, text analysis for sentiment and tone, and real-time interpretation during negotiations.

➢ Decision Support: AI provides decision support to human mediators by analyzing data, identifying potential solutions based on historical precedents, and offering recommendations for compromise or concession.

- Solution Proposal: AI generates proposals for potential solutions to the conflict based on analysis of the data and understanding of the parties' interests and concerns.
- Progress Monitoring: AI monitors the progress of mediation efforts by tracking communication patterns, identifying areas of agreement or disagreement, and providing feedback to mediators to adjust their strategies accordingly.

❖ Peacekeeping Operations: AI technologies are integrated into peacekeeping strategies for conflict monitoring, early warning systems, and intervention planning.

- Conflict Monitoring: AI systems continuously monitor conflict zones by analyzing various data streams, including satellite imagery, social media feeds, and field reports, to identify potential threats or escalations.
- Early Warning Systems: AI-powered early warning systems detect and alert peacekeeping forces to emerging conflicts or potential violence, allowing for proactive intervention to prevent escalation.
- Intervention Planning: AI supports the planning of peacekeeping interventions by providing analysis and insights into conflict dynamics, identifying strategic points for intervention, and recommending appropriate responses.
- Adaptive Strategies: Peacekeeping strategies are adapted based on real-time feedback from conflict monitoring and early warning systems. AI helps peacekeeping forces to adjust their strategies dynamically to respond effectively to changing conflict dynamics.

❖ Evaluation and Adaptation: Continuous evaluation of AI-supported processes is performed, and adaptation is made based on feedback and evolving conflict dynamics.

- Performance Metrics: Relevant performance metrics are established to evaluate the effectiveness of conflict resolution and peacekeeping efforts. These metrics may include a reduction in violence, restoration of stability, and satisfaction of stakeholders.
- Feedback Collection: Feedback is collected from various sources, including stakeholders, peacekeeping forces, and AI systems themselves, to gather insights into the outcomes and effectiveness of interventions.
- Analysis of Feedback: The collected feedback is analyzed to identify patterns, trends, and areas for improvement. AI technologies may be utilized to analyze large datasets and extract meaningful insights from feedback.
- Strategy Adjustment: Based on the feedback analysis, strategies, and approaches are adjusted to better address the evolving dynamics of conflicts. This may involve refining peacekeeping tactics, updating AI algorithms, or modifying intervention plans.

Conceptual Framework of Conflict Resolution

The conceptual framework of conflict resolution is indeed influenced by cultural backgrounds, with different cultures having varying approaches to conflict styles. (See Figure 1). Cultural intelligence and self-monitoring are relevant variables that can positively influence the ability to solve interpersonal conflicts more effectively (Gonçalves et al., 2016). Collectivist cultures may prioritize relational harmony and emotional restraint in conflict resolution, while individualistic cultures may focus on self-interests and problem-solving, this is AI food.

Interpersonal skills are strong predictors of mental health, achievement, success in the job market, and long-term health (Attanasio et al., 2020; Bonell et al., 2018; Smithers et al., 2018). According to Clarke et al. (2020), social skills have recently come under fire as being essential to well-being in our increasingly uncertain world. In our increasingly diverse and global society, the capacity to uphold inclusivity despite differences is essential (Garimella et al., 2018). Conflict styles in society are often influenced by personal interests, social relationships, cultural norms, individual personalities, and resolution techniques. Understanding social representations can improve group dynamics, perception, and functioning, promoting harmony and understanding in diverse communities (Shih & Susanto, 2010).

Engineering diplomacy demonstrated through collaborative initiatives in promoting peace through science, technology, and engineering collaboration (Amadei, 2019), involves integrating engineering into diplomacy, diplomacy into engineering, or both. The International Space Station (ISS), initiated by Reagan, stands as a diplomatic success despite past tensions with the Soviet Union but faces challenges as it nears the end of its operational life and contends with evolving dynamics in space (Dorigo, 2016; Stanley & Blount, 2023). Global academic and scientific partnerships advance knowledge

and technology(Gui et al., 2019), fostering a new era of international relations(Floridi et al., 2018), albeit with concerns about potential neo-colonial implications (Engwall, 2016). Collaboration between corporations and NGOs can lead to innovative business models for developing markets (Dahan et al., 2010), promoting peace and prosperity. Engineers collaborate on joint infrastructure projects, bridging cultural gaps and fostering enduring relationships (UNESCO, 2022). Engineering contributes to global harmony and connectivity through infrastructure projects like roads and bridges (Huck, 2023), influencing state formation and social dynamics, as seen in the interoceanic highway project in South America (Bowman, 2016).

