Librarians and Bioinformatics Communities Working Together to Advance Research and Instruction

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EXECUTIVE SUMMARY

Given the importance of bioinformatics in the health sciences and the increasing role information professionals are playing in informatics and data management, it is logical to develop collaborations between libraries and bioinformatics communities. Given these trends, academic libraries are providing new data services in support of research and teaching. Librarians at University of Michigan and Yale University have found different ways to engage with their respective bioinformatics communities and build successful partnerships around instruction, data analysis, software licensing, project management, seminar programming, and tool documentation. This chapter discusses the librarians' involvement, the advantages to the library and the bioinformatics communities, and the challenges faced.

INTRODUCTION

Academic libraries are always looking for new opportunities to enhance their services and role on campus. This often means applying information-related skills to new areas, topics, and services. This is evidenced by increasing library involvement in systematic reviews, visualization, and data-related activities. A recent trend is that from humanities to STEM, disciplines are becoming more data intensive. Therefore, to maintain their relevance on campus, academic libraries are providing new data services in support of research and teaching. These include data management, digital humanities, bioinformatics support, and

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GIS, among others. The pervasiveness of data in biomedicine is even more pronounced as high-throughput technologies generate huge amounts of data (e.g., genomics, proteomics, metabolomics) that is essential for understanding, diagnosing, prognosis, and treatment of diseases. Consequently, the production and organization of data and information in the form of journal articles, databases, and knowledge bases has also increased exponentially not only in volume but also in diversity. To understand the relevance of the data generated by these methods, the researcher needs to effectively aggregate diverse types of data to identify functions, phenotypes, expression, evolutionary conservation, disease association, protein structure, etc. (Hutchins, 2014). This is only possible by mining and integrating the enormous amount of biomedical data, information and knowledge contained in the text of the scientific literature, and datasets from molecular databases. In response to this, the field of bioinformatics has been developing at an accelerated pace and is playing a key role in biomedical research.

Bioinformatics is a highly interdisciplinary field that combines the use of computer science, statistics, and information technology for the management of biological data including, but not limited to, organization, mining, analysis (Luscombe et al., 2001), modeling (Hofmann-Apitius et al., 2015), and visualization (Staiano et al., 2005) of these data. The application of bioinformatics in medicine is not only making possible the understanding of mechanisms of disease but also the ability to tailor treatment and prognosis at the individual level in what is called Precision or Genomic Medicine. Medical libraries have been providing bioinformatics services in support of data-intensive biomedical research and teaching for many years. The Houston Academy of Medicine-Texas Medical Center Library created a biotechnology liaison librarian position to serve the information needs of the biotechnology clients, provide education and training, and to explore the use of databases to provide access to biotechnology results (Pratt, 1990). Also, in the 1990s, the Library of the University of California, San Francisco taught a class that introduced faculty and students to the use of the Internet for accessing human genome databases (Owen, 1995).

More structured bioinformatics programs from the medical library began to appear in the following decade, the 2000s. The University of Washington Health Sciences Libraries recruited a PhD biologist to develop a bioinformatics program that included consultation services, education and training, bioinformatics Web pages, and networked biological information resources (Yarfitz, 2000), as well as began to provide access to commercial bioinformatics software packages (Chattopadhyay et al., 2006). Librarians at University of Florida and Washington University published articles on their bioinformatics services which included training, resource licensing, and seminar administration (Tennant, 2005; Wang et al., 2007). The National Center for Biotechnology Information (NCBI), which is part of the National Library of Medicine, develops and maintains a suite of freely available databases and analysis tools often used in the field of bioinformatics. Many institutions' early services revolved around instruction on NCBI resources, such as the Basic Local Alignment Search Tool (BLAST), a web-based resource for comparing nucleotide and protein sequences (Osterbur et al., 2006). More recently, in-depth data analysis for researchers have been included resulting in co-authorship with faculty members (Li et al., 2013). Library bioinformatics services often benefit from forming collaborations with individuals outside of the library. Collaborations discussed in Lyon et al. (2006) led to an academic institute funding a bioinformatics librarian position, new professional development opportunities, and increased community awareness of library services and librarian skills. Other benefits resulting from bioinformatics collaborations include raising visibility of the library as knowledgeable and responsive to clients, co-sponsoring campus events, meeting institutional goals, and increase researchers' competitiveness for grant applications (Tennant, 2005; Wang et al., 2007; Li et al., 2013).

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