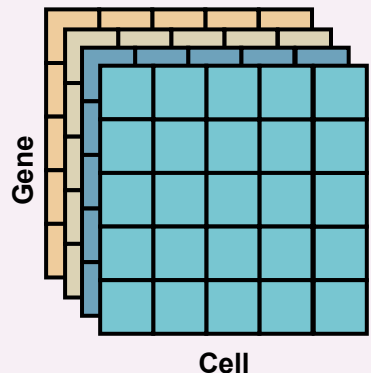
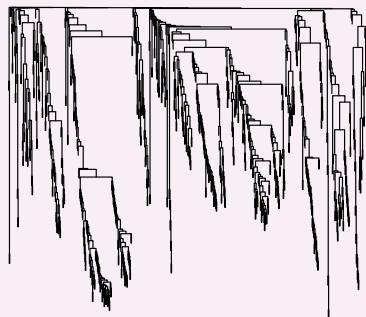


scDisProcema

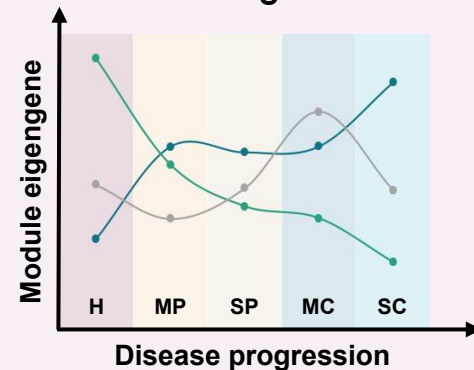
COVID-19 scRNA-seq data



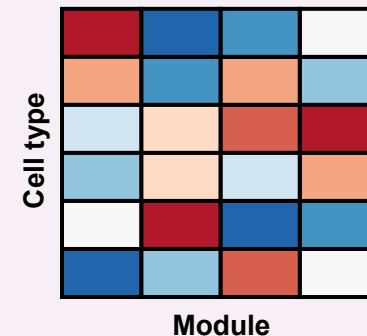
Gene co-expression matrix



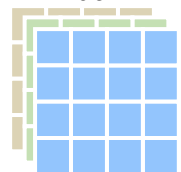
Module dynamic change



Cell-type-specific gene modules

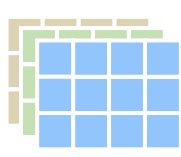


Gene expression matrix



Pre-processing
Aggregation

HVGs expression matrix

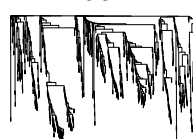


HVGs - cell state matrix



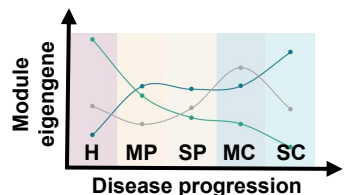
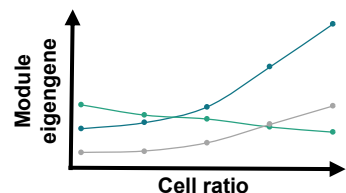
WGCNA

Gene co-expression matrix



1 Gene co-expression network construction

For Cell Type i (C_i) and Module j (M_j):

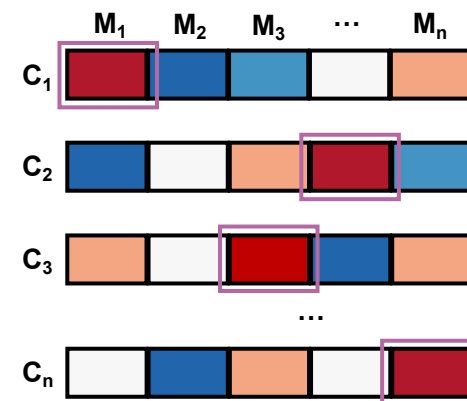


$$S_{(CC)} = \frac{\text{cov}(\text{Pro}_i, ME_j)}{\sigma_{\text{Pro}_i} \sigma_{ME_j}}$$

$$S_{(AF)} = \frac{\sqrt{\sum_{s=1}^S [(ME_j)_s - \bar{ME}_j]^2}}{S-1}$$

2 Module dynamic analysis

$Zscore(S_{(CC)} \times S_{(AF)})$



$S_{(MS)} = |Zscore|$

$\text{Max}(S_{(MS)})$

Key module

3 Key module identification