SpaceTx cell type calling – combined “consensus” mapping

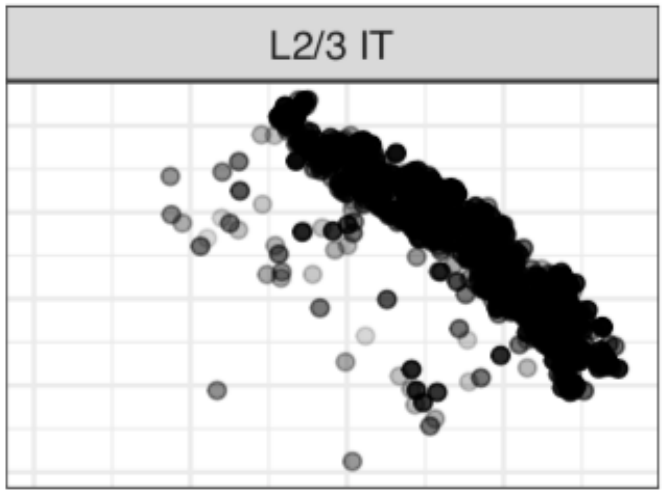
September 11, 2020

Renee Zhang

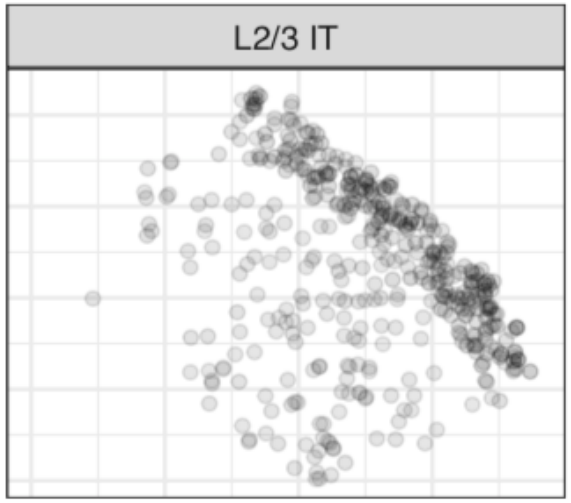
Intro

- Intuition: some of the computational methods may map “better” for some cell types, and some methods may map “better” for some other cell types
- Here, “better” means cleaner mapping in the spatial plot for those cell types with known layering knowledge, e.g. L2/3, etc.
- By combining all methods, can we arrive at a mapping that are overall “better”/cleaner in all cell types, by borrowing the strength of each individual method? → “Consensus” mapping
- Challenge: the quantitative (“probabilistic”) cell type calling methods have different distributional property, i.e. some skewed to 1, some skewed to 0, etc.

