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Genomic big data: Scalability challenges and solutions

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Genomics plays a role in nine of the 10 leading causes of death in the United States. For people who are at increased risk for hereditary breast and ovarian cancer or hereditary colorectal cancer, genetic testing may reduce illness risks by guiding evidence-based interventions. Such interventions involve the emergent practice of precision medicine that uses an individual's genetic profile to guide decisions made in regards to the prevention, diagnosis and treatment of disease. At the nexus of precision medicine and computer science; cloud computing and machine learning lies many research challenges for adapting and optimizing data-driven analytics to change the medical care delivered to patients in the US and beyond those borders. Focused on high-speed data analytics on large clusters for genomic data, our research applies scalable algorithms, new storage and computation designs and aims to achieve the possibilities of precision medicine with significant improvements in performance. In this work, we visit four major challenges facing big data genomics: Data acquisition, data storage, data distribution and data analysis. We present our solutions for privacy-preserving data distribution and scalable data analytics.

Biography

Faraz Faghri is currently a Computer Science PhD Student at University of Illinois at Urbana-Champaign under the supervision of Professor Roy Campbell. His work focuses on solving cloud computing, big data and bioinformatics problems; specifically he is interested in designing salable systems for storage and computation of high volume and high velocity health and genomic data, while preserving the privacy of individuals. He has worked with Microsoft Research Genomic, Yahoo!, Neustar, Akamai and GenapSys on various distributed large-scale problems in big data, Internet and Next-Generation DNA-sequencing platform. He has received his BS in Applied Mathematics and MS in Industrial Engineering.

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