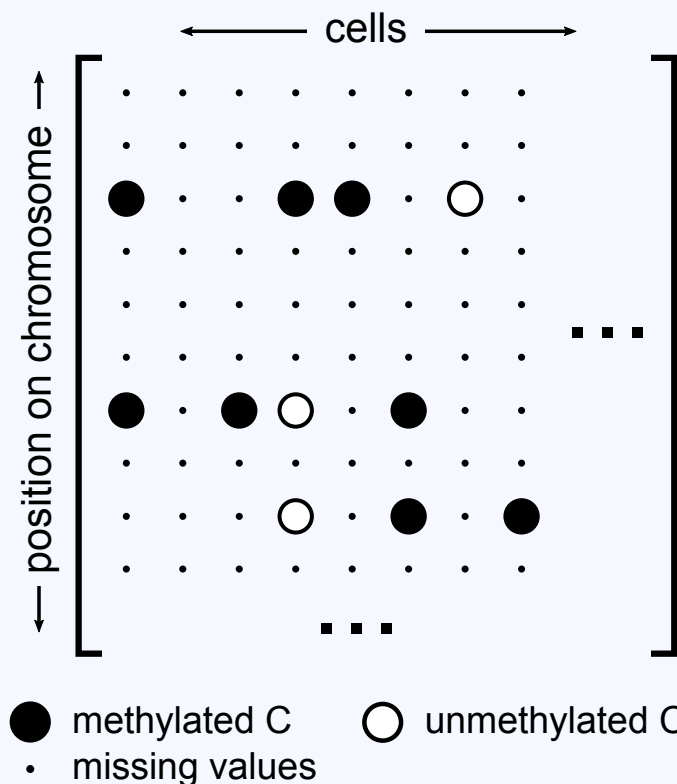


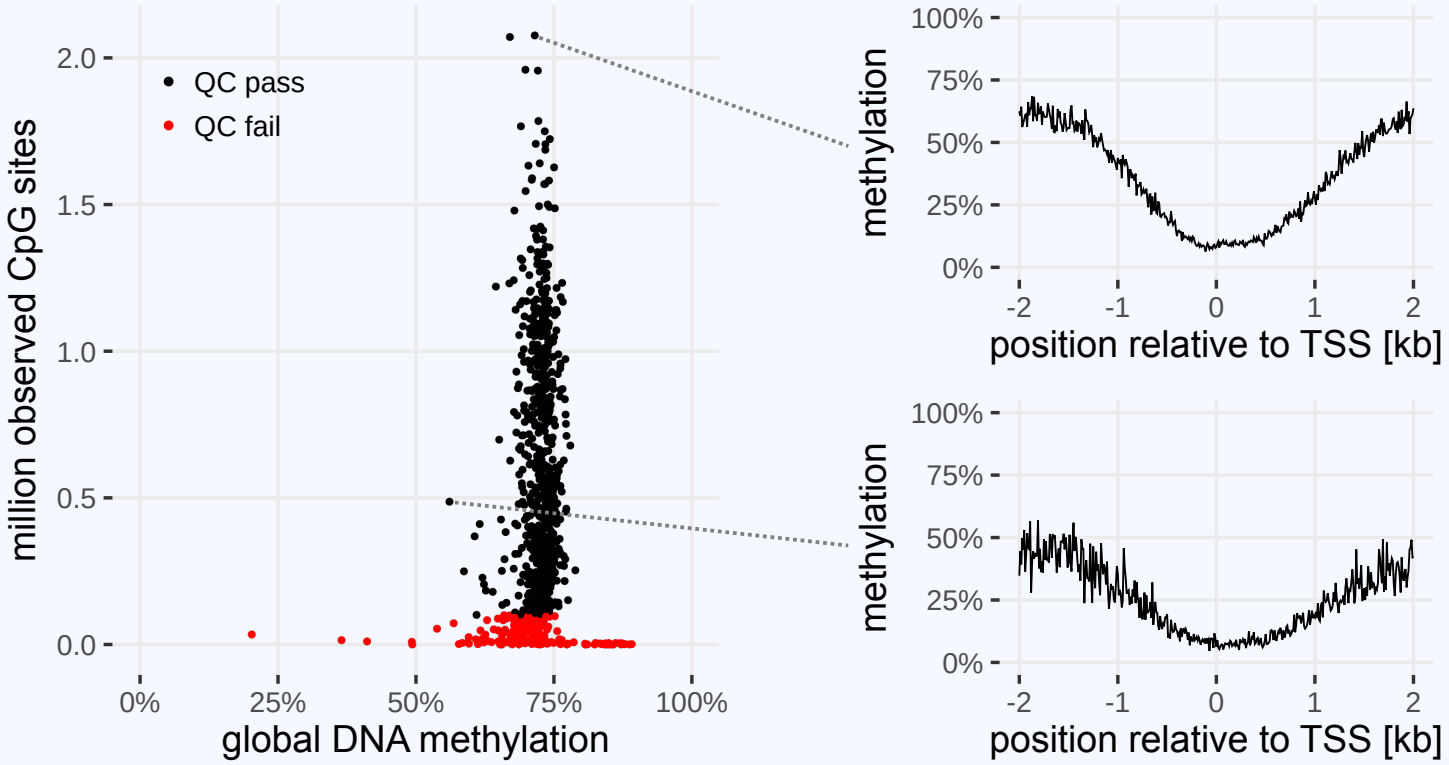
methylation files

chrom	position	meth
chr1	1015303	●
chr1	1015314	●
chr1	1015319	●
chr1	1016521	○
chr1	1016533	○
chr1	1017587	●
chr1	1017589	○
chr1	1017611	●
chr1	1022010	●
chr1	1022019	○
...		

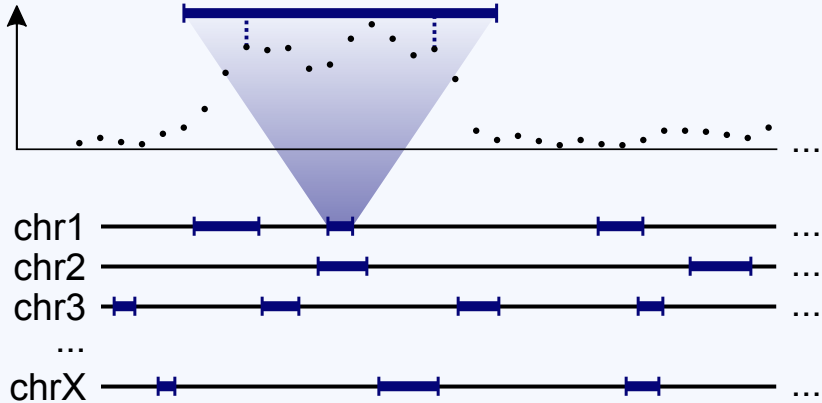
compressed storage  
of sparse data



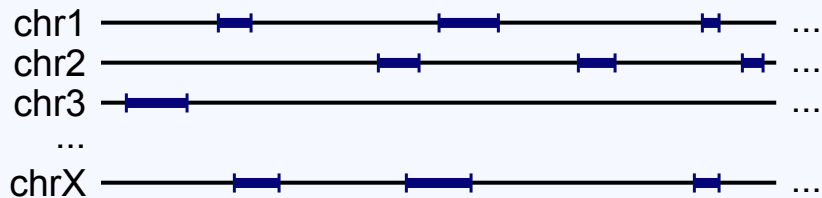
quality control



VMR discovery



or provide  
regions of interest