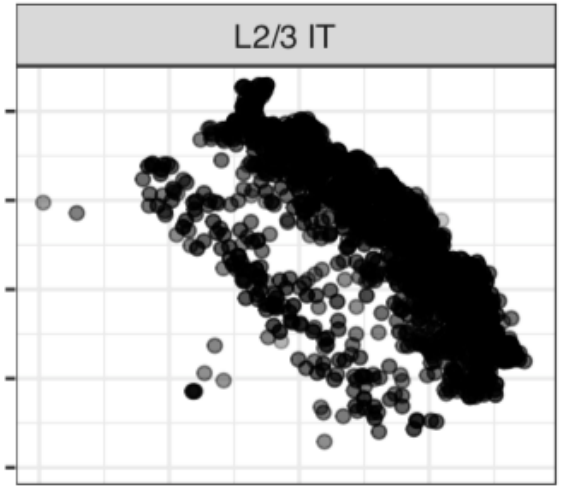
Eesh



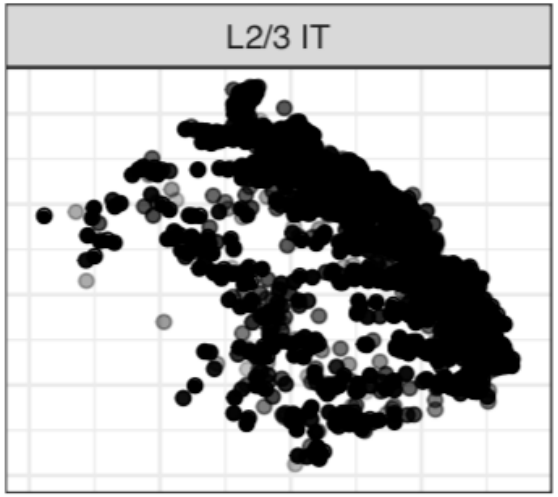
Gabriele



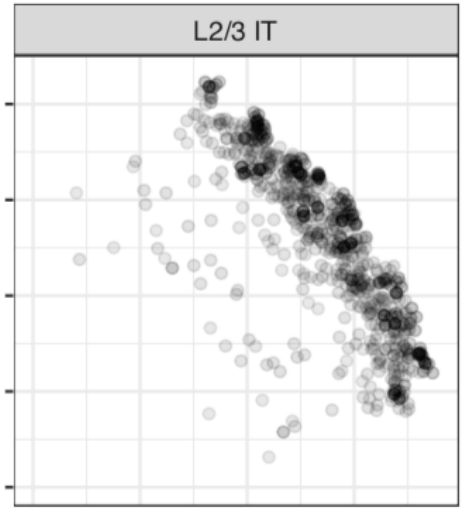
Jeremy



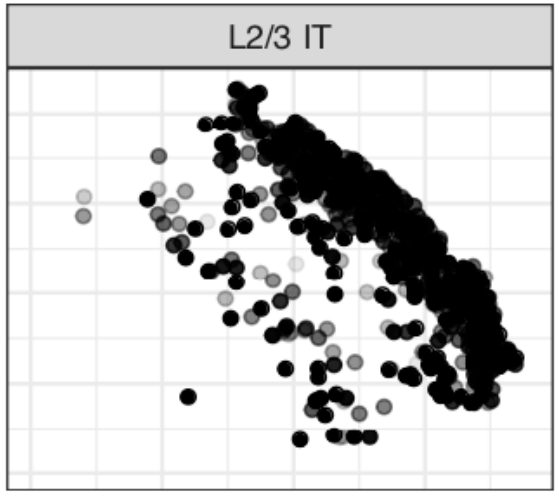
pciseq



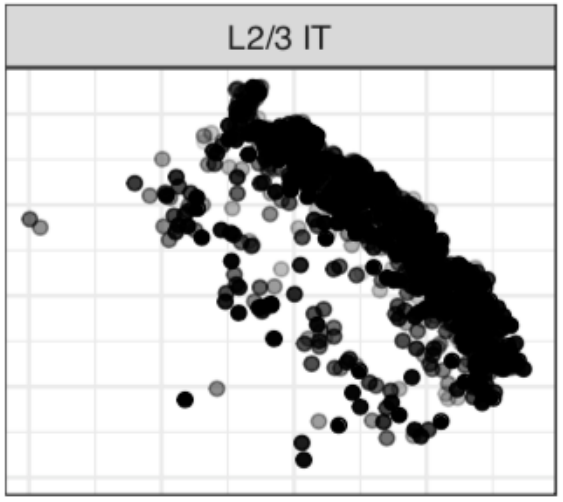
Renee



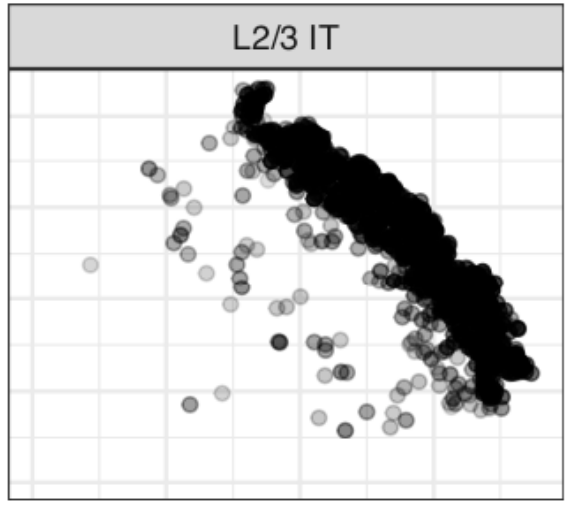
Viktor



