

A Stepping Stone To Develop Bio Informatics In Pakistan

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Background

Bioinformatics employs wide range of "informatics" techniques to analyze and understand information associated with large-scale biological data. The journey of bioinformatics started with the development of in silico methods for DNA to protein analysis such as sequence alignment, gene finding, gene annotation, protein structure prediction and phylogenetic reconstruction. Advancement in computational and molecular biology research and application of high-throughput next-generation sequencing (NGS) technologies in areas such as genomics, transcriptomics and proteomics has taken it to the next level. Academic groups, research consortia and industries worldwide are immensely practicing bioinformatics as a tool to address Life Sciences related questions. This field of study is relatively new in Pakistan as it was introduced in 2002 when Muhammad Ali Jinnah University now Capital University of Science and Technology (CUST) took the initiative and started an undergraduate degree program in bioinformatics for the first time. Later, similar program was introduced by COMSATS Institute of Information Technology (CIIT) another renowned university in Pakistan. HEC and the aforementioned universities played vital role in flourishing and increasing awareness about bioinformatics as the field of study among scientific communities in Pakistan. Consequently, several universities are launching similar programs at both graduate and postgraduate levels.

Scope of Bioinformatics in Pakistan

Bioinformatics cannot be overlooked in any country like Pakistan because it offers unique genetic resources in human population, crops and other species. Pakistan produces large variety of agricultural products such as cotton, wheat, rice, sugarcane, fruits, and vegetables, in addition to cattle and poultry. Furthermore, its geography and amalgam of various ethnicities with exceptional familial and social characteristics in population (>200 million) turned out to be a valuable resource of genetic disorders; to mention a few are Down syndrome, Fragile X syndrome, intellectual disability, Psoriasis, Schizophrenia, Deafness, Alzheimer's, Albinism and Epilepsy. Pharmaceutical industry is another sector where biotechnology is widely practiced in health care, agriculture, and environmental protection. The growth of pharmaceutical industry demands advanced tools methods for drug designing, finding targets of drug and identification of new therapeutic tools. Pakistan is aiming to raise its research standards

in agricultural, biotechnological and biomedical sectors by employing bioinformatics methods in life sciences studies realizing the fact that conventional methods are not inadequate to meet the challenges posed by nature.

A step to improve Bioinformatics in Pakistan

In order to meet the demands of bioinformatics oriented research and education in Pakistan; a vital step was taken by HEC approving "Overseas scholarship for MS/MPhil leading to PhD in bioinformatics" program in 2006. HEC offered 50 scholarships in bioinformatics with the aim to create mass of highly qualified manpower and to build the capacity of research institutes and industries in Pakistan through addition of PhDs in the field of bioinformatics. Moreover, it was hoped that absorption of specialized bioinformaticians by major organizations and institutes would boost research activities; in addition, new projects with economic returns could also be initiated. In this regard, collaboration was established with Swedish University of Agricultural Sciences (SLU), Sweden when the EMBnet node of Pakistan contacted the EMBnet node in Sweden at the EMBnet AGM in Torremolinos, Spain (2007). The study scholarships were open for talented and high-achieving graduates in selective fields of science. Applicants were shortlisted and called for interview after a graduate-assessment test. In year 2008 an expert panel comprising Erik Bongcam-Rudloff, Shahid Nadeem Chohan, Raheel Qamar, and a representative from HEC nominated 10 candidates for higher studies at SLU. It was first time that SLU designed MS in bioinformatics to the selected students in 2009. All students started PhD studies after completing their MS studies. These scholars were awarded with PhD degrees after successfully defending their doctoral theses publicly. List of doctoral theses on various research topics is shown in Table 1. The scholars also published more than 40 research articles published in peer-reviewed journals during the PhD education. After this scheme, there was hype about bioinformatics in educational sector of Pakistan. Several institutes launched degree programs in bioinformatics. At the time of writing, there are at least 20 universities and research institutes that are offering bioinformatics programs at undergraduate, graduate and postgraduate levels. The educational programs would fulfill the manpower required to provide solutions for handling overwhelming data, to develop new methods to analyze data and to build databases.

Result

This joint venture between HEC of Pakistan and SLU Sweden was stepping stone to expand the scope of bioinformatics in educational and research centres of Pakistan. Besides this, it provided opportunities to connect with the international players in the field. Similar efforts in the future would supplement adequate number of skilled bioinformaticians to support technology upgrading and to meet challenging needs of research in Pakistan.



Writer Dr. Shahid Manzoor with the Bio Informatics Experts in Sweden University

Pictorial of Seminar on Bio Informatics in University of the Punjab, Gujranwala Campus

