

Bioinformatics

The convergence of bioscience and IT into Bioinformatics has given the thrust to researchers for genomics-based drug discovery and development. Pressure is mounting over the pharmaceutical companies to reduce or at least control costs, and have a growing need for new informatics tools to help manage the influx of data from genomics, and turn that data into tomorrow's drugs.

Bioinformatics data play a vital role and emerging as a business model for the medical and pharmaceutical sector. Key areas such as gene prediction, data mining, protein structure modeling and prediction, protein folding and stability, macromolecular assembly and modeling of complex biological systems are thriving and IT has major role to play in these areas in bringing the tools to manage the high throughput experiments and the data they generate, and sharing and integrating all the data in a meaningful way resulting into the detailed models of complex systems, particularly biological pathways.

BioSuite

I launched the Bio-Suite at Hyderabad on 14th July 2004, which is an important software package that caters to all aspects of computational biology from genomics to structure-based drug design. It incorporates the latest publicly known algorithms, as chosen by a panel of academic partners, and has been coded entirely by the Tata Consultancy Services (TCS) team, using the software engineering practices. It

can be used by academic and R&D institutions, small and medium and large biotechnology companies. This bio-suite was developed by TCS in collaboration with Council for Scientific and Industrial Research (CSIR) and academic institutions including the IISc, for cost effective drug development in India.

Gene Chip

In 2004, I visited Dr. Cherian's Medical Centre at Chennai. It is known as, International Centre for Biomedical Sciences and Technology (Research & Applications). There I interacted with Dr. Emmanuel, who is working in the area of Gene Chip. They have developed a Gene Chip which can be used for finding the existence of genetic diseases including coronary artery diseases or neuro defect in the baby during a certain stage of pregnancy itself. The chip could also be modified to suggest to the patient's system to develop those chemicals, which in turn will help the patient recover from the present situation. The specialists assembled here may like to debate whether gene chip can be used for identifying the susceptibility of the baby to the allergic diseases in the advanced stage of pregnancy. Can medical bio-informatics help in finding a treatment regime for the mother, which may give immunity to the child from the allergic disease? It is reported that gene differences between humans and most animals are very nominal. More than 90% of our DNA is

similar. This property is a boon to researchers since animal models can be subsequently used for curing human diseases based on trial data. Medical researchers are progressing further in this area for finding the application of Gene Chip as a diagnostic tool and as a treatment regime for allergic diseases and asthma.

Nano Technology

When I think of Nanoscience and Nanotechnology, I would like to discuss about three scientists who have laid the foundation on nanoscience and nanotechnology. Mr. Richard Feynman, who described the concept of 'building machines' atom by atom in his talk at Caltech titled "There is plenty of room at the bottom". Mr. Eric Drexler, who wrote the book titled 'Nano Systems, Molecular machinery, manufacturing and computation'. Prof CNR Rao, who is an alumni of BHU has pioneered and fostered the nano-science research in India. Molecular nano technology has enormous potential for future aerospace systems and health areas. Research has shown that newly discovered class of molecules, leading to the development of carbon nano tubes that they have multiple applications in the system developed in the areas of electronics particularly nano-electronics and power systems. Carbon nano tubes are normal form of carbon with remarkable electrical and mechanical properties. It is hoped that such materials could revolutionize electronic design and open the space frontier by radically lowering the cost of launch to orbit. Carbon Nano tubes