Microbiome Machine Learning & Predictive Biomarkers — Hands-on

Learn how to take microbiome feature tables from exploratory analysis to deployable predictive models. This module covers feature engineering, class imbalance handling, cross validation, model comparison and interpretation, with a focus on robust biomarker discovery for clinical, environmental and industrial microbiome applications.

Microbiome Machine Learning & Predictive Biomarkers

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Session Index

Session 1

Fee: Rs 8800 Apply Now

ML Ready Microbiome Data & Feature Engineering

From feature table to ML dataset

taxa, pathways and diversity metrics as features **targets for classification and regression** **train test split for microbiome cohorts**

Dealing with sparsity and compositionality in ML context

filtering low prevalence and low variance features

relative abundance, log transforms and log ratios normalisation and scaling choices

Feature engineering for predictive microbiome models

alpha and beta diversity derived features balances and aggregated pathway scores adding clinical and environmental covariates

Session 2

Fee: Rs 11800 Apply Now

Model Building, Class Imbalance & Cross Validation

Baseline and advanced algorithms for microbiome data

regularised logistic and linear models tree based methods and gradient boosting simple neural and ensemble models

Handling class imbalance and data leakage risks

class weights, resampling and synthetic data patient level grouping in splits temporal and site based leakage checks

Cross validation and model selection protocols

k fold and stratified CV for microbiome cohorts nested CV for hyper parameter tuning metrics for imbalanced classification and regression

Session 3

Fee: Rs 14800 Apply Now

Biomarker Panels, Interpretation & Reporting

From model features to biomarker panels

feature importance and stability analysis sparse models and panel size control panel performance on held out data

Model interpretation and explainability tools

partial dependence and effect plots **SHAP like local explanations** **linking features back to taxa and pathways**

Reporting predictive microbiome models responsibly

ROC, PR and calibration plots **uncertainty, overfitting and limitations** **checklists for reproducible model reporting**

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Predictive Microbiome Model

End to end ML pipeline on a microbiome dataset

theory plus guided practical

Benchmarking and selecting a final model for deployment scenario

comparison across algorithms and feature sets **external style validation split if available** **simple threshold and decision support logic**

Deliverables: notebook, model objects, biomarker list and report

R or Python ML notebook **saved model and feature metadata** **PDF or HTML predictive microbiome report**