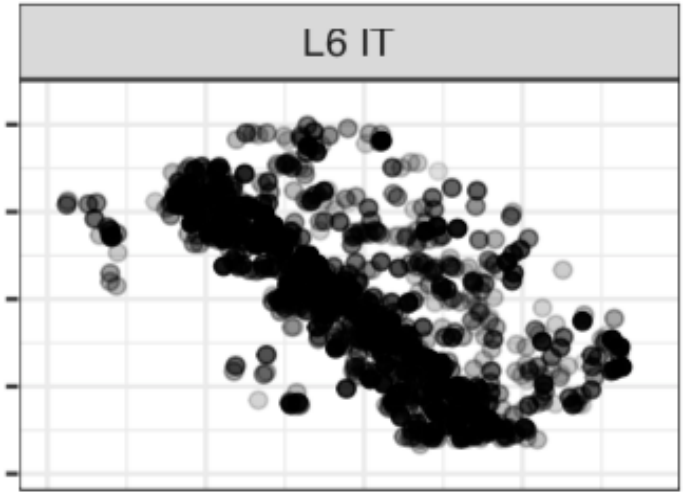
Yilin



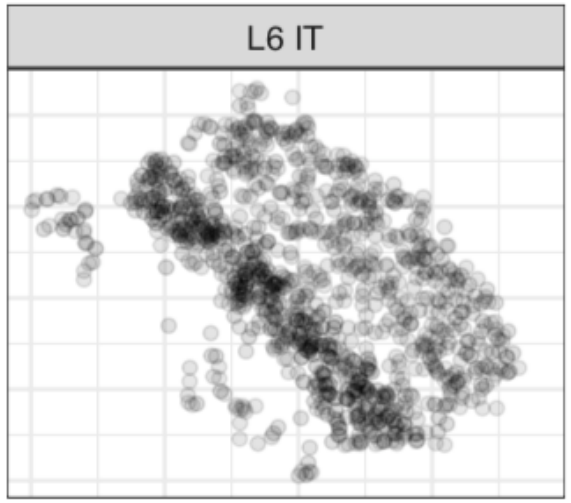
“Consensus”



Eesh



Gabriele



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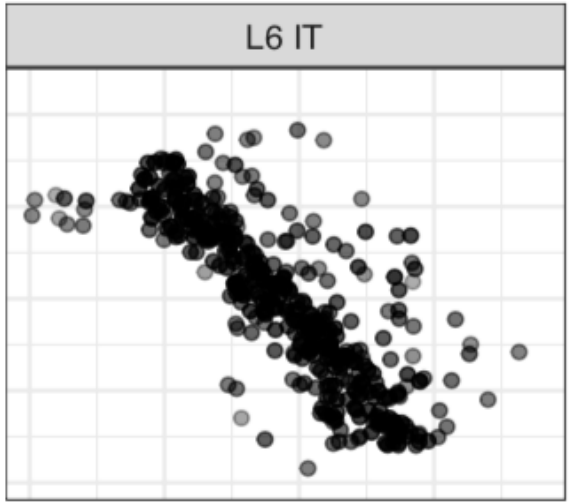
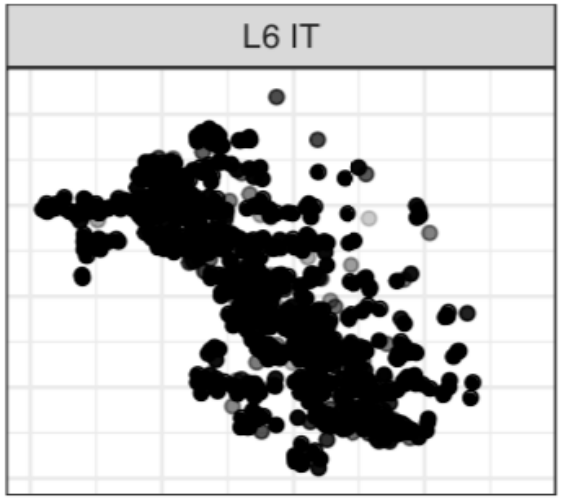
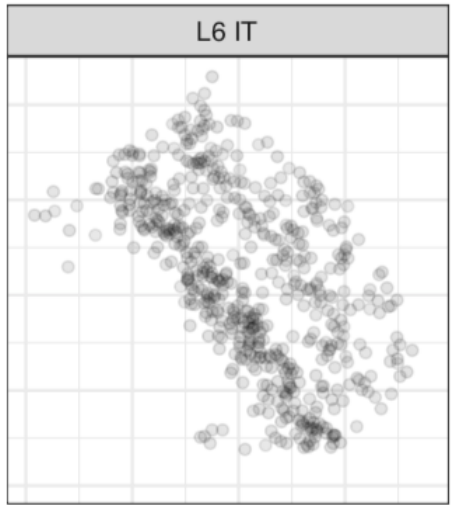


