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

- ℓ – side information (region of brain, cre line, etc.)
- X – result of experiment under one modality
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Problem: we can never observe X, Y together

One solution: Markov Link Method Assumption

If X is *more fine-grained* than ℓ, then in some cases we may assume that

$$\mathbb{P}(X, Y|\ell) = \mathbb{P}(X|\ell)\mathbb{P}(Y|X)$$

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And we can estimate the set of calibrations:

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

Analyze Θ

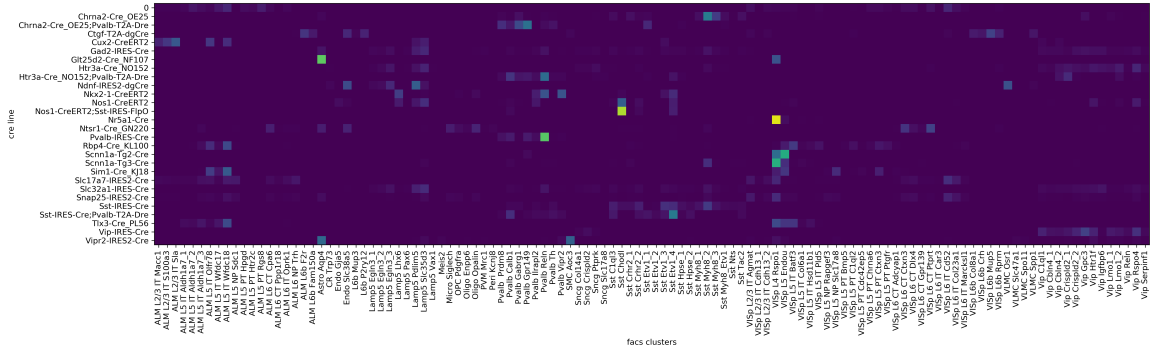
- Rotatially Uniform eXtremal distribution
- Uniform distribution
- Diameter estimation
- Center of mass

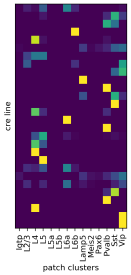
Empirical results

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 this:





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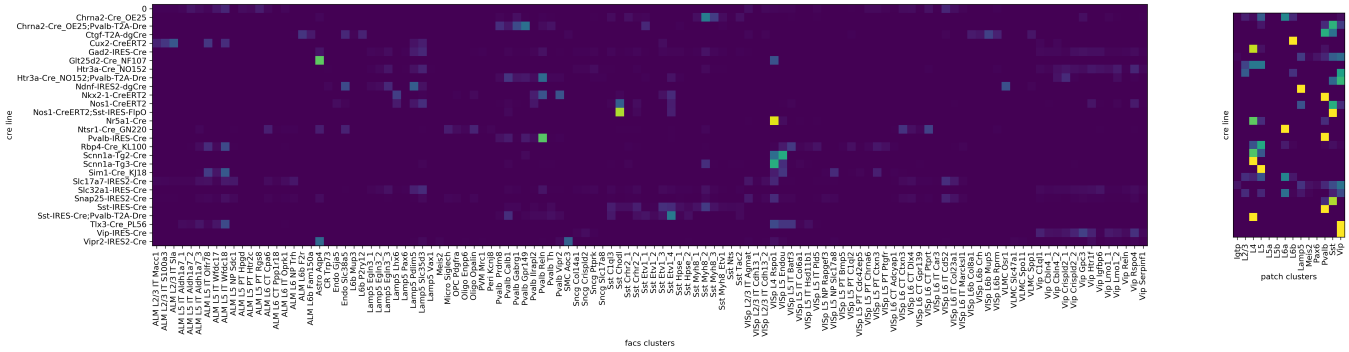

To this: