

Parameter tuning of the randomized SVD algorithms

Here, we perform parameter tuning of the randomized SVD algorithms examined, including Halko's method and algorithm971 [107-109]. These algorithms commonly use the preconditioning process called *power iteration*. This step sharpens the distribution of eigenvalues and enforces a more rapid decay of the singular values ([111] and **Additional file 2**).

We found that the number of iterations (*niter*) is critical to accuracy and at least three or more values are needed (**Figure S18-1 and 2**). Accordingly, for all randomized SVD implementations mentioned in the main manuscript, a value of 3 was used for the *niter* parameter.

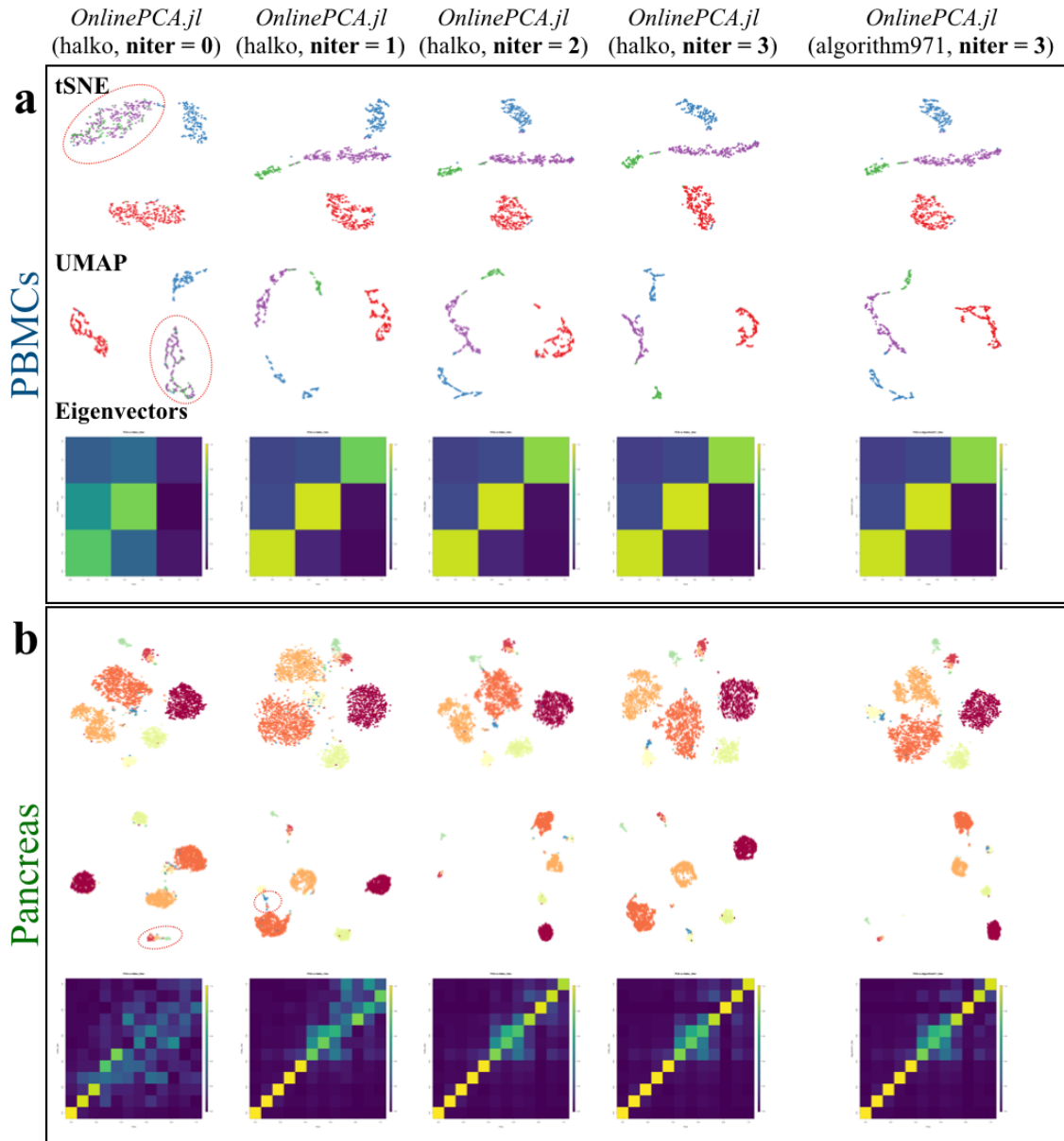


Figure S18-1 | Parameter tuning of Halko's method and algorithm971 (OnlinePCA.jl) (PBMCs and Pancreas datasets) The *niter* parameter was set at integer values from 0 to 3; the t-SNE appearance and cross-product plot used in the main manuscript were confirmed.

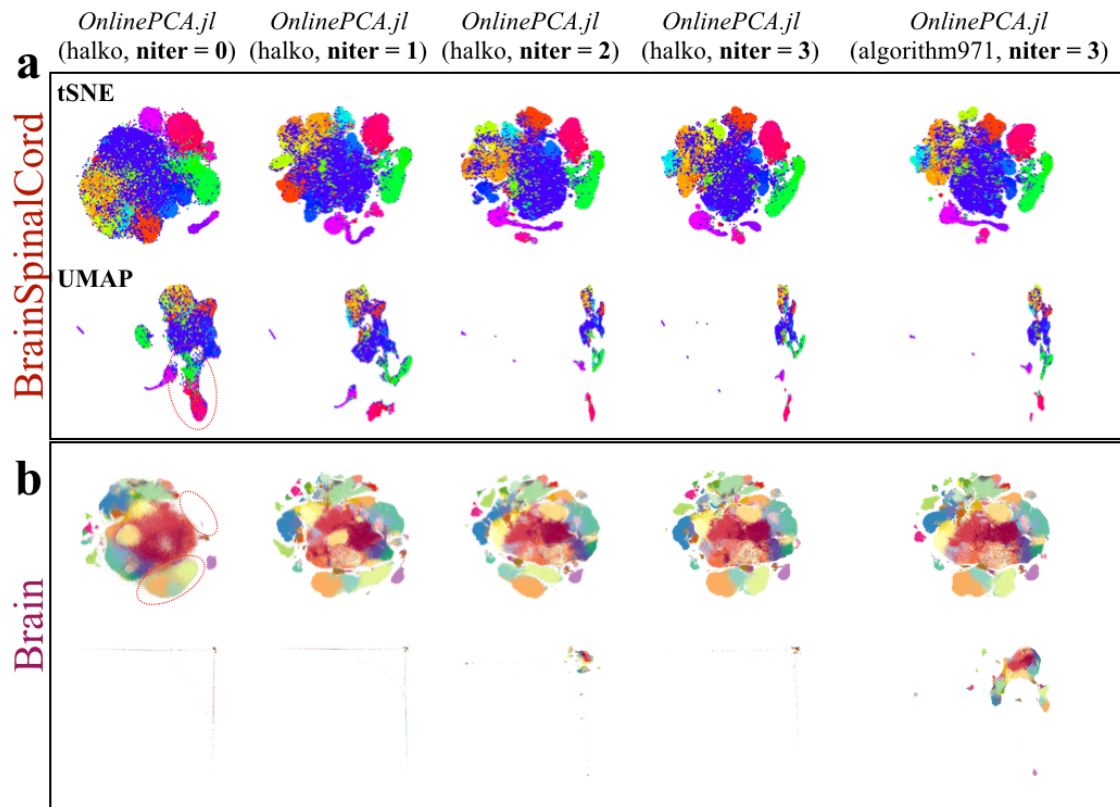


Figure S18-2 | Parameter tuning of Halko's method and algorithm971 (OnlinePCA.jl) (BrainSpinalCord and Brain datasets) The *niter* parameter was set at integer values from 0 to 3; the t-SNE appearance and cross-product plot used in the main manuscript were confirmed.