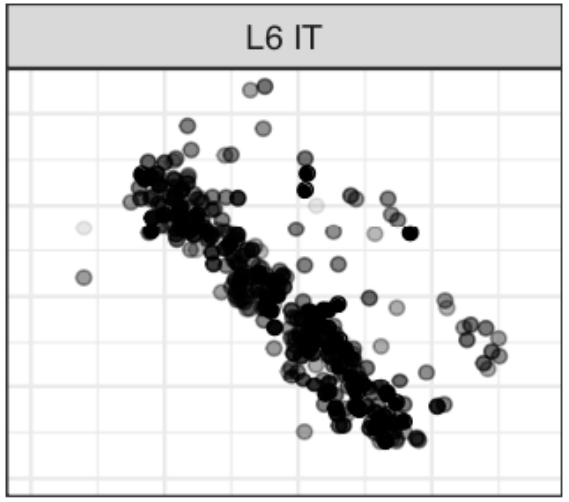
pciseq



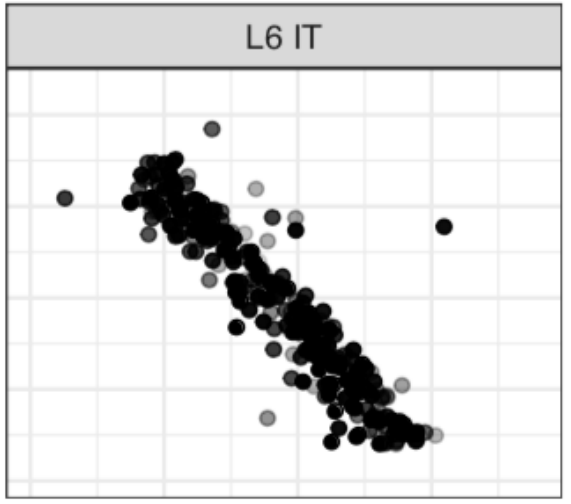
Renee



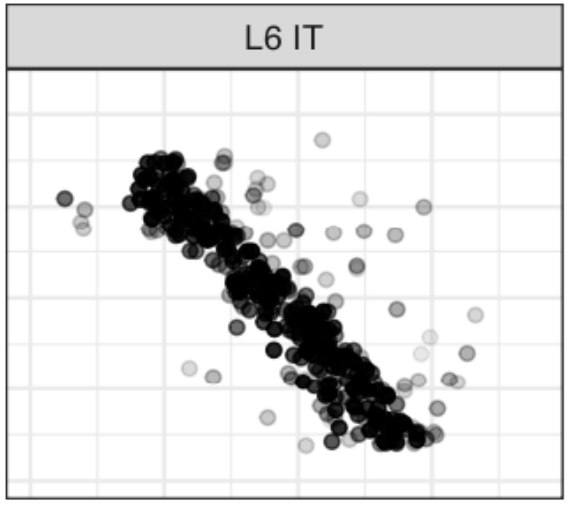
Viktor



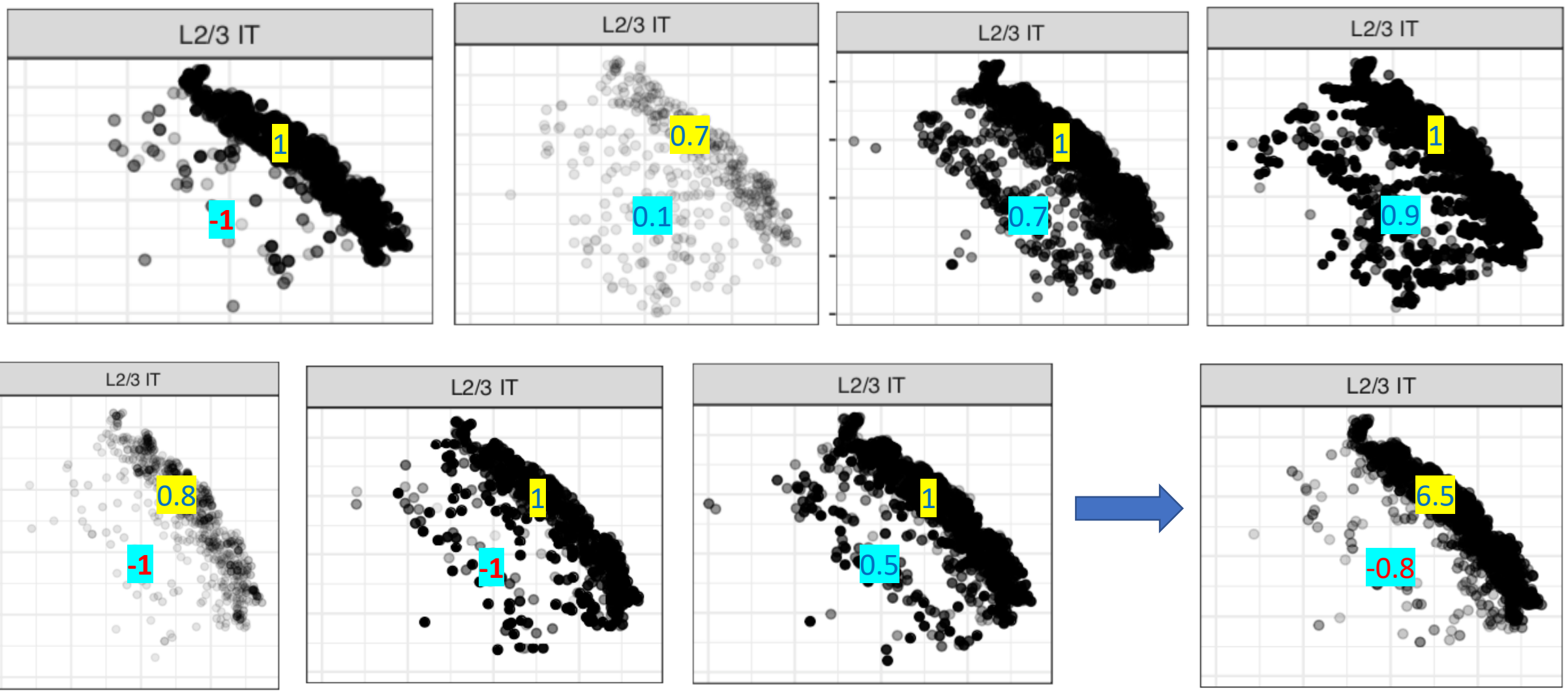
Yilin



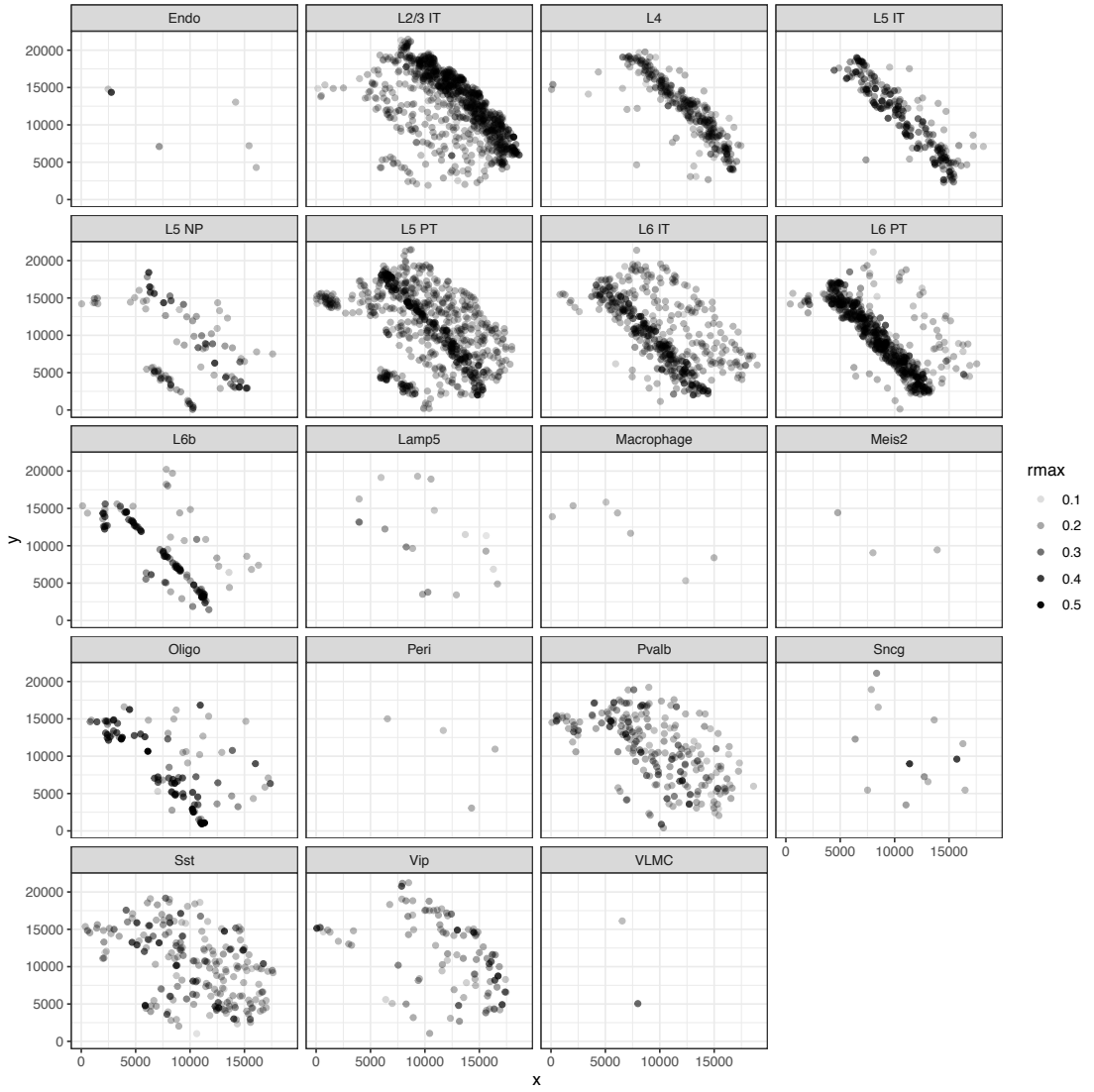
“Consensus”



