



BioMed Research International

Special Issue on
**High-Performance Computing and Big Data in
Omics-Based Medicine 2016**

CALL FOR PAPERS

Omics sciences are able to produce, with the modern high-throughput techniques of analytic chemistry and molecular biology, a huge quantity of data. Next generation sequencing analysis of diseased somatic cells, genome-wide annotations of biomarkers, systems pathology studies, and discovering of novel compounds are examples of the great advantages that high-performance computing can provide to omics science, providing a fast translation of biomolecular results to the clinical practice. Medicine in the near future will be predictive, preventive, and personalized thanks to big data-driven analysis.

Massive parallel clusters, distributed technologies such as grid and cloud computing, and on-chip supercomputing such as GPGPU and Xeon Phi implementation represent well-established solutions in research laboratories, but their capabilities should be widespread from clinical and healthcare experts to reach their full potential. On the other hand, although not seen intensive from a computational perspective, big data presents huge concerns while it is scaled to healthcare problems. Managing terabytes of data requires specific technologies, redundant facilities, shared and distributed file systems, clustered databases, indexing and searching process, and dedicated network configuration.

The aim of this special issue is to present the latest advances in treating omics data with high-performance computing solutions and big data analysis paradigms, showing the potential repercussions of these technologies in translational medicine. We are especially interested in parallel implementation of systems and algorithms, use of case descriptions of on-chip and distributed platforms for the biomedical community, or successful experiences of large-scale analysis and simulations in the field of high-performance computational biology.

Potential topics include, but are not limited to:

- ▶ Biological databases for big data management
- ▶ HPC, grid, and cloud computing for omics sciences
- ▶ Next generation sequencing data analysis
- ▶ Genomics variants analysis and classification
- ▶ Knowledge management for genomics and proteomics
- ▶ Machine learning for big data analysis
- ▶ Parallel algorithms for omics sciences
- ▶ Genome-wide identification of regulation patterns
- ▶ Coexpression and coregulation gene expression analysis
- ▶ Systems biology simulations and pathway analysis
- ▶ Infrastructures for big data integration in omics sciences
- ▶ Novel approaches for biomarkers identification
- ▶ Large-scale computations for discovering novel drugs
- ▶ Structural biology applications for modeling and simulations

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