Why Web Science?
The Web is a critical global infrastructure. Since its emergence in the mid-1990s, it has exploded into hundreds of billions of pages that touch almost all aspects of modern life. Today, the jobs of more and more people depend on the Web. Media, banking, and healthcare are being revolutionized by it, and governments are even considering how to run their countries with it.

Little appreciated, however, is the fact that the Web is more than the sum of its pages and it is more than its technical protocols. Vast emergent properties have arisen that are transforming society. Email led to instant messaging, which on the Web has led to social networks such as Facebook and Twitter. The transfer of documents led to file-sharing sites such as Napster, which have led to user-generated portals such as blogs, Flickr, and YouTube. Web 2.0, tagging content with labels, is creating online communities that share everything from concert news to parenting tips. As we seek to understand its origins, appreciate its current state, and anticipate possible futures, there is a need to address

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This is the second half of a two-part special issue with some of the best articles from the inaugural Web Science Conference. Here, we repeat the introductory remarks about Web Science from the first issue, followed by a brief introduction of each of the new articles in this issue.
the critical questions that confront us:

• How secure is the Web?
• How does trust work on the Web?
• How are our ideas about privacy changing as a result of the Web?
• How do we value content on the Web?
• How is the Web evolving (as both a social and a technical network)?
• Can we engineer the Web for the future?

The emerging field of understanding these and related questions is becoming known as Web Science, and curriculums at all levels are being designed and launched (A wiki maintained by the Web Science Research Initiative has a listing of more than 20 courses from universities around the world that are related to this area.).

To explore the many interdisciplinary aspects of this emerging area, the first international Web Science Conference (WebSci09) was held in Athens Greece in March of 2009. Given the significant proportion of everyday life that is spent online in many countries, the organizers decided that this meeting should be dedicated research from all fields exploring the ramifications of the Web on human. Questions that were explored included how do people and organizations behave online, and what motivates them to shop, date, make friends, learn, participate in political life, or manage their health or tax online? Which Web-based designs will they trust? To which online agents will they delegate? How can the dark side of the Web—such as cybercrime, pornography, and terrorist networks—be both understood and held in check without compromising the experience of others? What are the effects of varying characteristics of Web-based technologies—such as security, privacy, network structure, the linking of data—on online behavior, both criminal and non-criminal?

In this Issue

The articles in this special issue are some of the best papers from the Web Science Conference that was held in Athens, Greece, in March 2009 (http://websci09.org). With more than 150 papers and posters to choose from, picking the best for this issue was a tough choice. We wanted to select those we thought would be of greatest interest to IEEE Intelligent Systems readers, but we also wanted to portray the diversity of the field and the interdisciplinary nature of the conference. We chose a number of articles that we felt represented a cross section of the meeting and that have interesting ramifications for the intelligent systems area. The first set of articles was presented in a special issue that came out in 2009 (vol. 24, no. 6).

Although earlier versions of these articles were first published in 2009, we invited the authors to update their content, so the articles remain as relevant as when they were first published. Although we had hoped to include some papers from the second Web Science Conference (http://websci10.org), there was not room for more, so we urge the reader to look at them online. We particularly point out Eni Mustafaraj and Panagiotis Metaxas’ paper “From Obscurity to Prominence in Minutes: Political Speech and Real-Time Search,” which was selected as the best paper at that meeting.

In this issue, we present five articles representing a cross section of fields ranging from computing to philosophy. These articles help show the breadth of the parts of life affected by the Web as well as illustrate the interdisciplinary approaches involved in exploring these effects.

The first article we present is “Measuring Expertise in Online Communities” by Ching-man Au Yeung, Michael G. Noll, Christoph Meinel, Nicholas Gibbins, and Nigel Shadbolt. As tagging grew in popularity on the Web, so did the problem of spam tags, items added to direct people to a spurious website or an area outside of what they were really looking for. The authors examine how a computational tagging model could be developed based on the behavior of typical users. This approach could help identify spammers by their departure from this model.

The second article explores how the Web might fit in (or not) with the Extended Mind hypothesis generally credited to Andy Clark and David Chalmers. The idea behind this hypothesis is, essentially, that we might want to say that if users with a tool can do a cognitive task better than they can do alone, that the boundary of cognition might not be completely in the users’ brains. This is a controversial philosophical stance, being debated actively in many circles, and in the article in this issue, “Offloading Cognition onto the Web,” Les Carr and David Harnad look at it from a somewhat different, Web-centric approach. They ask whether evidence could be found for offloading cognitive search onto Web-based associative search tools.

Our third and fourth articles are explorations of aspects of the question of how people develop trust in Web-based materials, particularly in the area of reputation-based systems. David Karpf, in his article “Implications of the Mobile Web for Online-Offline Reputation Systems,” takes a social-science perspective in exploring how the immediacy of providing ratings allowed by the mobile
The final article, “Introducing New Features to Wikipedia: Case Studies for Web Science” by Matthias Schindler and Denny Vrandecić, takes a look at Wikipedia, the well-known online encyclopedia. As the system evolved in functionality over its first years, several major features were introduced that changed existing behaviors and/or allowed new ones. The authors explore how those changes were reflected in the behavior of Wikipedia authors, showing the interaction of the computational and the social that is at the heart of Web Science.

These five articles, joined with the previous six, show the scope and scale of the many facets of the emerging science of the Web and illustrate some of the many ways the Web can be studied.

References

Selected CS articles and columns are also available for free at http://ComputingNow.computer.org.
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