A “qualitative” consensus by assigning negative weight

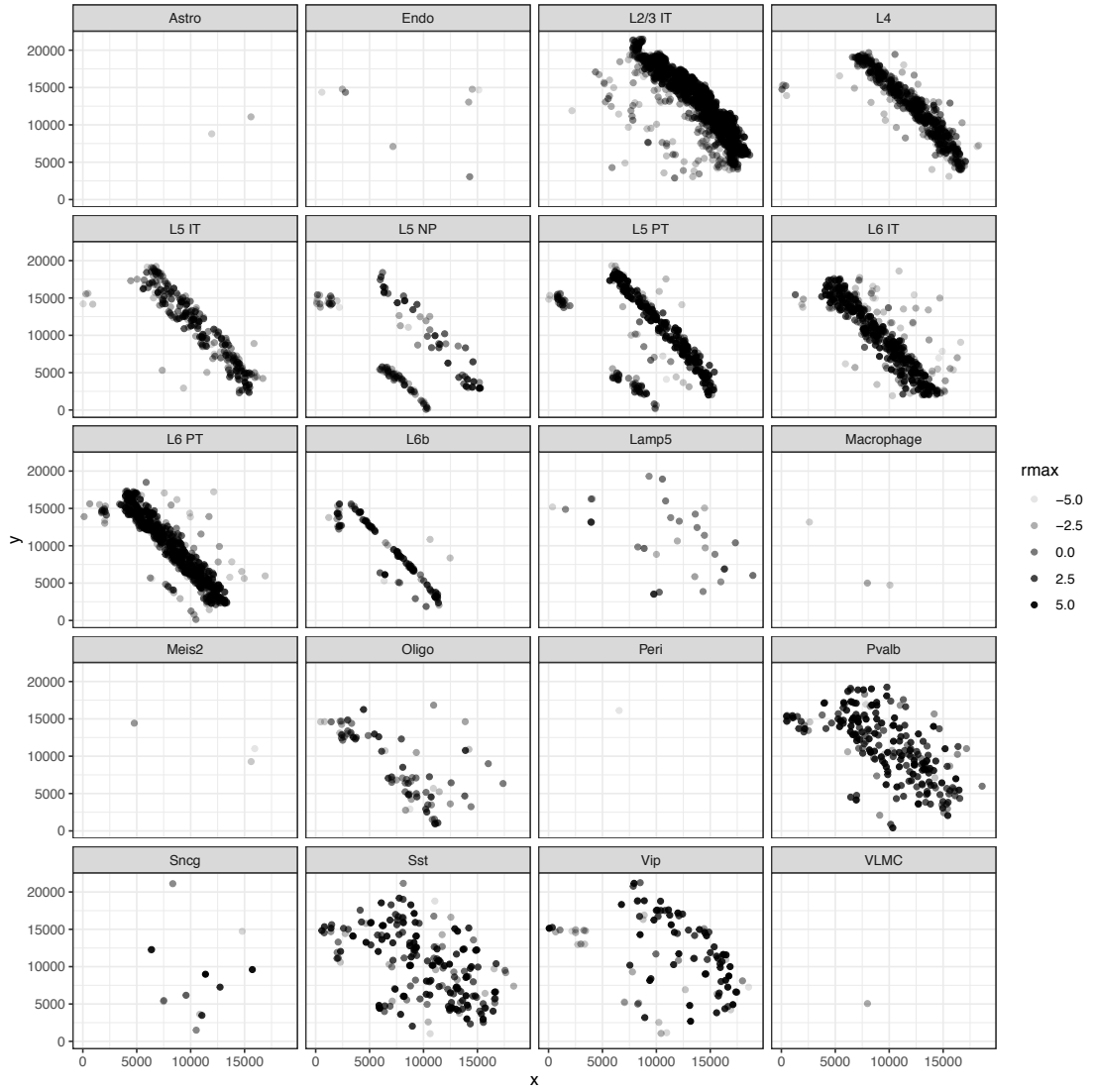


Arithmetic mean



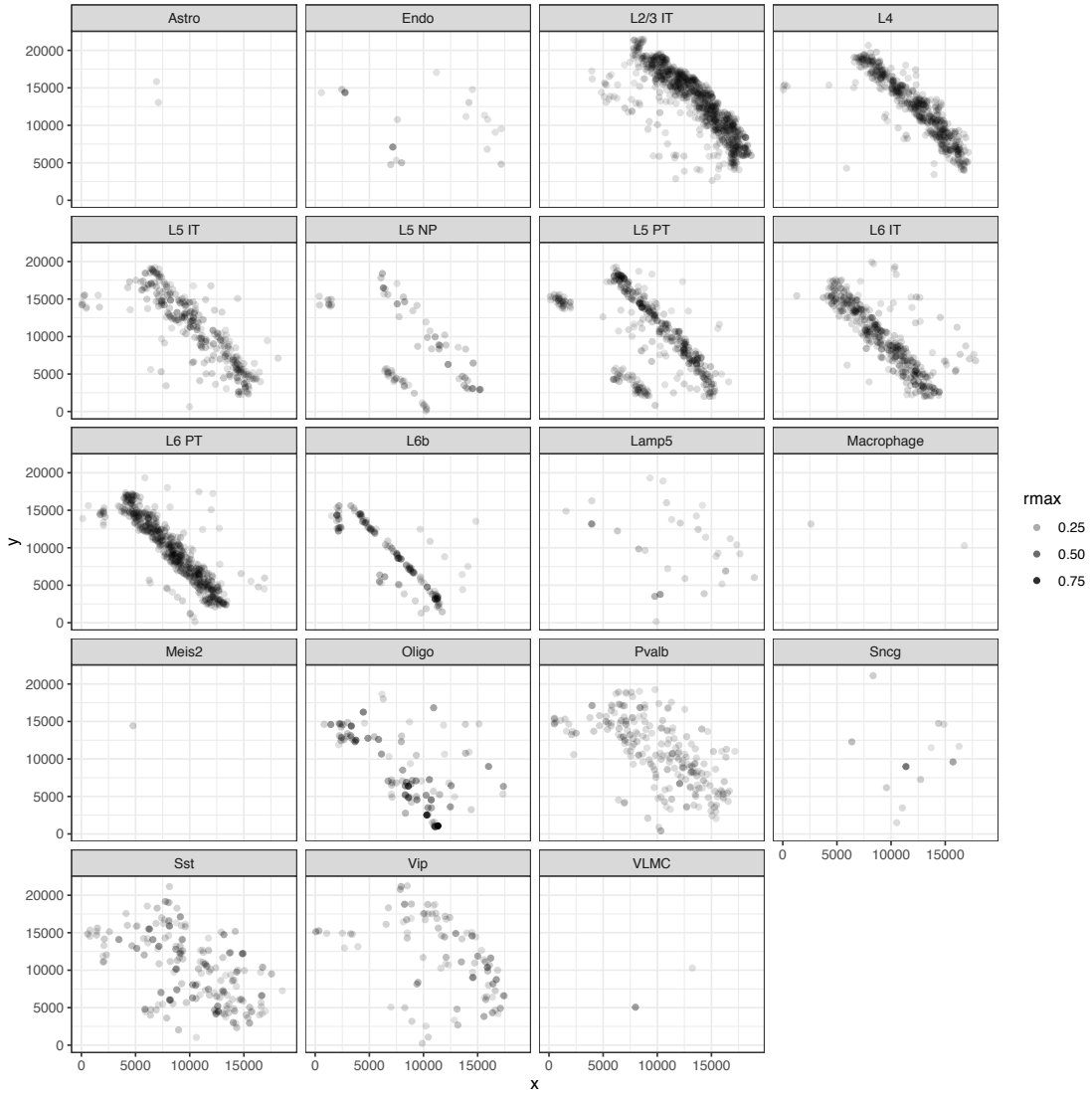
(Eesh)

