

Tutorial Proposal for CIBCB 2017

Title: An Introduction To CRISPR For Bioinformaticists

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Abstract:

The genome editing technique based on CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) was designated *Science* magazine's breakthrough of the year for 2015; all five of the prestigious Canada Gairdner International Awards for contributions to medicine in 2016 were given to scientists working on CRISPR; *MIT Technology Review* called it "the biggest biotech discovery of the century"; two CRISPR developers (Emmanuelle Charpentier and Jennifer A. Doudna) won the \$3 million Breakthrough Prize in 2015. This tutorial will address the questions of "What is CRISPR?", "Why is it so important?" and "How can bioinformaticists contribute?"

The tutorial will begin with an explanation of what CRISPR is and how it was discovered. This involves a discussion of the immune system of bacteria and archaea, and is an important story in the value of looking for patterns in DNA. We will discuss different types of CRISPR and how new CRISPR are identified. Next, we will discuss how CRISPR can be used for genome editing and some of the many possible applications. We will discuss how CRISPR can be used as an exploratory tool for better understanding of the regulatory processes in the genome. And, we will discuss the role that bioinformaticists can play in the development of the science of CRISPR. The tutorial will end with a discussion of the ethical issues involved with CRISPR.

Professional Biography:

Wendy Ashlock has an AB in mathematics from the University of Chicago, an MA in mathematics from the University of Guelph (thesis title: *Using Prisoner's Dilemma Fingerprints to Analyze Evolved Strategies*), and a PhD in computer science from York University in Toronto (thesis title: *Using Signal Processing Techniques to Identify LTR Retrotransposons, Endogenous Retroviruses, and Solitary LTRs in Genomes*). She worked as a computer scientist, under an NSERC (Natural Sciences and Engineering Research Council of Canada) postdoctoral fellowship, in the department of biology at York University in a lab headed by Dr. Ronald Pearlman, one of the foremost experts on the model organism *Tetrahymena thermophila*. At present, she is the Chief Data Scientist for a data science consulting firm that offers services to biologists (Ashlock & McGuinness Consulting, Inc.). She has volunteered extensively for IEEE, including currently serving as the chair of the IEEE CIS Bioinformatics and Bioengineering Technical Committee and serving as the Finance Chair for IEEE CIBCB 2017.

Her research interests include: applying computational intelligence to bioinformatics, applying computational intelligence to medicine, evolutionary game theory and serious games, modeling of biological systems, and the theory of evolutionary computation.