10x GENOMICS

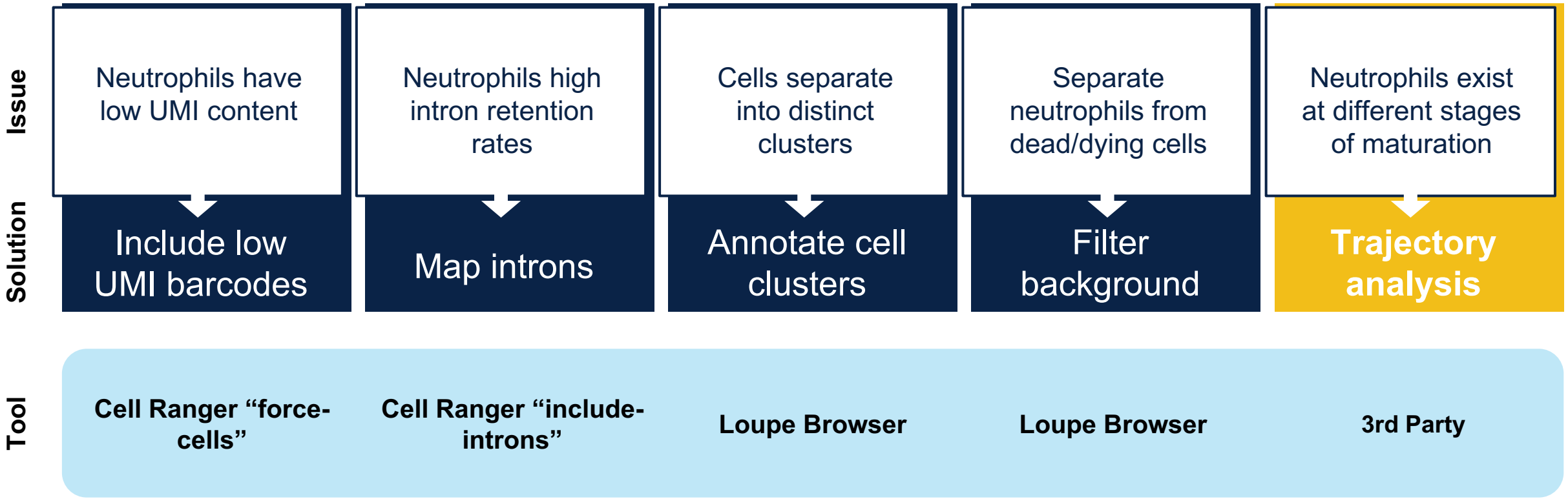
Introduction to RNA Velocity Analysis

7/20/2022

Hands on tour of the single cell analysis journey

Recap: Neutrophil analysis plan

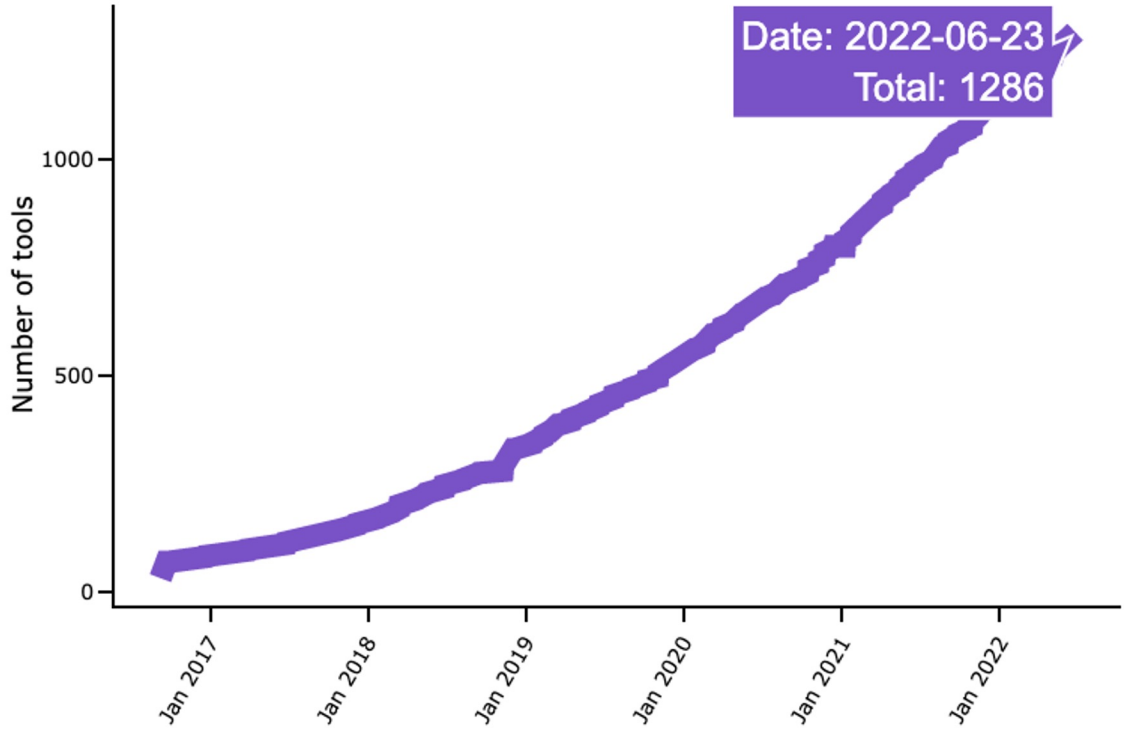
Our journey through analysis



© 10X GENOMICS, INC. 2022 | FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.

Approaching the Analysis Ecosystem

More than 1,000 tools!



https://www.scrna-tools.org/

- How do you choose?
  - Leverage your research question
  - Look to the literature
    - Citations
    - Reviews
  - Look at GitHub sites
    - Check for regular updates
    - Check for issues and responses

- 10x Analysis Guides