Effective communicative collaboration on engineering projects encourages learning and understanding of individuals from diverse backgrounds, enabling professionals to overcome complex challenges and develop innovative solutions (Igbinenikaro, 2024; Park et al., 2017), promoting a deeper understanding of various perspectives. Mutual respect, understanding, and trust of collaborators are essential to project success (Paul, 2018), transcending long-standing barriers by transforming global cooperation in convergence technology, establishing social observatories, challenging global brands in mobile communications, shaping Asia Pacific youth culture in encouraging cross-border collaboration (Trainini, 2013).

Teknologi AI telah mencapai kemajuan yang signifikan, namun tantangan dan tekad masih tetap ada dalam integrasinya ke dalam praktik penyelesaian konflik, khususnya mengenai penerapan etis dari pengambilan keputusan yang didorong oleh AI (Bankins & Formosa, 2023; Chongcs et al., 2023). AI systems in sensitive (Devitt et al., 2023) and high-stakes (Hsu & Chaudhary, 2023; Schmidt et. al, 2021) scenarios and the potential for unintended consequences necessitate thorough examination (UNIVERSITY NEWS, 2023) and thoughtful consideration (Candeias, 2023). Additionally, the extent to which AI can genuinely contribute to sustainable peacebuilding efforts remains a topic of ongoing debate among scholars, policymakers, and practitioners (Mehdi Salami, 2023). in the field of trade, for example, it is necessary to resolve the conflict between social morality and quality to minimize the impact of values that conflict with the values espoused by ethical consumers (Tal et al., 2022).

Research Objectives

This study investigates the potential benefits and challenges of AI in peacebuilding, its ethical implications, and recommendations for policymakers and practitioners. It aims to understand the intersection of AI, ethics, and peacebuilding, providing insights for decision-making and shaping future strategies. The study aims to foster critical reflections within the peacebuilding community and offer practical guidance for harnessing AI's power for sustainable peacebuilding outcomes.

Methodology

This study utilizes an extensive review of literature, integrating diverse fields such as computer science, political science, and ethics, to comprehend the complexities of AI in conflict resolution, providing valuable insights for policymakers, professionals, and academics. In the literature review approach, the researchers combine the content analysis approach, to describe the content of information systematically and objectively, which can be applied to various forms of text, including academic articles, books, websites, and other media, about quantifying ai's role in conflict resolution: assessing its potency in mediation and peacekeeping. This approach serves to abbreviate a large amount of text about quantifying AI's role in conflict resolution: assessing its potency in mediation and peacekeeping become an organized and concise summary of the main results, providing an insight into history and culture (Rathore & Patwa, 2020) The findings highlight the potential benefits of AI in conflict resolution, such as improved efficiency, reduced human bias, and enhanced decision-making processes. Additionally, the study identifies key challenges and ethical considerations that must be addressed to ensure responsible and effective use of AI technologies in this context. Overall, this research contributes to a deeper understanding of the implications of AI in conflict resolution and offers practical recommendations for its implementation.

The Role of Technology in Conflict Management

AI4PCR is a web application that uses AI to encourage neutral language during interpersonal conflicts, effectively reducing social provocation and discrimination (Hsu & Chaudhary, 2023). This application underscores the critical role of

technology in conflict management, especially in contexts such as international sourcing and partnering (Khin & Kee, 2022). In water conflicts, AI can be instrumental in providing predictive analytics and real-time data monitoring, aiding in resolving disputes over water resources (Salameh et al., 2021).

Research indicates that diversity and effective conflict management positively impact teamwork and organizational performance in firms (Tabassi et al., 2018; Urionabarrenetxea et al., 2021). The role of Information and Communication Technology (ICT) in conflict management is complex; it can either enhance or exacerbate conflict resolution strategies depending on the situation (Todaro & Stirpe, 2017). For instance, video conferencing technology helps team members from different locations feel more connected and engage in conflict resolution discussions, leading to better outcomes. Conversely, relying on instant messaging or email can cause misunderstandings and misinterpretations that hinder conflict resolution.

The complexity of ICT's role is also evident in scenarios involving refugees and migration. AI tools can assist in managing and analyzing large datasets related to refugee movements, improving coordination and response strategies (T. Bani Salameh, 2024). This dual nature of technology in conflict management highlights the importance of selecting appropriate tools and methods tailored to specific conflict situations, ensuring that technology serves as a facilitator rather than a barrier to effective resolution. By examining these technological interventions and their implications, the study highlights the transformative potential of AI and ICT in fostering a more harmonious and productive organizational environment, emphasizing the need for continued innovation and research in this evolving field.

