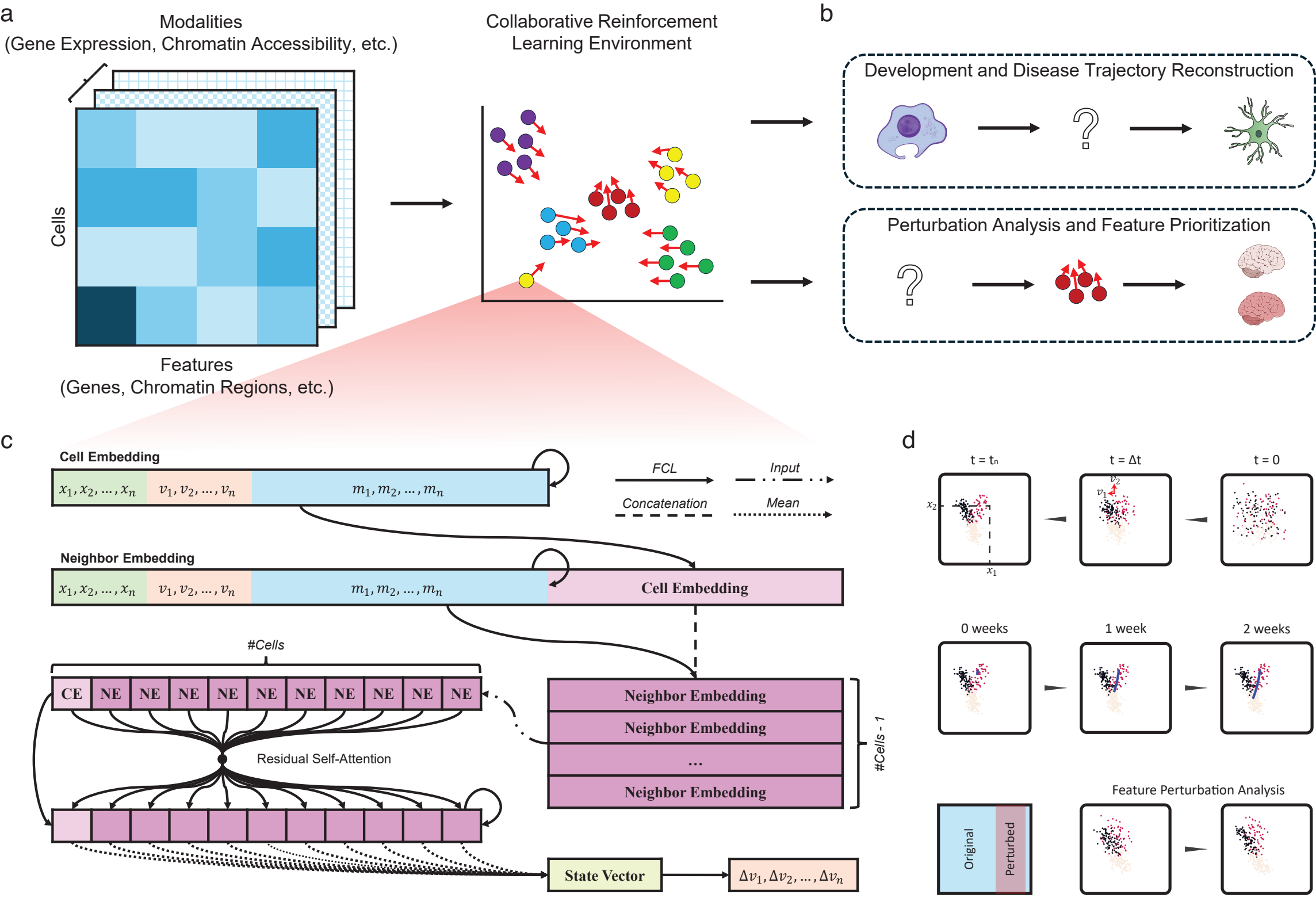
a
Modalities
(Gene Expression, Chromatin Accessibility, etc.)
Cells
Features
(Genes, Chromatin Regions, etc.)
Collaborative Reinforcement
Learning Environment
b
Development and Disease Trajectory Reconstruction
Perturbation Analysis and Feature Prioritization
c
Cell Embedding
$x_1, x_2, \ldots, x_n$
$v_1, v_2, \ldots, v_n$
$m_1, m_2, \ldots, m_n$
FCL
Input
Concatenation
Mean
Neighbor Embedding
Cell Embedding
#Cells
CE
NE
Residual Self-Attention
Neighbor Embedding
...
#Cells - 1
State Vector
$\Delta v_1, \Delta v_2, \ldots, \Delta v_n$
d
t = tₙ
t = Δt
t = 0
x_1
x_2
v_1
v_2
0 weeks
1 week
2 weeks
Feature Perturbation Analysis
Original
Perturbed