1080-60-167   **Gourab Ghoshal*** (`gourab.ghoshal@gmail.com`) and **Albert-Laszlo Barabasi**. *Ranking stability and super-stable nodes in complex networks.*

Pagerank, a network-based diffusion algorithm, has emerged as the leading method to rank web content, ecological species and even scientists. Despite its wide use, it remains unknown how the structure of the network on which it operates affects its performance. Here we show that for random networks the ranking provided by pagerank is sensitive to perturbations in the network topology, making it unreliable for incomplete or noisy systems. In contrast, in scale-free networks we predict analytically the emergence of super-stable nodes whose ranking is exceptionally stable to perturbations. We calculate the dependence of the number of super-stable nodes on network characteristics and demonstrate their presence in real networks, in agreement with the analytical predictions. These results not only deepen our understanding of the interplay between network topology and dynamical processes but also have implications in all areas where ranking has a role, from science to marketing. (Received January 24, 2012)