Bio-Analytics Workshop
Course Content

Techfest is the annual science and technology festival of IIT Bombay.

Following is the basic outline of the in-person workshop that would be happening in Techfest at IIT Bombay.

The details of the workshop are as follows:

Workshop Name:

Bio-Analytics

Content of the Workshop:

The fields of digital health and bioinformatics are collectively shaping our future and are in high demand. Students, professionals, clinicians, and researchers alike require an understanding of extensive clinical and biological data derived from 'omics' fields - genomics, proteomics, e.t,c. and other sources to comprehend the clinical outcomes of patients or interpret experimental results. The necessity for data analysis among biologists and clinicians has become imperative.

The BrainProt™ Team at IIT Bombay has taken a significant lead in educating and training biologists, computer scientists and statisticians in data analysis and visualization

Topics to be covered

Day 1 Session 1:

Getting started

- Introduction to Clinical/ Biological Data, Omics and Digital Health
- Role of Proteomics, Genomics, Transcriptomics and Metabolomics
- Value of Biological/Clinical/Biomedical Data in 21st century

Data Repositories and Resources

- Repositories, Resources and Databases: Sources and magnitude of Biological/Clinical/Biomedical Data generation
- Data Mining, downloading, munging and filtering of Biological/Clinical datasets
- Preparation of Data Matrix and mapping meta-data for data analysis

Day 1 Session 2:

Data Pre-processing and Data Analysis

- Data Quality Check and Outlier detection
- Batch effect, Batch Correction and Missing Value Imputation
- Data Normalization, Transformation and Scaling

Statistical Data Analysis in Clinical Biology

- Basic Statistical Data Analysis and identification of differentially expressed features
- Identification of disease associated features and markers
- Role of BrainProt™ in identification and visualization of disease associated marker

Quiz 1

Day 2 Session 1:

Feature Selection and Machine Learning in Biomarker Discovery

- Application of feature selection and machine learning strategies in Omics research and Digital Health
- Machine Learning using Orange Software to identify biomarker in Disease biology
- Verification and Validation of Biomarker

Day 2 Session 2:

Data Visualization and Biological/Clinical interpretation

- Different types of Data Visualization (Online Resources and Python)
- Biological Enrichment and Pathway Analysis (GSEA, ORA, NTA)
- Connecting the dots of Omics, Digital Health and Clinical Research

Quiz 2