For more information about water conflicts, see Mohammed Bani Salameh et al., The Water Crisis and the Conflict in the Middle East. Sustainable Water Resources Management, Vol. 7, Issue 5, October 2021. https://doi.org/10.1007/s40899-021-00549-1.

For more information about the impact of refugees, see, for example, Mohammed T. Bani Salameh, 2024. Beyond Borders: Impacts of the Syrian Refugee Crisis on Jordan, in Refugees and Migrants: Current Conditions and Future Trends. https://doi.org/10.5772/intechopen.1005219.

Historical Overview of AI in Conflict Resolution

AI can enhance conflict resolution through predictive modeling, decision-support systems, and data-driven diplomacy, improving accuracy and efficiency. Still, ethical considerations like data privacy and algorithmic bias must be addressed (Carneiro, Novais, & Neves, 2014). Deep learning has shown promising results in conflict resolution since the 1980s, improving decision-making (Aloisi & De Stefano, 2023), negotiation (Georgiadou et al., 2020), mediation (Kumari & Kumar, 2023), and peacebuilding processes (Amadei, 2019). Applications include online mediation (Candeias, 2023), early warning systems (Yankoski et al., 2021), and e-negotiation platforms.

A new approach in the area of interpersonal skills training (Poria et al., 2017), where computer-based social-emotional learning includes the use of computer simulations and virtual environments to train teachers in managing the classroom (Greif Green et al., 2020), as well as the application of virtual body language detection in communications for health professionals (Kron et al., 2017) and the use of smart glasses to teach social-emotional skills (Keshav et al., 2018). The use of artificial agents is increasingly common in mental health training (Moore & Caudill, 2019), and has been used to teach job interview skills (Hsu & Chaudhary, 2023; Porayska-Pomsta & Chryssafidou, 2018).

AI can analyze complex data in medicine (Ahmad et al., 2021), identifying patterns and offering potential solutions to conflicts can be achieved by using integration patterns such as Proxy, Broker, Wrapper-Façade, Component Configurator, Interceptor, Integration Adapter, Messenger, Façade, Mediator, and Process Automator. AI's integration solutions, including location transparency and mobility, are expected to revolutionize conflict resolution, but reliability depends on factors like data quality, algorithmic bias, and safety (Zhang & Zhang, 2023). AI's advanced capabilities in conflict resolution enable mediators and parties to understand underlying issues better, identify potential solutions, and reach a more satisfactory resolution (see Figure 1 and Figure 2).

The integration of artificial intelligence (AI) into conflict resolution practices signifies a notable departure from

traditional approaches (Schmidt et. al, 2021). Its application in conflict resolution has gained attention in recent years, driven by advances in computing power (Vidhya et al., 2021; Witt et al., 2023), data accessibility, and algorithmic sophistication (Bjola, 2019; Jensen et al., 2020; Perrotta et al., 2021; Schmidt et. al, 2021). Initial experiments with AI-driven decision support systems and predictive analytics laid the groundwork for contemporary applications in mediation, peacekeeping (Qadir et al., 2022; Williams & O'Neill, 2023), and crisis management (Ali, 2022; Essien & Petrounias, 2022).

The application of AI in various domains has occurred, but its use in conflict resolution is still relatively new (Lovejoy et al., 2022; Vemuri, 2020). This trend was born with a high-level meeting discussing the potential of AI in conflict resolution, emphasizing real-time analysis and decision support systems (IRRC, 2021; Pokhriyal & Koebe, 2023; Rudawska, 2019). Historical perspectives on American, Chinese, and Russian attitudes toward AI in military contexts have also influenced ethical debates (Schmidt et. al, 2021), which examine the historical trajectory of AI in conflict resolution, highlighting its potential to improve decision-making and promote peaceful resolution (Abedin et al., 2023; Buch et al., 2022; Guo et al., 2018; Johnson et al., 2021; M. Arana-Catania, 2021; Robinson et al., 2023).

Current State of AI Applications in Mediation and Peacekeeping

AI applications in mediation and peacekeeping improve mediators' ethical considerations, data-driven insights, and critical conflict resolution, rethinking theoretical frameworks in International Relations (Grover et al., 2018). Ethical concerns arise over AI's use in sensitive situations, prompting mediators and peacekeepers to balance benefits and risks. Cooperative AI aims to connect AI research to broader discussions on cooperation and aligning machine preferences with human intentions (Dafoe et al., 2020).

