Roger Guimerà receives the
Young Scientist Award for Socio and Econophysics 2014

Teaching robots to predict Supreme Court decisions, conflict in teams, drug interactions, and more

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Roger Guimerà, ICREA Research Professor at Universitat Rovira i Virgili, in Tarragona, Catalonia, is this year's recipient of the "Young Scientist Award for Socio- and Econophysics" of the German Physical Society (DPG). The Prize, endowed with 5000 euros, recognizes outstanding original contributions by a scientist under 40 that uses physical methods to gain a better understanding of socio-economic problems, and is among the most prestigious prizes in the world in this field.

Guimerà's research is devoted to the study of complex systems, from cells to ecosystems and societies, whose behavior is the outcome of the interactions between many elements. In particular, the focus of his research has been on the intricate networks of interactions between such elements, and some of Guimerà's most recent studies revolve around the idea of using network analysis predictively. In a recent study, Guimerà and his coworker Marta Sales-Pardo set out to investigate whether it is possible to build a robot able to predict the decisions of US Supreme Court justices. Unlike previous studies, the robot they designed did not know anything about the law or the cases on which it had to make predictions; rather, it predicted the vote of one justice from the vote of the others in the same case, as well as the voting record of the Court. Strikingly, they found that such a robot is more accurate at predicting votes than human legal experts who have all the relevant information on the cases–the information hidden in the network of past decisions is, indeed, powerful.

The potential applications of the tools from mathematics and physics that Guimerà has used to predict decisions of the Supreme Court are as diverse as surprising. Together with his collaborators, he has been able to show that it is possible to predict which members of a work team are more likely to develop conflictive relationships (joint work with Núria Rovira, Marta Sales-Pardo, and Tània Gumí), and to predict whether someone will like a movie before they actually watch it (joint work with Marta Sales-Pardo, Alejandro Llorente, and Esteban Moro). And the applications go beyond the social sciences and into biology and medicine–the same methods are also useful to predict which combinations of drugs may result in harmful side effects (joint work with Marta Sales-Pardo).

Guimerà has made important methodological contributions, which have been highlighted by the Award Committee: "His methodological contributions include module identification and the prediction of missing links, which is of growing importance in Big Data." His ability to apply these tools to a broad range of problems has also been recognized by the Committee: "Guimera's research is method-oriented, but always inspired if not driven by specific networks in a broad interdisciplinary range: from transportation networks, over metabolic networks, to social networks."

The prize will be awarded today in Dresden, during the spring meeting of the German Physical Society. The awardee will give an invited address on his research.

Short bio

Roger Guimerà was born in Barcelona in 1976, graduated in Physics at Universitat de Barcelona in 1998, and obtained a PhD in Chemical Engineering from Universitat Rovira i Virgili in 2003. He then moved to Northwestern University where he worked as a postdoctoral fellow, as a Fulbright Scholar, and as a Research Assistant Professor. Since 2010, he is ICREA Research Professor in the Department of Chemical Engineering of Universitat Rovira i Virgili, where he co-directs the SEES Lab together with Marta Sales-Pardo. Prior to this award, he has received the Premi Nacional de Recerca al Talent Jove from the Catalan Government (2010), and the Erdos-Renyi Prize in Network Science from the Network Science Society (2012).

Further information

- On Roger Guimerà's research (including all articles): http://seeslab.info
- Links to scientific articles:
  - Drug interactions: http://dx.doi.org/10.1371/journal.pcbi.1003374
  - Supreme Court: http://dx.doi.org/10.1371/journal.pone.0027188
  - Team conflict: http://dx.doi.org/10.1038/srep01999
- On the prize: http://www.dpg-physik.de/dpg/gliederung/fv/soe/YSA/preistraeger_YSA.html