  - Introductions
  - Tutorials
  - Informatics blogs

© 10X GENOMICS, INC. 2022 | FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.

RNA Velocity

Single-cell RNA-seq provides only static snapshots of cellular states at the moment of the measurement.

RNA velocity (La Manno et al, 2018; Bergen et al. 2020) can predict the direction and speed of movement of cells in transcriptome space.

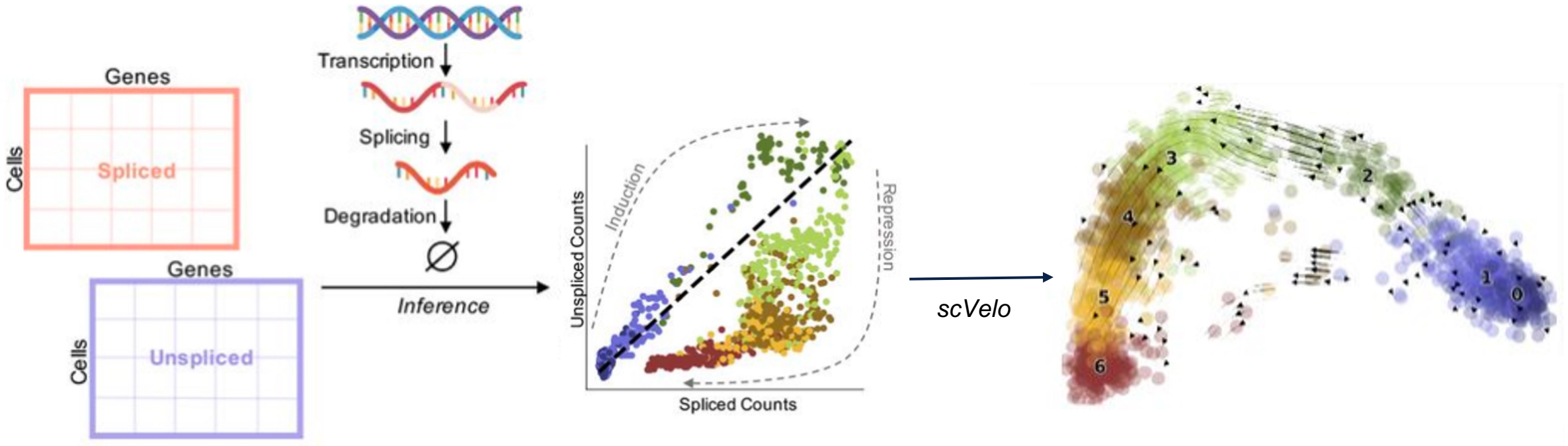
Application: analysis of cell dynamics → developmental biology, tissue regeneration, disease progression

Volker Bergen, https://www.youtube.com/watch?v=QWfd_kSNPgk

© 10X GENOMICS, INC. 2022

How does RNA velocity work?