AI's influence in decision-making may undermine trust in emotionally charged situations, necessitating a balance between efficiency and human touch for conflict resolution and successful logistics partnerships (Klumpp et al., 2019), by assisting workplace mediation in analyzing data and proposing solutions, (Dempere et al., 2023; United Nations, 2023), however, it is important to consider cultural insensitivity and official orders. While mishandling knowledge risks health (Ogunseitan, 2023) contributes to renewed conflicts, suboptimal outcomes, and loss of life. In peacekeeping missions, misinterpreted signals can lead to ceasefire violations or hostilities (Ho et al., 2023).

Challenges and Opportunities

Cyberattacks targeting ICT and disinformation pose significant threats. Espionage complicates matters further (Nish & Naumann, 2019; Wardle & Derakhshan, 2017). AI development in conflict zones requires ethical considerations such as privacy and cultural sensitivity in providing great opportunities for innovation and collaboration in addressing security issues (see Figure 2).

AI has the potential to improve compliance with International Humanitarian Law (IHL) and Human Rights Law (HRL) in armed conflicts, enhancing situational awareness, decision-making, targeting accuracy, accountability, monitoring, and humanitarian access. However, it also poses challenges such as the emergence of new forms of violence, blurring combatant-civilian distinctions, and uncertainties regarding attribution and responsibility (Connor, 2019; Review et al., 2020; Roff H.M., 2018). Lethal autonomous weapons systems (LAWS), autonomous military platforms capable of independent target engagement, illustrate AI's complexities in warfare. While LAWS promises operational efficiency and reduced casualties, they raise ethical and legal concerns regarding deployment and oversight (Verbruggen, 2017).

Metrics for Assessing AI's Efficacy in Conflict Resolution

Measuring the impact of artificial intelligence (AI) in conflict resolution necessitates the development of comprehensive metrics encompassing both quantitative and qualitative dimensions of effectiveness (see Figure 2). Traditional metrics, such as violence reduction (Blom et al., 2023), recognized by the United Nations (UN) as a sustainable development goal (SDG) and crucial to public health and criminology, along with indicators like the number of successful peace agreements and conflict duration, offer valuable insights into the tangible outcomes of AI interventions. As defined by Blom, Fadeeva, and Barbosa (2023), violence and abuse are intentional acts likely to cause harm, irrespective of their physicality or legality.

However, evaluating the impact of AI extends beyond such metrics, encompassing factors like trust-building, community engagement, and the long-term sustainability of peace efforts (Garimella et al., 2018; Hsu & Chaudhary, 2023).

Contrarily, Wen et al. (2022) argue that sensor errors may lead to observation conflicts, subsequently triggering contradictory actions. Their study emphasizes the human-automation system conflict in automation and digitalization, underscoring the necessity for human-centered design to avert significant mishaps arising from conflicts in such systems (Wen et al., 2022). Elkhatat, Elsaid et all, (2023) demonstrated higher accuracy in identifying GPT 3.5 content, but there were inconsistencies in human response control, highlighting the need for improvements.

Conventional conflict resolution training focuses on various conflict strategies, while online programs limit practice to predefined scenarios and multiple-choice options (Greif Green et al., 2020; Kron et al., 2017). Hence, a multidimensional approach that integrates quantitative indicators with qualitative assessments (Oblizanov et al., 2023) becomes imperative for accurately evaluating the efficacy of AI in conflict resolution. This approach involves goal setting, case studies, method selection, data analysis, results reporting, impact evaluation, learning and improvement, and ethical considerations (Lawton, 2023; Oblizanov et al., 2023).

A number of metrics are available to evaluate the effectiveness of AI in resolving conflicts, and these metrics are essential for assessing how well AI/ML models perform in this area. The significance of determining appropriate evaluation metrics for AI/ML models is outlined by Naser and Alavi (2023), who stress that a good model performs optimally and best describes the phenomenon at hand. These metrics may include data analysis accuracy, dispute resolution process speed, outcome fairness and legal certainty in the context of AI's application in conflict resolution (Agus et al., 2023). Furthermore, a crucial consideration in evaluating AI systems' effectiveness is how well they can adhere to or deviate from due process norms (Ebers, 2022).

It's interesting to note that although artificial intelligence (AI) has been demonstrated to improve online family dispute resolution (OFDR) systems' performance through better decision-making and resource distribution (Wilson-Evered & Zeleznikow, 2021), there are risks and challenges related to its use, including the possibility of error and the inability to understand human factors and legal nuances (Agus et al., 2023). Furthermore, since new regulations seek to advance diversity, fairness, trustworthiness, transparency, and explainability, the changing regulatory and governance landscape for AI is probably going to have an effect on the evaluation of AI's effectiveness in conflict resolution (Abbott & Elliott, 2023).

