The Science of the Web

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Abstract. Since its inception, the World Wide Web has changed the ways people communicate, collaborate, and educate. There is, however, a growing realization among many researchers that a clear research agenda aimed at understanding the current, evolving, and potential Web is needed. A comprehensive set of research questions is outlined, together with a sub-disciplinary breakdown, emphasising the multi-faceted nature of the Web, and the multi-disciplinary nature of its study and development. These questions and approaches together set out an agenda for Web Science — a science that seeks to develop, deploy, and understand distributed information systems, systems of humans and machines, operating on a global scale.

When we discuss an agenda for a science of the Web, we use the term "science" in two ways. Physical and biological science analyzes the natural world, and tries to find microscopic laws that, extrapolated to the macroscopic realm, would generate the behaviour observed. Computer science, by contrast, though partly analytic, is principally synthetic: it is concerned with the construction of new languages and algorithms in order to produce novel desired computer behaviours. Web science is a combination of these two features. The Web is an engineered space created through formally specified languages and protocols. However, because humans are the creators of Web pages and links between them, their interactions form emergent patterns in the Web at a macroscopic scale. These human interactions are, in turn, governed by social conventions and laws. Web science, therefore, must be inherently interdisciplinary; its goal is to both understand the growth of the Web and to create approaches that allow new powerful and more beneficial patterns to occur. Finally, the Web as a technology is essentially socially embedded; therefore various issues and requirements for Web use and governance are also reviewed.