Markov Link Method for combining destructive measurements

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Destructive measurements

- It is easy to calibrate thermometers
- RNAseq methods? Not so easy

Setup

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- X – result of experiment under one modality
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Problem: what if can never observe X, Y together?

One solution: Markov Link Method Assumption

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Example:

- ℓ – cre line
- X – fine-grained cell-type (from deeply sequenced scRNA)
- Y – cell-type (from Patch-seq data)

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Observe $\mathbb{P}(X|\ell), \mathbb{P}(Y|\ell)$ and determine that set of calibrations consistent those observables:

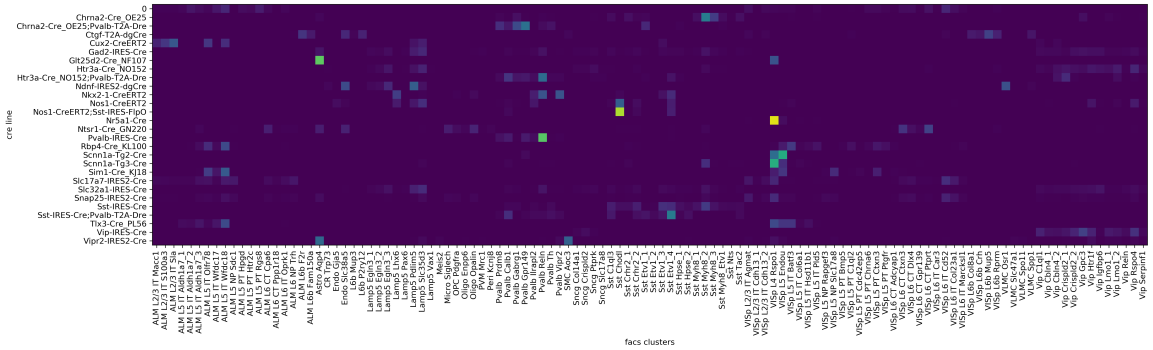
$$\Theta = \left\{ \mathbb{Q} : \ \mathbb{P}(Y|\ell) = \sum_X \mathbb{P}(X|\ell)\mathbb{Q}(Y|X) \right\}$$

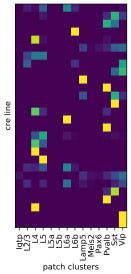
Empirical results

Tasic, Bosiljka, Zizhen Yao, Kimberly A. Smith, Lucas Graybuck, Thuc Nghi Nguyen, Darren Bertagnolli, Jeff Goldy et al. "Shared and distinct transcriptomic cell types across neocortical areas." bioRxiv (2017): 229542.

Empirical results

From datasets about two separate experimental methods...