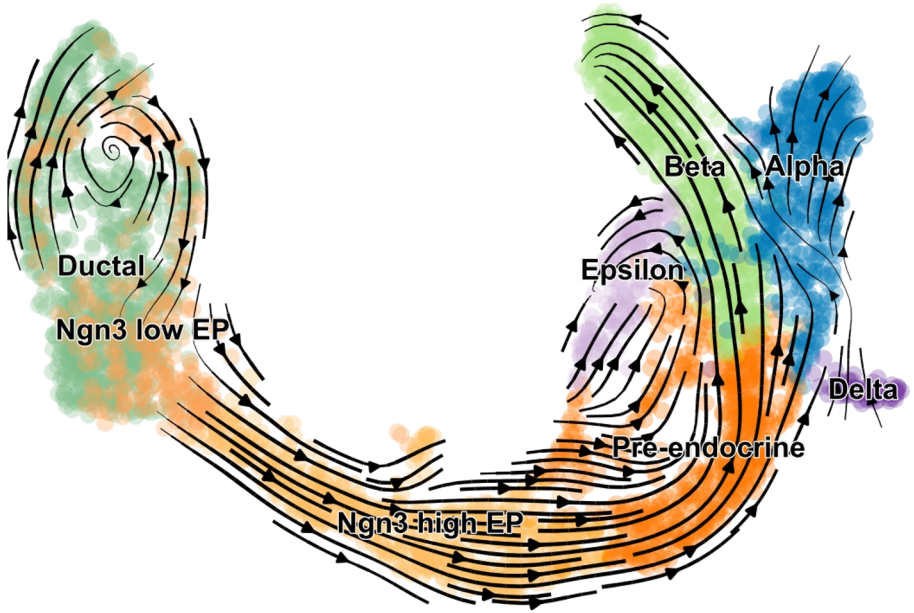
Estimation basis: the relative abundance of nascent (**unspliced**) and mature (**spliced**) mRNA → rate of RNA splicing and degradation



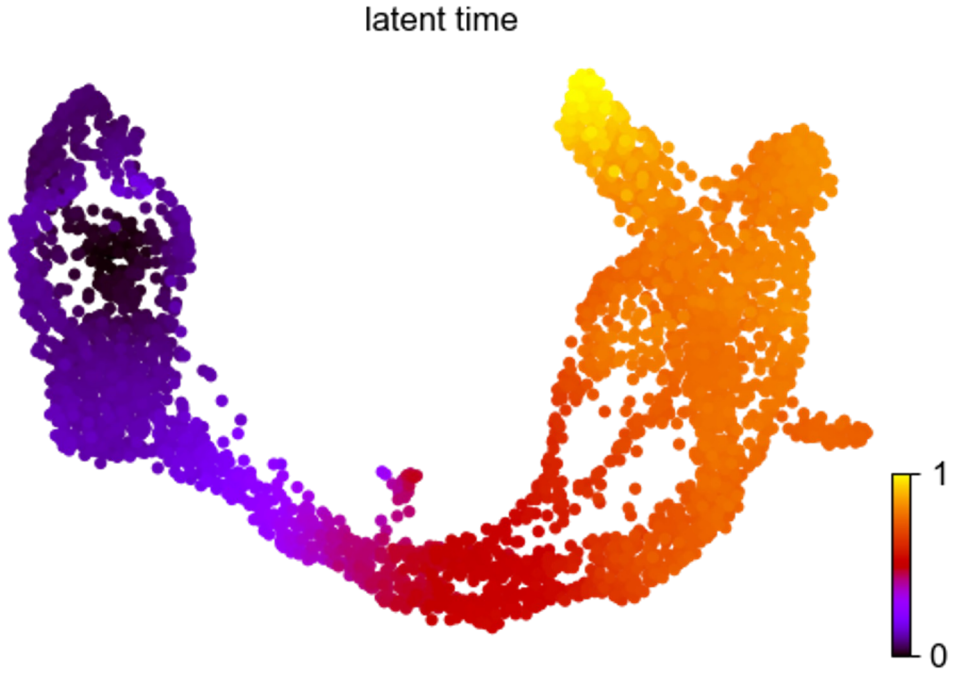
https://doi.org/10.1101/2022.02.12.480214

