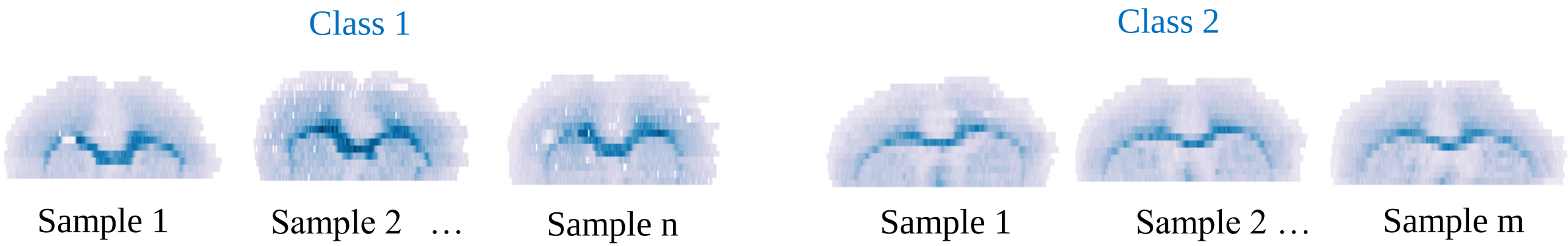
Analysis goal: class comparison

- Analyze one m/z at a time



- What to compare:
  Average ion intensity across tissue: between groups

- Statistical methods:
  T-test, ANOVA, linear regression

- Limitations:
  loss of spatial information

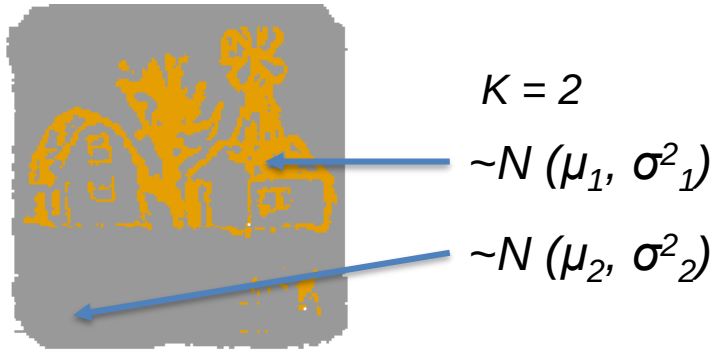
Spatial-DGMM model

- Spatial-DGMM is a Dirichlet Gaussian mixture model with spatial dependence

- Assumptions:
  1. k subgroups per ion image
  2. The intensities of pixels are from k Gaussian components with unique means and variances
  3. The component membership of a pixel ~ Dirichlet process
  4. The component memberships of pixels are spatially correlated

Input

Single ion image (ion intensities of one m/z across the sample)

