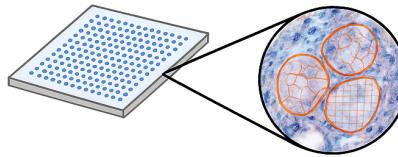


## VisiumHD bin-resolution bins ( $\sim 2\mu\text{m}$ )



Inputs

VisiumHD  
bin-level expres-  
sion



Cell  
segmentation

Workflow

Applied to VisiumHD: high-resolution spatial trans-  
criptomics with cell segmentation

Naive



Weighted by Area

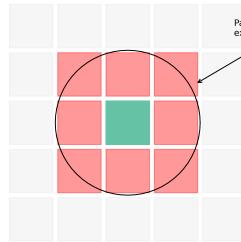


SPHERE

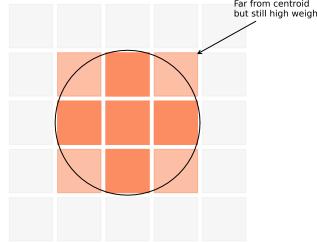


### Challenges in Current Bin-to-Cell Methods

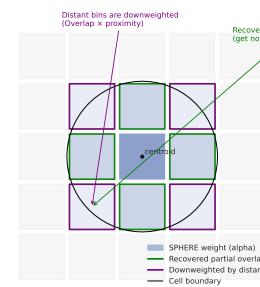
Naive Method



Weighted by Area



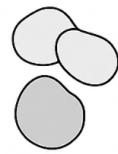
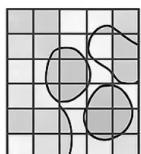
**SPHERE:** recover partial overlaps  
and downweight distant bins



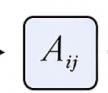
### SPHERE workflow

Inputs

Bin-level expression  
+ cell segmentation



Calculate  
overlap  
 $A_{ij}$



Calculate  
proximity  
 $D_{ij}$



Normalize  
and reassign  
expression  
 $S_{ij} = A_{ij} D_{ij}$

$$S_{ij} = A_{ij} D_{ij}$$

Output  
reconstructed  
cell x gene matrix

