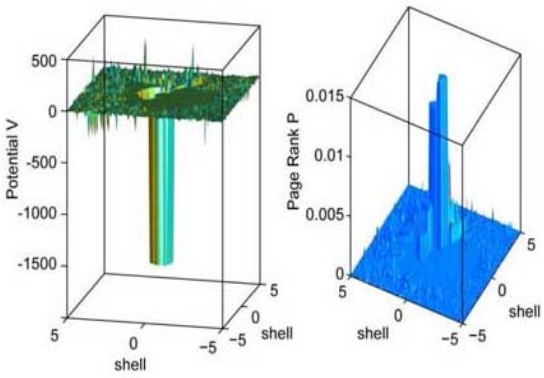
Google page ranking and SchrÃ¶edinger

p2pnet news view | Cool Stuff:- A field of study inspired by Google's PageRank algorithm looks set for a shake up following the publication of an entirely new formulation of the problem of ranking web pages, writes KFC in the physics arXiv blog.



"Nicola Perra at the University of Cagliari in Italy and colleagues have discovered that when they re-arrange the terms in the PageRank equation the result is a SchrÃ¶edinger-like wave equation," says the post.

Schroedinger-like wave equation?

"In physics, especially quantum mechanics, the SchrÃ¶dinger equation is an equation that describes how the quantum state of a physical system changes in time," says the Wikipedia.

"It is as central to quantum mechanics as Newton's laws are to classical mechanics."

"So what, I hear you say," the post goes on, "that's just a gimmick."Maybe, but, "What the wave equation allows is a study of the dynamic behaviour of PageRanking, how the rankings change and under what conditions, says KFC, adding:

"One of the key tools for this is called perturbation theory. "It's no understatement to say that perturbation theory revolutionised our understanding of the universe when it was applied to quantum theory in the 1920s and 1930s.

"The promise is that it could do the same to our understanding of the web and if so, this field is in for an interesting few years ahead."

Say Perra *et al*: »»»

> The WorldWide Web is one of the most important communication systems we use in our everyday life. Despite its central role, the growth and the development of the WWW is not controlled by any central authority. This situation has created a huge ensemble of connections whose complexity can be fruitfully described and quantified by network theory. One important application that allows to sort out the information present in these connections is given by the PageRank alghorithm. Computation of this quantity is usually made iteratively with a large use of computational time. In this paper we show that the PageRank can be expressed in terms of a wave function obeying a Schroedinger-like equation. In particular the topological disorder given by the unbalance of outgoing and ingoing links between pages, induces wave function and potential structuring. This allows to directly localize the pages with the largest score. Through this new representation we can now compute the PageRank without iterative techniques. For most of the cases of interest our method is faster than the original one. Our results also clarify the role of topology in the diffusion of information within complex networks.

"The whole approach opens the possibility to novel techniques inspired by quantum physics for the analysis of the WWW properties," they add.