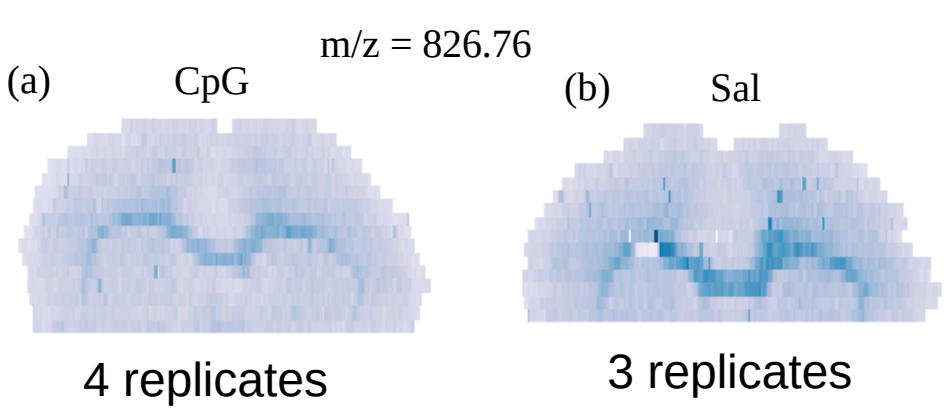


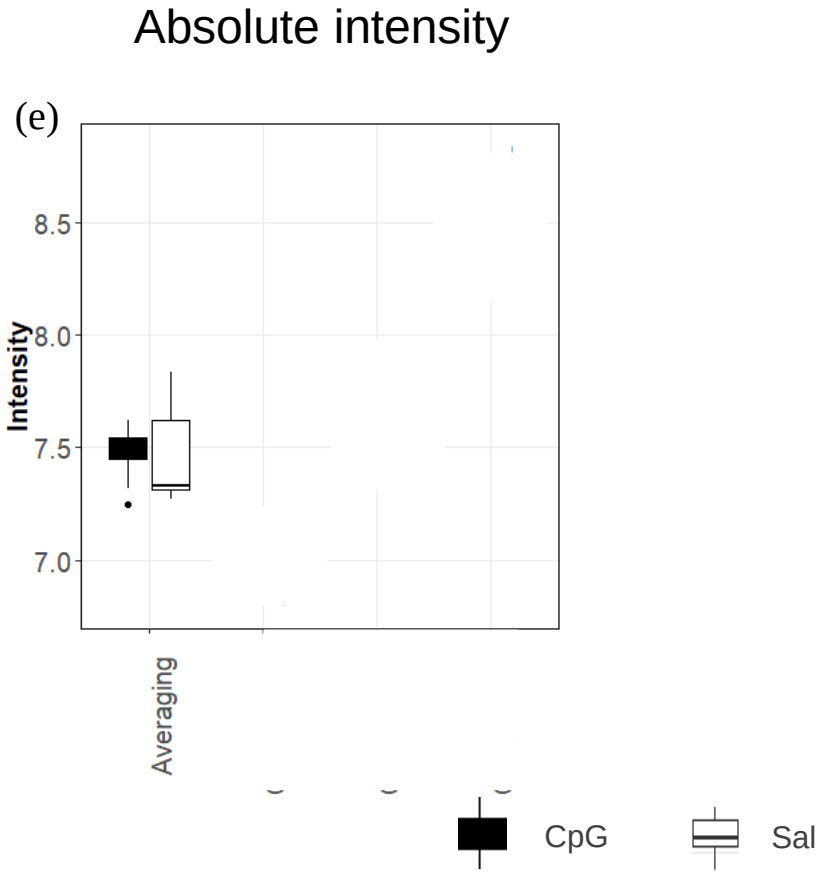
Output

- Number of Gaussian components and their means and variances
- Component membership of each pixel

Spatial-DGMM uncovers differences in ion abundance between conditions

- Goal: class comparison
- Spatial-DGMM overcomes the limitation of average ion intensity across tissue





