Invited Talk

A large-scale application of comparative genomics for biodefense

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In the summer of 2000 the bioinformatics team at the Lawrence Livermore National Laboratory (LLNL) in Livermore, California was requested to help find a more efficient way to design highly specific and sensitive DNA signatures for bio-threat pathogen detection in the environment. The LLNL team pioneered a comparative genomics approach, using tools such as Vmatch and MGA to construct an efficient automated pipeline for signature candidate development. Signatures for dozens of pathogens have been designed using this system and subsequently bench-screened intensively against large background, target, and near-neighbor sample collections. Signatures for many important organisms have been formally validated by the Centers for Disease Control (CDC) and have been in daily use around the US under the BioWatch program. These signatures have become the gold standard for environmental pathogen detection and have been shared with the G8 nations for world-wide biodefense use. This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.