The effectiveness of artificial intelligence (AI) in resolving conflicts can be assessed through performance, speed, fairness, and due process standards compliance metrics (see Figure 2). While AI has the potential to increase the efficacy and precision of dispute resolution procedures, it is crucial to address the problems that come with it and make sure that AI systems are regulated to uphold outcomes that are fair and trustworthy (Abbott & Elliott, 2023; Agus et al., 2023; Ebers, 2022; Naser & Alavi, 2023; Wilson-Evered & Zeleznikow, 2021).

Case Studies and Real-world Applications

Examining real-world case studies and applications of AI in conflict resolution provides valuable insights into its potential benefits and limitations. These range from the use of predictive analytics to anticipate conflict dynamics in the Democratic Republic of Congo (Englebert, 2016; Venugopalan, 2016) to the application of chatbots (Cunningham-nelson et al., 2019; Okonkwo & Ade-Ibijola, 2021) encourage dialogue between rival factions in Colombia (Paterson, 2015). There are many examples of AI technology being leveraged to overcome complex security challenges (Huang et al., 2023; Villegas-Ch & García-Ortiz, 2023). By analyzing these case studies, AI may be able to identify best practices, lessons learned, and areas for improvement in integrating AI into conflict resolution strategies, including the online education industry (Rahmaniar, 2023; Q. Tang, 2024).

In other situations, The effectiveness and efficiency of conflict resolution have been shown to increase with the integration of Artificial Intelligence (AI) into Online Dispute Resolution (ODR). In ODR, Rastogi et al. (2023) explores how AI might offer quicker, more economical, and more efficient solutions; in contrast, Carneiro et al. (2014) and Kathuria et al. (2023) critically assess AI-based methods by examining research projects and commercial providers. Together, these studies imply that AI can significantly contribute to the simplification of dispute resolution procedures. Surprisingly, despite

the possible advantages, the difficulties posed by AI in ODR are acknowledged, including maintaining accountability and transparency (Rastogi et al., 2023). In addition, Bello (2017) draws attention to the public's preference for human judges over automated ones, highlighting the intricacy of justice as a human ideal and the challenge of accurately capturing this in AI systems, no matter how advanced. In conclusion, case studies and practical applications show that AI has proven effective in some aspects of resolving conflicts, especially in open dispute resolution (ODR).But the use of AI in this field needs to be done so carefully, weighing the efficiency benefits against the requirement to preserve the human components of justice and fairness. Thus, there are certain limitations to AI's effectiveness in conflict resolution, and more study and advancement are required to overcome these issues (Bello, 2017; Carneiro, Novais, Andrade, et al., 2014; Kathuria et al., 2023; Rastogi et al., 2023).

In addition, the UN Secretary-General acknowledged the role that technology played in the organization's efforts to promote world peace and emphasized that embracing new technologies was essential to upholding the principles outlined in the UN Charter and carrying out the organization's current mandate (1949- Guterres & Secretary-General, 2018). Through the provision of tools for knowledge management, extraction, and conflict analysis, machine learning can effectively assist mediation teams, as demonstrated in a case study of the Yemeni conflict by ((Arana-Catania et al., 2022). The study highlights the value of interdisciplinary and participatory co-creation methodologies for the development of context-sensitive and targeted tools as well as for assuring meaningful and responsible implementation. It also demonstrates the potential of machine learning tools in conflict mediation (Arana-Catania et al., 2022).

Comparative Analysis with Traditional Methods

Comparing the performance of AI-based approaches with traditional conflict resolution methods provides a valuable benchmark for assessing their relative effectiveness and efficiency. Although AI offers certain advantages, such as scalability (Moro-Visconti et al., 2023; Soldati et al., 2023), adaptability (De Lemos & Grzes, 2019; Joshi, 2023), and speed of analysis (Rodríguez-Rangel et al., 2022; X. Tang et al., 2020; WHITEPAPER, 2021), traditional methods, such as diplomacy (Mehmet et al., 2013; Seib, 2012), negotiation (Groth, 2017), and mediation (Roy, 2016), has the unique power to foster trust, empathy and mutual understanding between parties in conflict. Therefore, according to Figure 1 and Figure 2 , active collaboration between AI and traditional approaches can provide input in designing hybrid models that utilize the strengths of both paradigms.

