Social networks enable smart household appliances to make better recommendations

September 9 2016

David Núñez. Credit: UPV/EHU

In his Ph.D. thesis, David Nuñez, a UPV/EHU computer engineer, has improved the tools for predicting the trust that a user will place in

another person in her social environment, and has come up with a faster algorithm that selects the minimum set of users of a social network capable of influencing the maximum possible number of users of the network.

The thesis, titled "Computational intelligent methods for trusting in social networks," produced by the computer engineer David Núñez in the Computational Intelligence Group at the UPV/EHU's Faculty of Computing, falls within the framework of the European research project Social and Smart (SandS). A part of the project focuses its attention on user interaction with smart domestic appliances linked to a smart module.

These are household appliances (systems) to which the user describes in ordinary language the problem that he/she wants to solve (such as "making bread," "removing a stain from a pair of trousers," etc. depending on the type of household appliance). The system analyses the problem that needs to be solved and searches the database to see whether there is a solution (recipe) for the problem described by the user. If one exists, it is provided, and if not, the system forwards the description of the problem to an intelligent module so that a new solution can be produced and then passed on to the user. The user can execute the proposed solution or else readjust its parameters. Once the execution of the problem has been completed, the user will express his/her satisfaction with the result obtained. The users can communicate with each other over the system's social network and propose recipes that can be evaluated by other users.

The thesis by Núñez has provided new intelligent techniques in the area of social networks. Specifically, he has covered three lines of research in this area: trust, the recommendation systems and the maximising of influence.

Three lines of research

The first line of research seeks to predict the trust that a user will place in another person belonging to her social environment on the basis of the opinions that other contacts have expressed about the target user. The researcher has developed some tools for predicting trust that are more straightforward than the ones found in the literature, and are more algebra-based.

The second line of research focuses on the systems of recommendation, and two experiments have been carried out. The first is linked to the generating of recipes for making bread in a smart bread maker. An attempt has been made to simulate the prediction of the bread recipe (solution of the problem) on the basis of the satisfaction expressed (description of the problem), and even to predict satisfaction (solution of the problem) on the basis of a recipe provided (description of the problem). The second task in this second line of research has endeavoured to make recommendations about products. The recommendation is based on the previous evaluations of the users. What is being proposed are techniques based on the Web of Trust of the target user to whom one wishes to make a recommendation and also on similarities between users and their means of evaluation.

The third line of research is related to maximising influence. The aim of this line is to detect what would be the minimum set of users of a social network that is capable of influencing the maximum possible number of users of the network. "We have come up with a new algorithm that improves the algorithm that exists in the literature in terms of time—the classical Greedy method," explained David Núñez. "Our method has succeeded in getting closer to the optimum like the Greedy one, but does so more rapidly."

More information: J. David Nuñez-Gonzalez et al, A new heuristic

for influence maximization in social networks, *Logic Journal of IGPL* (2016). DOI: 10.1093/jigpal/jzw048

Provided by University of the Basque Country