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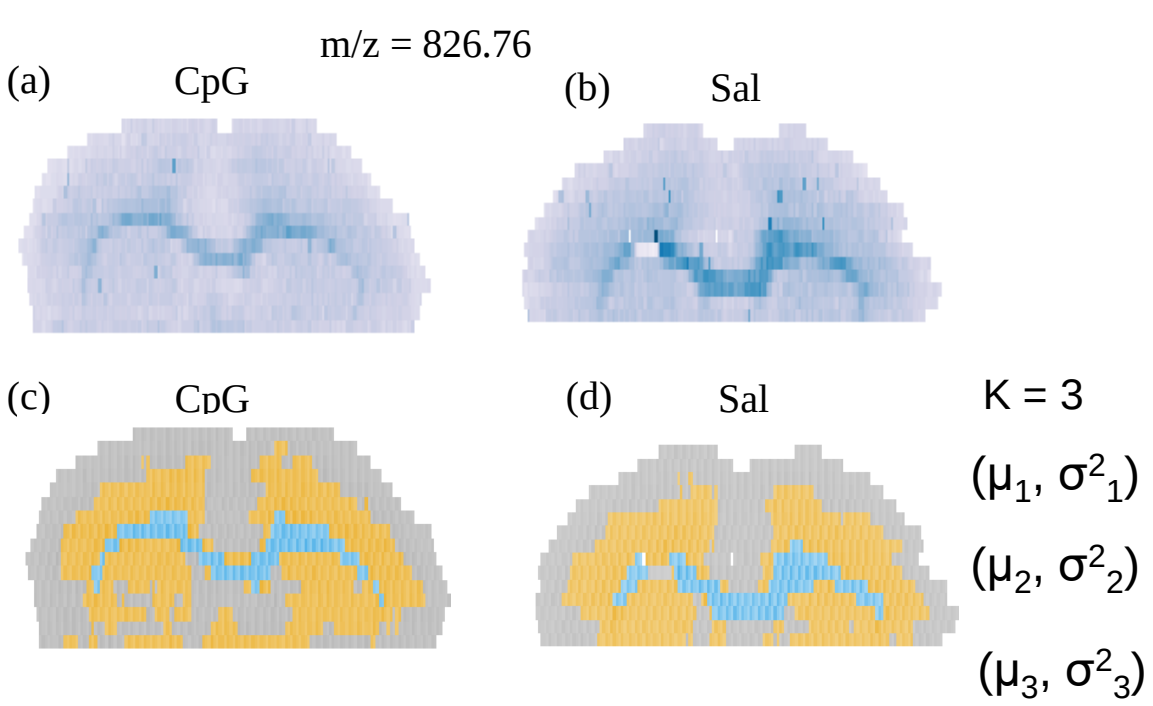

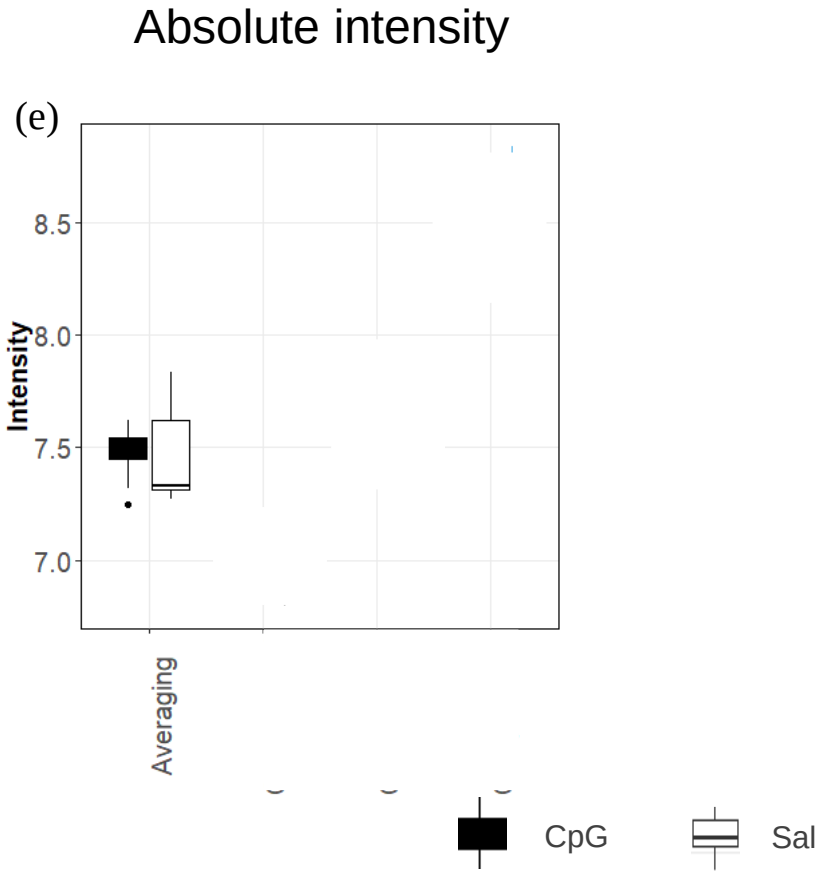

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