Ethical and Legal Considerations

Ethical Implications of AI in Conflict Resolution

AI integration in conflict resolution requires ethical considerations, metathinking, creativity, empathy, and accountability, requiring careful examination and deliberation (Esmaeilzadeh & Vaezi, 2022), as an ethical framework to guide the responsible application of AI technology (Bird et al., 2020). AI systems may perpetuate biases and inequalities in decision-making processes, impacting lives and livelihoods. Reinforcement learning algorithms may be used for conflict resolution tasks in complex action spaces. (Pham et al., 2019).

Respecting and upholding human rights principles is paramount (The Pulte Institute for Global Development, 2022) in the development and application of AI technologies in conflict resolution, including freedom of association (Ashraf, 2020), thought and expression (Larson, 2021), and freedom from discrimination. AI systems must comply with international human rights standards, including the rights to privacy, freedom of expression, and protection from discrimination (OAIC, n.d.), to avoid unintended harm and negative consequences for vulnerable groups (Council, 2014).

In addition, ensuring effective governance mechanisms is necessary for transparency, accountability, and oversight in the use of AI in conflict situations (Nyst & Falchetta, 2017). International organizations, governments, civil society organizations, and technology companies all have a role to play in establishing strong regulatory frameworks that protect human rights and encourage responsible AI innovation (Giebelhausen & Poehlman, 2024; Jones, 2023).

Legal Frameworks and Regulatory Challenges

Navigating the legal landscape surrounding AI in conflict resolution presents numerous challenges (Lake et al., 2016),

given the rapidly evolving nature of technology and the complexities of international law. An appropriate regulatory framework may stimulate innovation and promote, rather than restrict, new activity by promoting stability and certainty in the regulatory environment (Korpela, 2021).

Key legal issues include liability for AI-driven decisions jurisdictional questions regarding the use of autonomous systems in cross-border conflicts (Wilson et al., 2024), and compliance with existing legal frameworks, such as the Geneva Conventions and international humanitarian law (ICRC, 2022; İCRCİ, 1949). Addressing these challenges requires close collaboration between legal experts, policymakers, and technologists to develop adaptive legal frameworks that strike the right balance between innovation and regulation (Department of Industry Science and Resources, 2024).

Predictions for the Future of AI in Conflict Resolution

AI's role in conflict resolution is expected to expand, particularly in dispute resolution processes. AI has shown success in modeling human decision-making for limited variables but faces challenges in complex decisions with multiple actors and incomplete information (Kase et al., 2022). AI's potential in military operations, diplomacy, peacekeeping, and humanitarian aid requires strong ethical guidelines and regulatory frameworks, requiring collaboration among stakeholders to incorporate emerging trends (Shull et al., 2020).

The Situational Awareness Geospatial Enterprise (SAGE) is a tool that can enhance the UN's predictive capacity by documenting scenes, events, and activities, potentially generating 'risk maps' to predict conflicts, communal violence, or attacks on civilians (Duursma & Karlsrud, 2018). Despite aspirations, SAGE's predictive capabilities are hindered by inconsistencies in data quality and its focus on events rather than individuals, potentially limiting the UN's accuracy. (Druet, 2021).

UN databases could be repurposed for predictive analytics, raising data security concerns. Local informants in conflict zones may be targeted by combatants, potentially endangering civilians. This could also lead to diverting peacekeeping resources (Paper, 2023; Wangmo et al., 2019). In summary, transforming a database into a predictive asset raises significant security concerns and may conflict with established data protection regulations.