Negative weighting



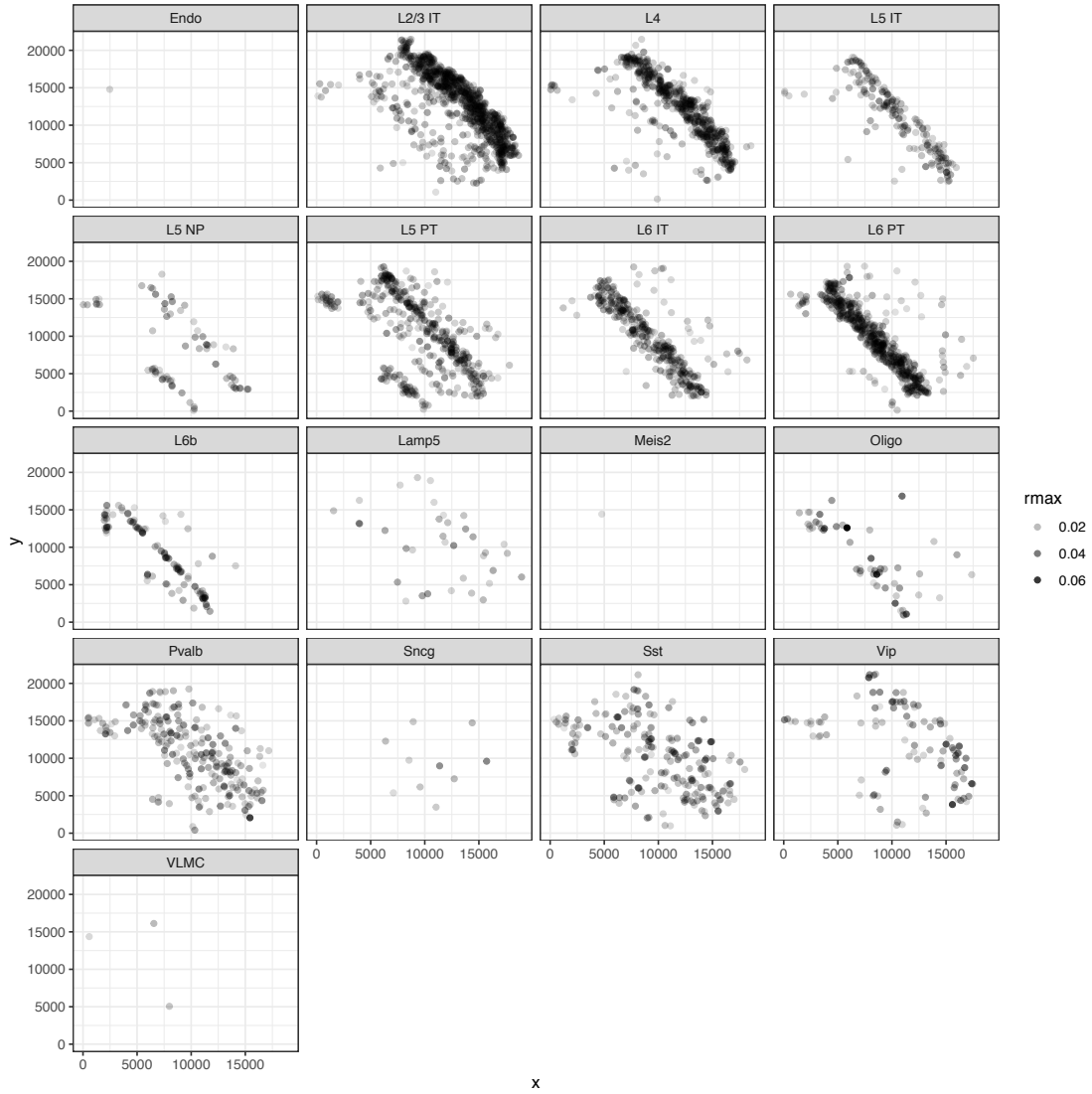
(Renee)

Geometric mean



(Eesh & Charles)

JS divergence

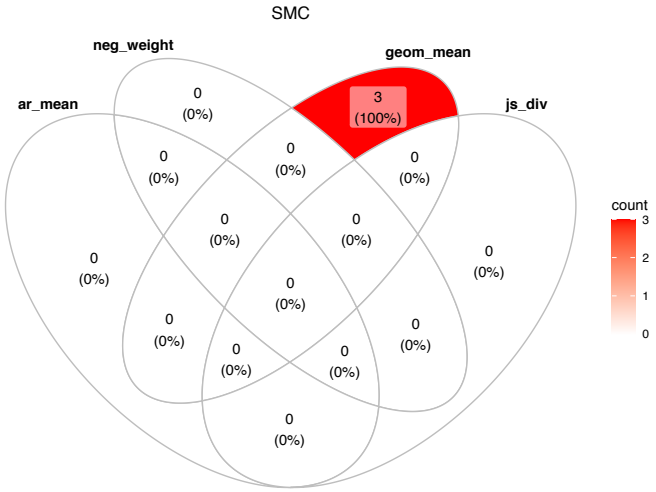


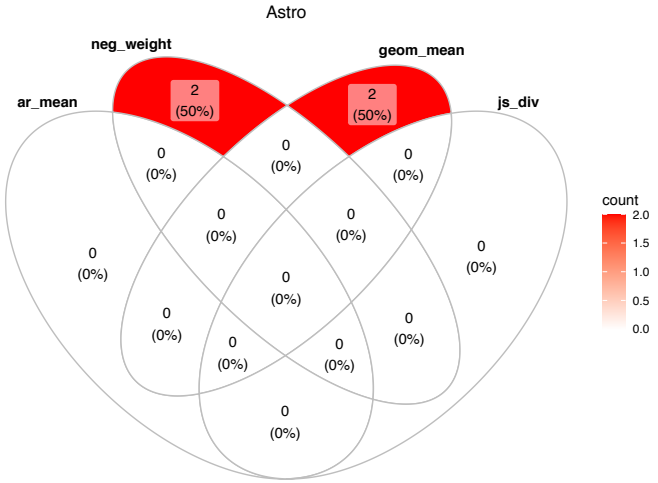
(Eesh & Charles)