methylation matrix

	region 1	region 2	...	region M
cell 1	11%	88%	...	45%
cell 2	8%	92%	...	NA
cell 3	25%	NA	...	33%
...	...	...	...	...
cell N	0%	88%	...	42%

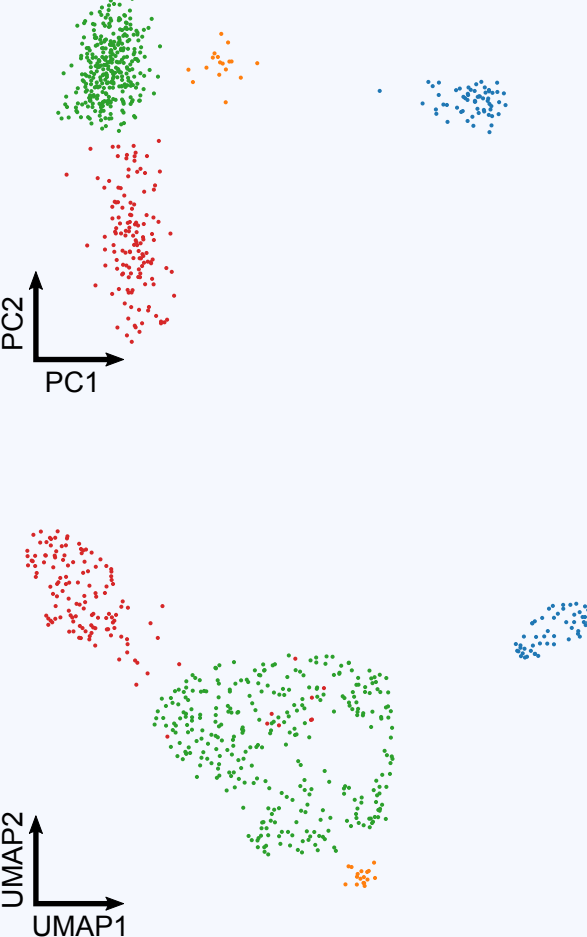
methylation %

&

	region 1	region 2	...	region M
cell 1	-0.012	-0.041	...	+0.429
cell 2	-0.142	+0.136	...	NA
cell 3	+0.242	NA	...	-0.182
...	...	...	...	...
cell N	-0.543	+0.057	...	+0.018

shrunk mean of the residuals

downstream analysis



DMR discovery