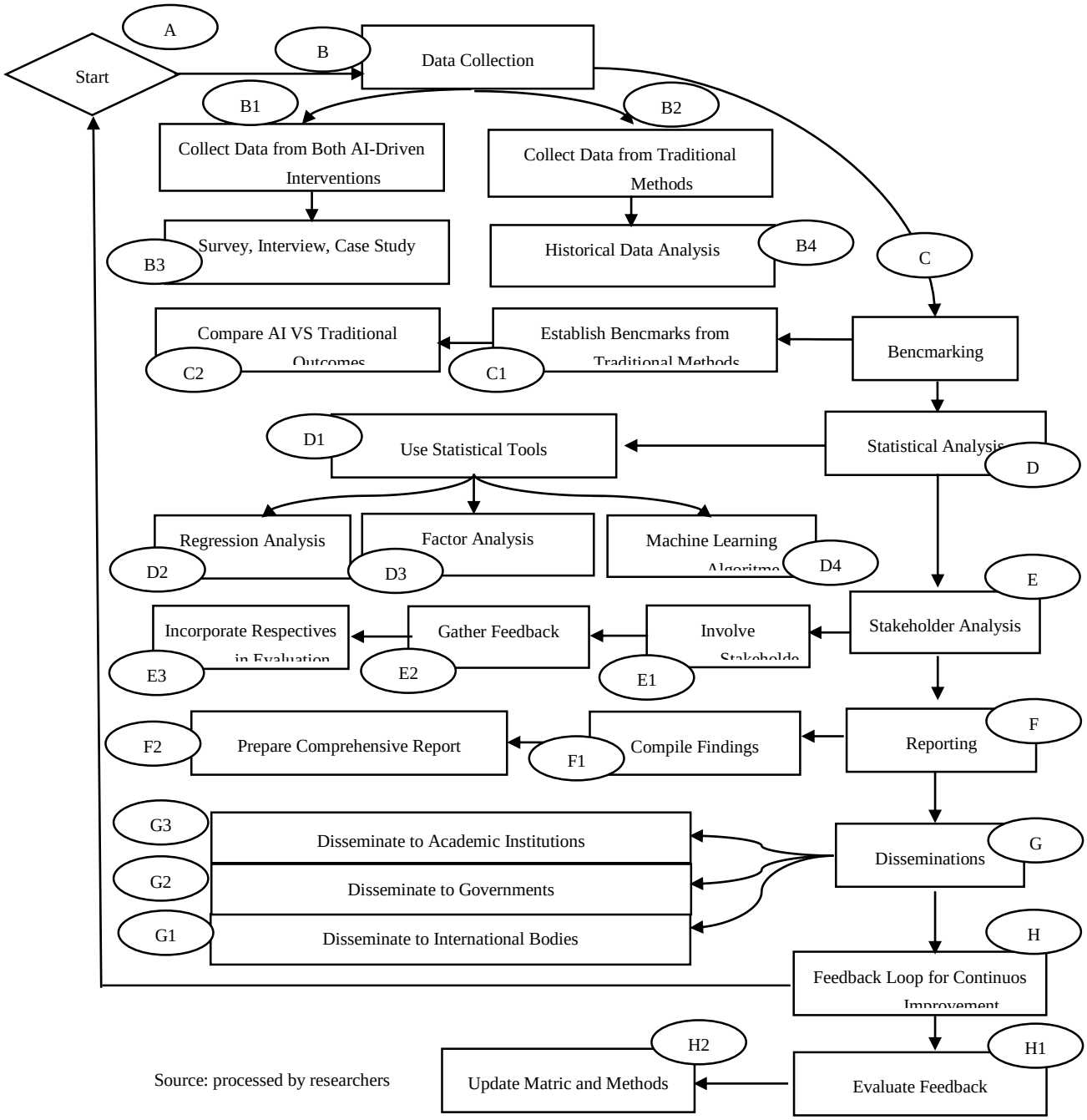
Future predictions for AI in conflict resolution point to a situation in which ML and AI technologies will become more and more important. The PERSUADER system serves as an example of how AI approaches, such as case-based reasoning, might be combined with decision-theoretic approaches to improve the effectiveness and caliber of dispute resolution in the future (Sycara, 1993). This is consistent with the larger trend of AI and ML applications enhancing decision-making processes and outcomes and revolutionizing a number of industries, such as cybersecurity, healthcare, and finance (Muthuraj & Shrutika Singla, 2023; Rajitha et al., 2024; Rego Rodríguez et al., 2022; Sawwalakhe et al., 2023).

Interestingly, even if AI has the ability to resolve conflicts better, there are still issues that need to be resolved in order to fully utilize it, like data security, ethical concerns, and the requirement for multidisciplinary cooperation (Rajitha et al., 2024). Furthermore, the development and integration of advanced machine learning techniques into decision support systems may be crucial to the growth of AI in conflict resolution (Sycara, 1993).

With platforms like the PERSUADER setting the standard for showcasing the possible advantages of AI-enhanced mediation and negotiation, the future of AI in conflict resolution seems bright. The use of AI and ML in conflict resolution is anticipated to grow in popularity as these technologies develop, leading to more effective and efficient dispute settlement procedures. To guarantee responsible and secure deployment, multidisciplinary efforts and thorough assessment of the related issues are necessary for the achievement of these developments (Rajitha et al., 2024; Sycara, 1993).

Proposed Framework

Based on the results of data analysis and mapping, here, the researcher proposes a simple model for quantifying AI's role in conflict resolution as assessing its potency in mediation and peacekeeping, as the researcher presents in the flow diagram in Figure 2.



Source: processed by researchers

Figure 2. Flow diagram for quantifying AI's role in conflict resolution, focusing on mediation and peacekeeping

Explanation Figure 2.