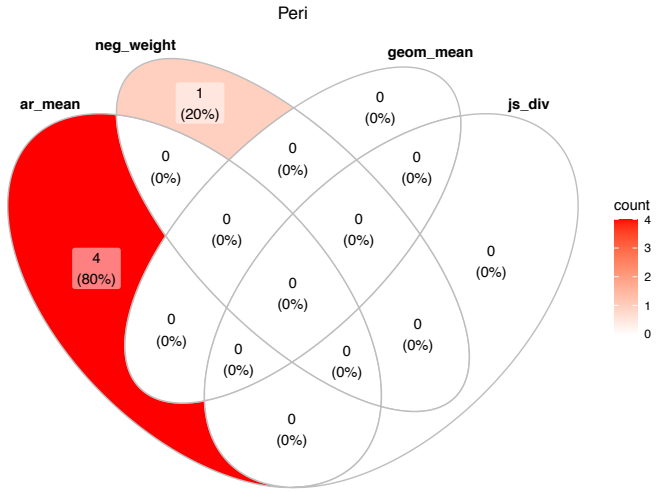
Number of cells mapped to each subclass

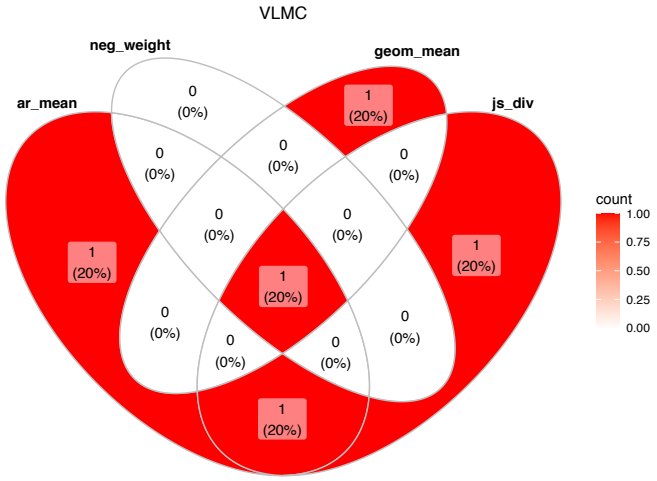
subclass	n_ar_mean	n_neg_weight	n_geom_mean	n_js_div
CR	0	0	0	0
SMC	0	0	0	0
Astro	0	2	2	0
Peri	2	1	0	0
Meis2	3	3	1	1
VLMC	3	1	2	3
Endo	6	7	19	1
Macrophage	6	3	2	0
Sncg	13	13	12	10
Lamp5	17	30	32	37
Oligo	86	72	96	52
Vip	90	91	92	100
L5 NP	92	109	76	71
L6b	102	91	114	96
L5 IT	186	212	270	168
Sst	202	188	188	202
Pvalb	211	208	218	219
L4	271	460	474	494
L6 IT	403	383	358	311
L6 PT	507	557	508	521
L5 PT	609	272	327	400
L2/3 IT	727	833	745	850

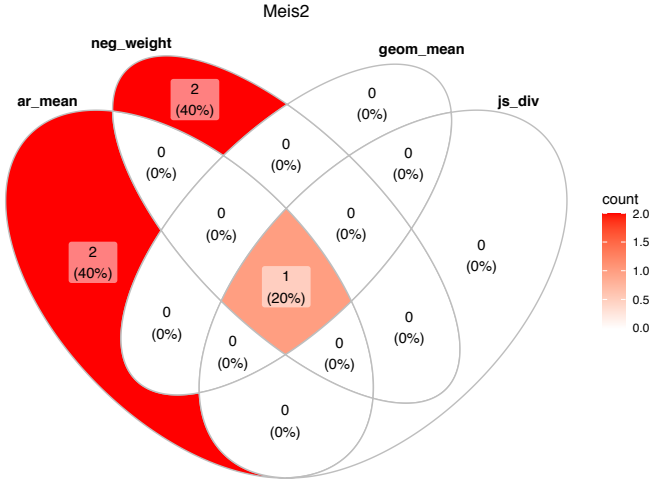
Nearly no agreement on rare cell type callings