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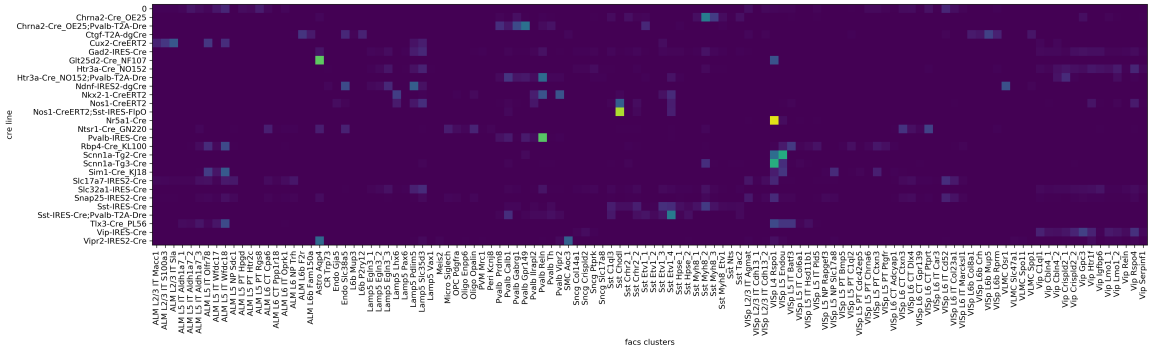
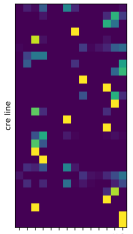
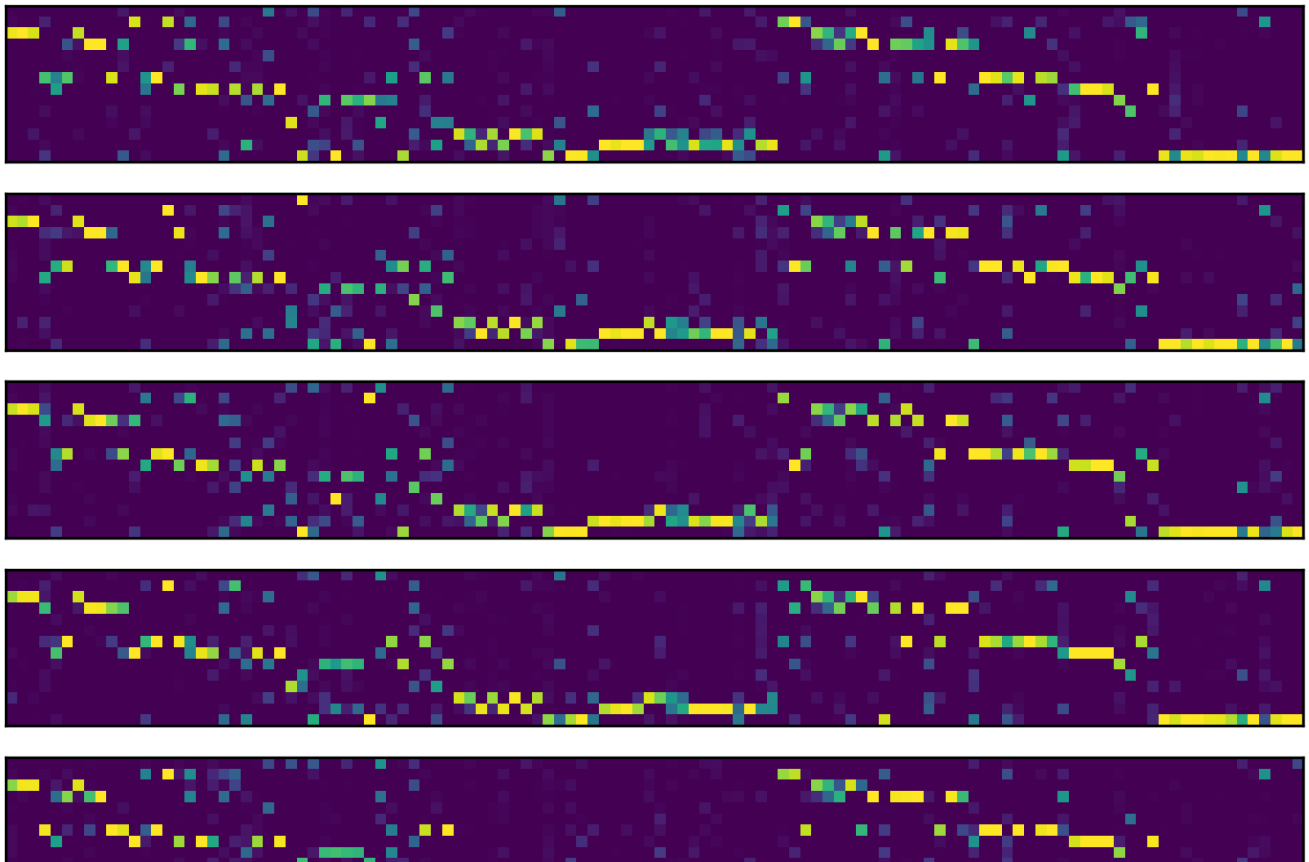




... to a set of possible calibrations between the methods.



Making sense of the set of possible calibrations

- Rotatially Uniform eXtremal distribution
- Uniform distribution
- Diameter estimation
- Center of mass