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Further Advances on Quantum PageRank

Network theory plays a key role in contemporary scientific research due to the mathematical properties of networks as well as to its wide range of applications in fields like bioinformatics, food webs, metabolic networks and the structure of Internet [1]. PageRank [2], a most famous algorithm originally designed to rank nodes on the Internet, has inspired the development of algorithmic techniques for studying social networks and protein interaction networks [3] as well as the formulation of a quantum walk-based algorithm for page ranking [4].

Quantum walks were originally developed as quantum-mechanical counterparts of classical random walks. In the early days of this cross-disciplinary research field, quantum walks were used just as a mathematical tool to develop sophisticated algorithms. Later on and in stark contrast to the algorithmic properties of classical random walks, it was proved that quantum walks constitute a universal model for quantum computation. Current research efforts in the field of quantum walks include the development of quantum algorithms. In this talk we shall present a concise review of classical and quantum PageRank [4] as well as a proposal to add the feature of incoming link importance to further versions of Quantum Page Rank. *This is a work in progress.*

References

- [1] M.E.J. Newman. Networks, an introduction. Oxford University Press (2011)
- [2] L. Page et al. Stanford University Tech Report SIDL-WP-1999-0120 (1999)
- [3] M.S. Mariani et al. Scientific Reports 5, 16181 (2015)
- [4] G. D. Paparo, M. A. Martin-Delgado. Scientific Reports 2, 444 (2012)