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AI in Social Good: LLM-Based Multi-Agent Interventions in Crisis Management and Disaster Response

Abstract: Crisis management and disaster response are critical domains that benefit immensely from technological advancements. Recent strides in AI, particularly the application of Large Language Models (LLMs), present novel opportunities to enhance coordination, real-time analysis, and effective interventions during emergencies. This study explores the deployment of LLM-based multi-agent systems as a robust approach to augment disaster preparedness, response, and recovery efforts. Building on recent studies, such as the application of LLMs for developing action plans in disaster scenarios and the utilisation of social media for situational awareness, we synthesise methodologies that harness the collective capabilities of LLMs to support emergency teams with real-time data interpretation, strategic decision-making, and communication enhancement.

Key findings from empirical analyses demonstrate that LLMs can be instrumental in classifying and processing high volumes of social media data during crises, effectively bridging the gap between raw information and actionable insights. Moreover, LLMs offer capabilities for generating rapid, adaptable plans of action, aiding decision-makers in environments where time is of the essence. By leveraging multi-agent frameworks, in which LLMs operate collaboratively with human responders and automated systems, the efficiency and reach of emergency responses can be significantly improved.

Our review highlights case studies, including the Moroccan earthquake response, which showcases the utility of AI-driven hackathons and real-time data processing, underscoring the role of interdisciplinary collaboration in overcoming data scarcity and communication barriers. In addition, we discuss the legal and ethical implications of embedding LLMs in crisis management, emphasising transparency, fairness, and the importance of human oversight. This research advocates for structured guidelines that ensure responsible AI integration, aiming to align LLM capabilities with public safety and humanitarian needs while addressing challenges such as bias, data quality, and the contextual complexities of diverse crises.

In conclusion, deploying LLM-based multiagent systems can revolutionise disaster response through enhanced situational awareness, proactive planning, and sustained community support. Future efforts should focus on refining these systems to handle nuanced scenarios, adapt to different cultural contexts, and collaborate seamlessly with human stakeholders to maximise their impact on mitigating the effects of disasters.

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Biography: Oluwatimilehin Odubola is the principal at Resilstudio, where he leads projects focused on advancing sustainability and building a regenerative future. With a background in computer science and mathematics, he applied data-driven scalable solutions to complex environmental challenges. As a founding member of the SISYPHUS Global Systems, he developed a flood risk toolset recognised by the Clinton Foundation, IBM, and Verizon for its innovative approach to climate resilience.

Oluwatimilehin has consulted with the European Climate Foundation on net-zero projects at national, European, and global levels. His expertise spans environmental justice, renewable energy, climate resilience, and MRV (monitoring, reporting, and verification) systems. His work centres on leveraging AI and data to create equitable solutions with meaningful local impacts.

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