A. Start. The process begins with an initial step referred to as "Start".

B. Data Collection. Data collection is carried out from various sources to obtain information relevant to conflict resolution. It includes two main types of data:

- **B1: Collect Data from AI-Driven Interventions** - Data collected from AI-driven interventions, incl:
  - **B3: Surveys, Interviews, Case Studies** - Collect data through surveys, interviews, and case studies.
- **B2: Collect Data from Traditional Methods** - Data collected from traditional methods, incl:
  - **B4: Historical Data Analysis** - Analyze historical data from previous conflict resolutions.

C. Benchmarking. This process involves benchmarking to evaluate the performance of AI interventions compared to traditional methods:

- **C1: Establish Benchmarks from Traditional Methods** - Setting benchmarks from traditional methods.
- **C2: Compare AI vs. Traditional Outcomes** - Comparing the results of AI interventions with traditional methods.

D. Statistical Analysis. Statistical analysis is performed to understand and evaluate the data collected::

- **D1: Use Statistical Tools** - Using statistical tools.
- **D2: Regression Analysis** - Regression analysis to understand the relationship between variables.
- **D3: Factor Analysis** - Factor analysis to identify underlying factors.
- **D4: Machine Learning Algorithms** - Uses machine learning algorithms for deeper analysis..

E. Stakeholder Analysis. Analyze views and input from stakeholders:

- **E1: Involve Stakeholders** - Involve stakeholders.
- **E2: Gather Feedback** - Collect feedback from them.
- **E3: Incorporate Perspectives in Evaluation** - Combining perspectives in evaluation.

F. Reporting. Prepare reports based on the analysis that has been carried out:

- **F1: Compile Findings** - Compile the findings obtained.
- **F2: Prepare Comprehensive Reports** - Prepare comprehensive reports.

G. Dissemination. Disseminate report results to various related parties:

- **G1: Disseminate to International Bodies** - Disseminate reports to international bodies.
- **G2: Disseminate to Governments** - Distribute reports to the government.
- **G3: Disseminate to Academic Institutions** - Disseminate reports to academic institutions.

H. Feedback Loop for Continuous Improvement. Receive feedback for continuous improvement:

- **H1: Evaluate Feedback** - Evaluate the feedback received.
- **H2: Update Metrics and Methods** - Update metrics and methods based on feedback.

I. Return to Start.

This process repeats itself by returning to the initial step (Start) to refine and perfect the process based on the feedback received. This diagram helps in understanding the workflow from data collection to reporting and continuous improvement in quantifying the role of AI in conflict resolution.

Recommendations for Policymakers and Practitioners

Moving forward, policymakers and practitioners must carefully consider the potential risks and implications of repurposing UN databases for predictive analytics. It is essential to establish clear guidelines and protocols for data security and protection, particularly in conflict zones where the safety of local informants is at risk. Additionally, measures should be put in place to prevent the diversion of peacekeeping resources and ensure that the UN's forecasting capabilities remain accurate and reliable. Collaboration between international organizations, governments, and local stakeholders is crucial in addressing these challenges and finding sustainable solutions.

Areas for Further Research

AI's potential in conflict resolution is promising, but further research is needed to explore its applications in peacebuilding, its impact on conflict dynamics, its long-term sustainability, its role in addressing security threats, and its ethical, legal, and societal implications. Future research should focus on these areas.

Conclusion

The integration of artificial intelligence (AI) in conflict resolution offers significant potential but requires a balanced approach that considers ethical, legal, and technical aspects. AI's capabilities in data analysis, predictive modeling, and decision-support systems can enhance mediation and peacekeeping efforts by providing data-driven insights and solutions. However, challenges such as algorithmic biases, data privacy concerns, and the need for human oversight must be addressed to ensure AI's effective and responsible application in conflict resolution.

Future trends in AI for conflict resolution suggest a need for interdisciplinary collaboration and continuous research to

refine AI technologies and methodologies. Establishing clear guidelines and robust ethical frameworks will be essential to harness AI's potential while mitigating associated risks. The development of comprehensive metrics to evaluate AI's impact on conflict resolution, including both quantitative and qualitative indicators, will be crucial for assessing the effectiveness and sustainability of AI interventions.

Overall, the study underscores the importance of a nuanced approach to AI integration in conflict resolution. By balancing innovation with ethical considerations and regulatory measures, AI can play a transformative role in promoting global peace and stability. Ongoing efforts to address the complexities and challenges of AI in this context will be vital to realizing its full potential in fostering sustainable conflict resolution and peacebuilding initiatives.

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