Madrid duo fire up quantum contender to Google search

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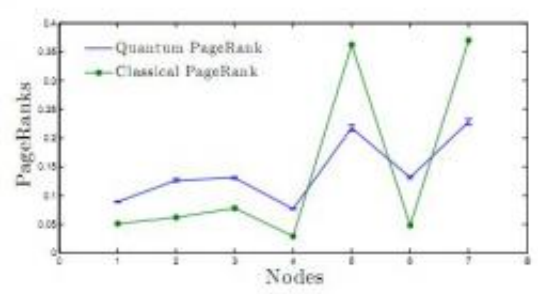

Comparison of the hierarchies that result from the Classical and the Quantum PageRank. For more details, please see the paper at arXiv:1112.2079v1 [quant-ph]

(PhysOrg.com) -- Two Madrid scientists from The Complutense University think they have an algorithm that may impact the nature of the world's leading search engine. In essence, they are saying Hey, world, Google This. "We have found an instance of this class of quantum protocols that outperforms its classical counterpart and may break the classical hierarchy of web pages depending on the topology of the web," say the researchers.

Google's PageRank algorithm represents of the idea that the importance of a webpage is measured by the number of important papers that point towards it. PageRank from Google not only measures a web page's popularity by how many sites, but the authority of the sites linking to the

page.

Giuseppe Paparo and Miguel Martín-Delgado at The Complutense University in Madrid are taking the Google approach a step further. They have revealed a quantum version of the algorithm, and they have presented their findings in a paper dated December 9, “Google in a Quantum Network.”

The distinguishing feature is speed. Quantum algorithms produce results “extremely rapidly,” note reports, faster than a so called “classical” algorithm.

In their research using a tree graph, the quantum algorithm outperformed the classical algorithm in ranking the root page. They achieved similar results using a directed graph. The quantum algorithm identified the highest ranking page faster than a classical algorithm.

In quantum networks, information is routed as quantum bits, or qubits, rather than classical.

Technologists familiar with quantum computing believe that the classical web will be replaced, or enhanced, by a network of quantum nodes. Nonetheless, the recent research can be seen as an early step.

The possibility of establishing a quantum network of practical use is still under active investigation, say the authors, and they acknowledge they are not the first to explore the waters. “Some early versions of them, modest as they may be, have been designed and realized in real world in the recent years or in some instances they are under way.”

The authors say that what they are introducing is not something opposite to Google’s approach, but rather a quantum PageRank algorithms “in a scenario in which some kind of quantum network is realizable out of the

current classical internet web, but no quantum computer is yet available. “

They say their work is a “quantization” of the PageRank protocol that is used to list web pages according to their importance.

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The authors also recognize their study has limitations and that more research is needed. Their ultimate goal is devising a quantum algorithm that can overcome difficulties but their explorations were only on small networks. They said it would be interesting to perform computations with the quantum PageRank applied to very large networks “with the properties exhibited by the complex structure of the real web.”

More information: Google in a Quantum Network, arXiv:1112.2079v1 [quant-ph] arxiv.org/abs/1112.2079

Abstract
We introduce the characterization of a class of quantum PageRank algorithms in a scenario in which some kind of quantum network is realizable out of the current classical internet web, but no quantum computer is yet available. This class represents a quantization of the PageRank protocol currently employed to list web pages according to their importance. We have found an instance of this class of quantum protocols that outperforms its classical counterpart and may break the classical hierarchy of web pages depending on the topology of the web.

via Arxiv Blog