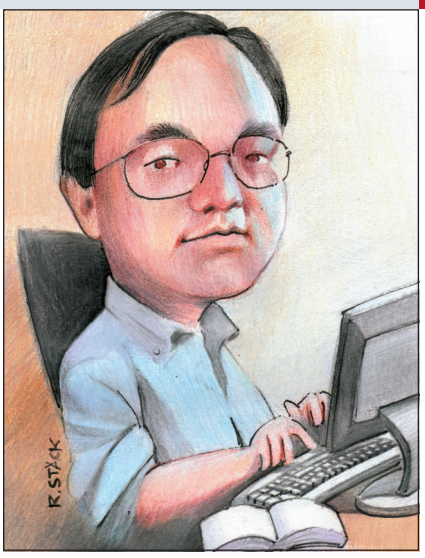

Supporting Global Collective Intelligence via Artificial Intelligence

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There are increasing concerns about the future of humanity that arise from the threats of environmental problems, resource shortage, ethnic conflicts, and terrorism, among others. These potentially disastrous consequences have taught humans that we must work collectively at the global level to change our ways of interacting with one another and with nature. Recent years have witnessed growing efforts in developing global collective intelligence systems as a response to the potential global threats and as a means to build a better future for humanity. One example project is the Millennium Project, which identifies 15 global challenges facing humanity, expanding across a wide range of domains—including clean water, population and resources, health issues, energy, democratization, the rich–poor gap, peace and conflict, transnational organized crime, science and technology, the status of women, and so on. The technological backbone of this project is a planned integrated global network of nodes, information, and software, manifesting elements of a prototypical global collective intelligence system.

Take one issue—"global climate change and sustainable development"—as an example. Given its enormous importance and the interconnectedness of its various natural, societal, economic, and technological components, this problem can't be addressed by any one entity, government, or institution, acting alone. Dealing with it requires effective communication and collaboration, as well as collective decision making among governments, international organizations, corporations, universities, non-governmental organizations (NGOs), and creative individuals on a global scale. Thus, global intelligence emerges from the collective efforts of many individual entities via collaboration and competition, and appears in a consensus of decision and policy making. In humanistic studies, Mihai I. Spariosu gave a definition of global intelligence in his 2004 book *Global Intelligence and Human Development*. Global intelligence was broadly defined as "the ability to understand, respond to, and work toward what is in the best interest of and will benefit all human beings and all other life on our planet" (p. 6). Spariosu argued that there are neither ready-made solutions nor quick fixes to world problems, but what we need to work on collectively, throughout the planet, is a change in our modes of relating to each other and to our natural habitat.

To achieve global collective intelligence—that is, to work toward this mutual understanding, effective communication, and collaboration—IT, and especially AI technologies, are playing a critical role. The Internet, and user-generated content

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and activities such as crowdsourcing via social networks, provide powerful platforms for connecting geographically distributed individuals, disparate groups, and online communities together, motivating individuals and organizations to participate in information dissemination and interactive communication, and collectively contributing to the generation of idea repositories.

While Internet-mediated interactions enable unprecedented opportunities, many challenges still exist in accomplishing global intelligence. First, the quality of the collective information, such as the dispersedness, heterogeneity, and inconsistency of information from diverse sources, can bring about standardization, representation, and fusion issues. Second, the identification of the internal patterns, structures, and relations from global data require big data analytics technologies. Third, both the convergence of well-supported decisions concerning what actions to take and the prediction of decision outcomes are challenging tasks. There are also other evaluation, policy, management, and ethical issues that must be solved.

Global intelligence aims at augmenting human intelligence via collective practice, so that the connected people, groups, and computational components work together more intelligently than individual entities. Although the goal of global intelligence is distinct from that of AI (which aims at modeling human intelligence and intelligent behavior and developing intelligent systems), in many aspects, frameworks, skillsets, and general tools that are distilled from AI research and practice are beneficial to realize a global collective intelligence system. Such systems can benefit from AI's long tradition of knowledge representation, knowledge-based, and case-based systems. Big data analytics and prediction can benefit from typical techniques such as data mining, machine learning, and generic problem solving. AI modeling techniques, agent-based social simulation, and explicit representation of argumentation can facilitate large, diverse, and geographically dispersed groups that systematically explore, evaluate, and support decision making by enabling the policy maker to do a series of what-if analyses and evaluate decision outcomes.

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Support for global collective intelligence should come from beyond AI, as well. Its accomplishment needs cross-disciplinary efforts in both computational and social disciplines. From the perspective of IT development, its technological infrastructure encompasses Web, database, wireless, agent, and software engineering technologies. To support Internet-enabled interaction and communication, it relies on the theories and practice of communication, human-computer interaction, sociology, psychology, and anthropology. To develop Internet-enabled collective intelligence systems and enhance its performance, global intelligence must

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learn from sociology and anthropology and integrate psychological and organizational theories into its design schema.

We advocate a multidisciplinary methodology to study global intelligence, and big data-driven AI and computational approaches to implement a global collective intelligence system. This is a huge undertaking, and a rewarding one that could help realize the vision of a smart planet. The phenomena of collective intelligence also help us better understand human intelligence—and in particular, human social intelligence, which is primarily a collective capability rather than an individual one, and arises in the context of social interactions. The lessons learned from this can be a major asset for multiple subareas of AI. ■

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