Differential Abundance & Compositional Statistics — Hands-on

Move beyond naive relative abundances and p values to compositional aware, publication grade differential abundance analysis. This module covers normalization, log ratio transforms, popular tools such as DESeq2, edgeR, ALDEx2 and ANCOM-BC, and how to report results with clear effect sizes and appropriate covariate handling for microbiome studies.

Differential Abundance & Compositional Statistics

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Compositional Data & Normalization

Why microbiome data are compositional

counts, proportions and closures | **relative vs absolute abundance** | **subcompositional incoherence and pitfalls**

Normalization options for count tables

library size factors | **TSS, RLE, TMM ideas** | **rarefaction**

vs model based normalizations

Intro to log ratio thinking

CLR, ALR and ILR concepts | pseudocounts and zeros | base and reference choices

Session 2

Fee: Rs 11800 Apply Now

Classical DA: DESeq2/edgeR Style Models

Count models for feature wise testing

negative binomial frameworks | dispersion estimation | shrinkage and contrasts

DESeq2 and edgeR workflows for microbiome data

design formulas and covariates | model diagnostics and MA plots | p values, FDR and log2 fold changes

Limitations of RNA style DA when data are compositional

sensitivity to global shifts | false gain and loss effects | when these methods are still useful

Session 3

Fee: Rs 14800 Apply Now

Compositional DA: ALDEx2, ANCOM-BC & Log Ratios

ALDEx2 style effect estimation

Monte Carlo Dirichlet sampling | median effect and uncertainty | interpretation of effect statistics

ANCOM and ANCOM-BC style approaches

log ratio based testing idea | bias correction and structural zeros | suitable use cases and caveats

Custom log ratio based features and balances

pairwise and group log ratios | balances and phylogenetic balances overview | using ratios in simple regression models

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: From Counts to Interpretable DA Results

Designing a DA analysis for one microbiome question

guided theory plus practical

Running at least two DA approaches on the same dataset

DESeq2 or edgeR as baseline | one compositional method (ALDEx2 or ANCOM-BC) | comparing overlap and differences

Deliverables: volcano plots, effect size tables and narrative

ranked features with log fold change and FDR | annotated figures for presentations | short report explaining methods and choices