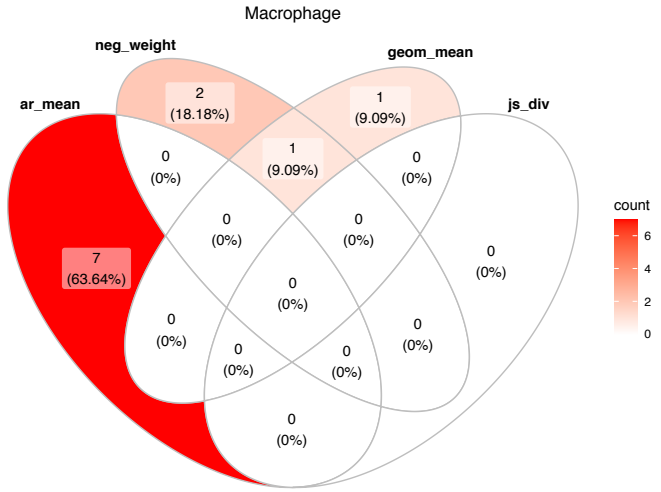




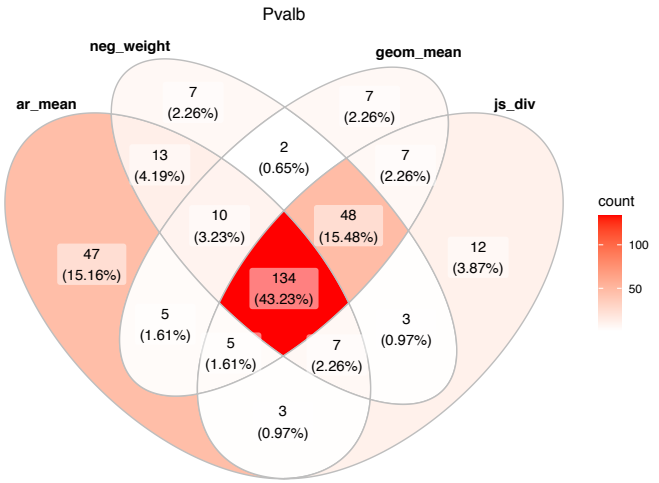


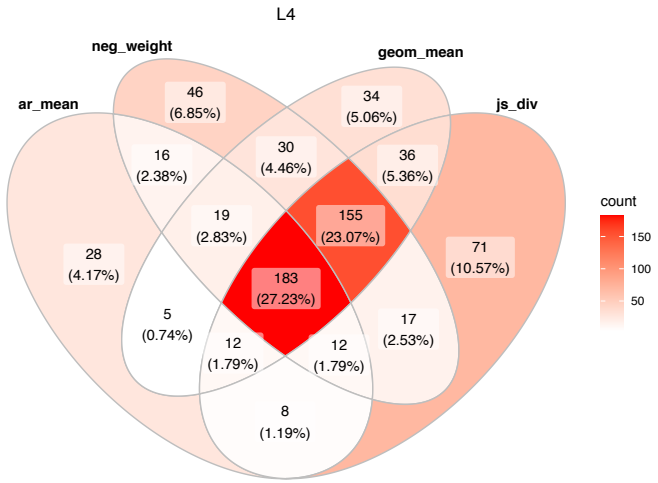


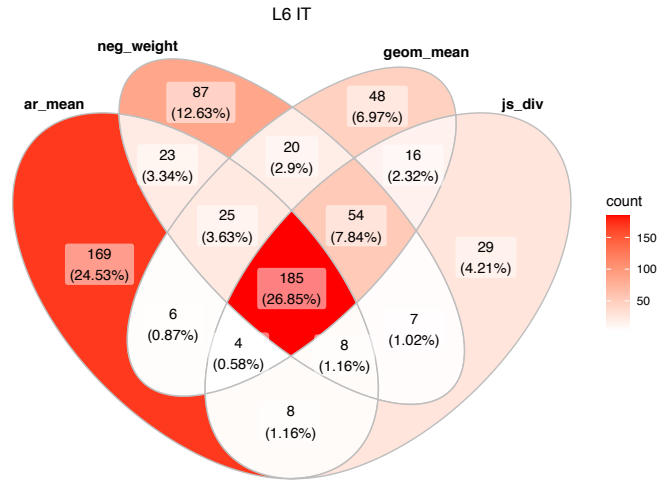


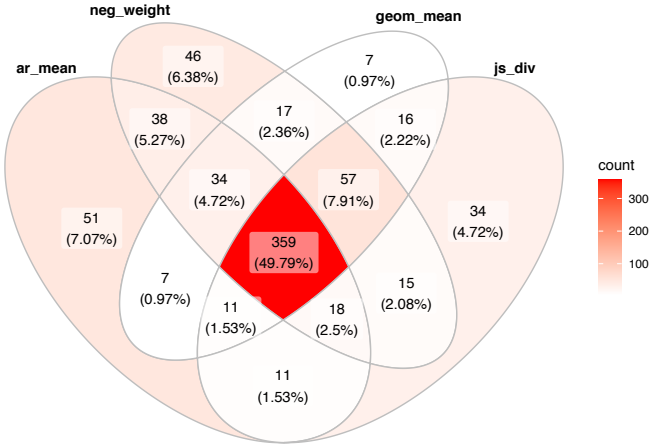


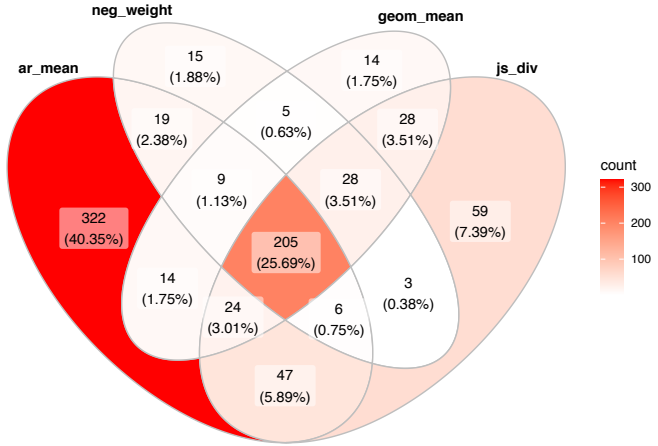
More agreement on abundant cell types

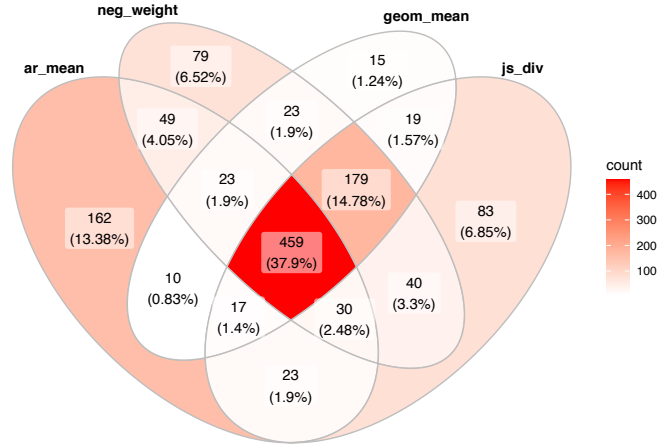












Qualitative agreement measure

- Cohen's/Fleiss's Kappa: inter-rater reliability measure for categorical data between two/multiple raters
- For subclass types, Fleiss's Kappa = 0.7022774

```
> pairwise_agreement(df_subclass, cols=cols)
             ar_mean neg_weight geom_mean    js_div
ar_mean    1.0000000  0.6244072 0.6266478 0.6031913
neg_weight 0.6244072  1.0000000 0.8132597 0.7648112
geom_mean  0.6266478  0.8132597 1.0000000 0.7842830
js_div     0.6031913  0.7648112 0.7842830 1.0000000
```

- For broad class types, Fleiss's Kappa = 0.8051847

```
> pairwise_agreement(df_class, cols=cols)
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ar_mean    1.0000000  0.7093764 0.7140030 0.7018781
neg_weight 0.7093764  1.0000000 0.9122499 0.9150444
geom_mean  0.7140030  0.9122499 1.0000000 0.8799261
js_div     0.7018781  0.9150444 0.8799261 1.0000000
```