Preface on "Applications of Networks"

Networks have been recently recognized as playing a central role in understanding a wide range of systems spanning diverse scientific domains such as physics and biology, economics, computer science and information technology. Specific examples run from the structure of the Internet and the WWW to the interconnections of finance agents and ecological food webs. Despite a truly interdisciplinary approach is required in order to understand each specific system of interest, statistical physics in particular has recently contributed enormously to our understanding of networked structures. Indeed networks are made by many components whose microscopic interactions give rise to global structures and dynamical evolutions often characterized by emergent collective behaviors and complex topological properties. In this context the statistical physics approach finds a natural application since it attempts to explain the various large-scale statistical properties of networks in terms of the local interactions governing the dynamical evolution of the constituent elements of the system. For this reason, statistical physicists are extremely active in the area of complex networks and can be considered as leading actors in the emergence of this new field sometime defined as network science. It is not by chance that many of the seminal papers in the field have been published in the physics literature, and nevertheless made a considerable impact on other disciplines. At the same time, new problems arising in other disciplines are taken up by the statistical physics community, leading to a very interesting cross-fertilization among the different scientific areas.

The present special issue of *The European Physical Journal B* is devoted to the recently emerging field of complex networks. Many of the papers contained in this issue have been selected from the contributions presented at the midterm conference of the FET open project Coevolution and Self-Organization in Dynamical Networks (COSIN IST-2001-33555), which met in Rome during the first week of September 2003. Several other papers have been invited by the issue's editors in view of the relevance of the reported results and in order to provide a comprehensive coverage of the various aspect of networks research.

The purpose of this special issue is twofold. First, we would like to provide a snapshot of the forefront research activities in the area of complex networks, and provide a good sampling of the disciplines involved, and the kinds of problems that form the subject of inquiry. Indeed, the present issue is arriving at a moment in which we can consider that the network area has reached a degree of scientific maturity, and that many important results are being established in the field. On the other hand, we want to emphasize the many problems left open and the various research directions still in their initial stages. We hope that this presentation of the field will attract the interest of colleagues within and outside the network community, and serve to further improve our understanding of this fascinating subject.

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