Smart algorithms and programs to help with data analysis

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Modern genetic studies are based on the knowledge of genome, the complete sequence of which has to be reconstructed from small fragments (reads) produced by a number of different DNA sequencing methods. Despite a noticeable progress in the evolution of these technologies, there is still no one approach that could "read" genomic DNA from A to Z. As a result, finding a solution to the genome assembly problem has become one of the most important bioinformatics tasks, without solving which it will likely not be possible to discover the origins of an overwhelming number of diseases.

The quest to find a solution to this problem attracts many talented mathematicians and programmers. What is currently missing, however, and which would tremendously benefit this area of study are equally interested and highly educated bioinformaticians, in possession of the aggregate knowledge of biology and/or medicine, mathematics, and programming.

As scientists across the world work to discover new antibiotics, analyze the response of the immune system to different conditions and corresponding changes in the antibodies repertoires, study of the influence of human microbiota and the microbiota of the environment on humans and the overall health of the Planet they generate huge amounts of data that needs to be analyzed, interpreted, stored and transferred.

During my talk I will emphasize the role of bioinformatics in genetics studies and present an overview of the smart tools that our lab has developed to help with data analysis. One of them - the genome assembler SPAdes (which is actually, a family of software products - plasmidSPAdes, rnaSPAdes, metaSPAdes etc) has put the Center of Algorithmic Biotechnologies SPbU on the map as one of the leaders in genome assembly.

Keywords—*Algorithms, bioinformatics, data analysis, genome assembly*

Professional Biography

Dr. A. Lapidus is Professor of the Department of Cytology and Histology St. Petersburg State University. Alla Lapidus has completed her PhD at the age of 27 in VNIIGenetics Institute, Moscow, Russia. She is the Deputy director of the Centre for Algorithmic Biotechnology, SPbSU, the oldest university in Russia. Dr. Lapidus is the author of more than 350 published papers and patents. She was honored with the Elsevier Scopus Award 2015 for her outstanding achievement in the field of Biology. This award recognizes the contributions made by researchers to the global scientific landscape and is based on the publication and citation data drawn from Elsevier's Scopus.

Dr. Lapidus has authored two online courses on the international Coursera platform titled “Introduction to bioinformatics” and “Introduction to bioinformatics: metagenomics”.

In 2019 Dr. Lapidus was awarded the national "Professor of the Year" prize in the "Biological Sciences" category.



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Any Comments: