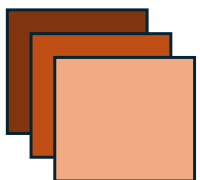
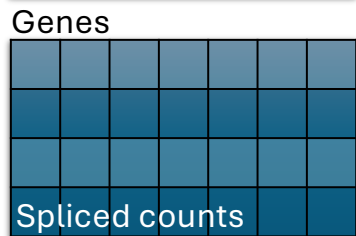
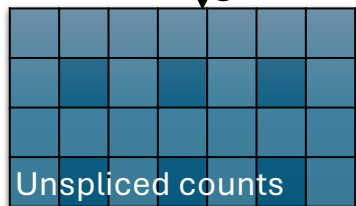


## Preprocessing

Normalization  
and KNN-smoothing

concatenate  
batches

filter uninformative  
genes



## Encoder

MLP  
Encoder

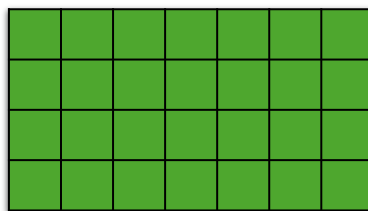
GAT  
Encoder

+  
MMD penalty  
between batches

Velocity matrix

Latent space

## Generative process

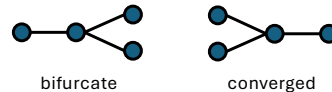


## Applications

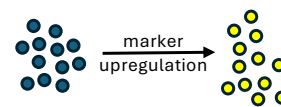
Uncertainty quantification



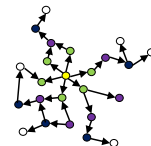
Trajectory patterns  
discovery



State driver markers  
identification



GRN inference



temporal-CCC inference