© 10X GENOMICS, INC. 2022

Example of scVelo results



Endocrine development in the pancreas with lineage commitment to four major fates: α, β, δ and ε-cells.

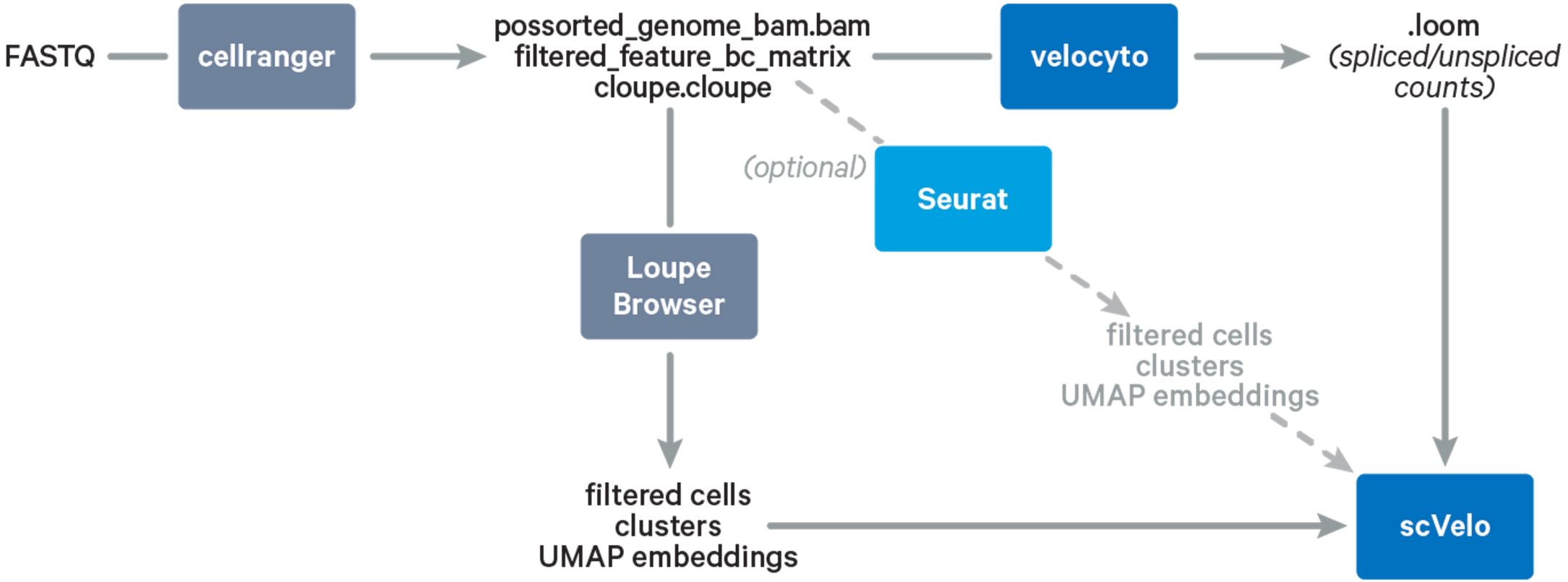


The **latent time** represents the **cell's internal clock** and approximates the real time experienced by cells as they differentiate, based only on its transcriptional dynamics.

https://scvelo.readthedocs.io/

© 10X GENOMICS, INC. 2022

Velocity analysis using 10x data



https://www.10xgenomics.com/resources/analysis-guides/trajectory-analysis-using-10x-Genomics-single-cell-gene-expression-data

© 10X GENOMICS, INC. 2022