

Below, we provide links to tutorials for various methods. In general, if a method offers tutorials for multiple datasets, you should select the one most similar to your data technology and use the corresponding recommended parameters. In addition, we list below the parameters that are recommended to be prioritized for tuning.

PASTE

<https://github.com/raphael-group/paste/blob/main/docs/source/notebooks/getting-started.ipynb>

When using the `pst.pairwise_align()` function, you can try varying levels of alpha (e.g., $\alpha = 0.1$, 0.01 , 0.001), or use the `G_init` parameter (pre-computed using `pst.match_spots_using_spatial_heuristic`) to find an initial mapping. This is because PASTE may sometimes become stuck in a local minimum during convergence, depending on the initialization.

PASTE2

<https://github.com/raphael-group/paste2/blob/main/tutorial.ipynb>

When using `PASTE2.partial_pairwise_align()`, you can try varying levels of alpha (similar to PASTE), or adjust the parameter 's', which represents the approximate overlap percentage between the two slices.

STAligner

<https://staligner.readthedocs.io/en/latest/>

During preprocessing, when calling `STAligner.Cal_Spatial_Net()`, users can experiment with different values of the `rad_cutoff` parameter (e.g., 50, 100, 150) to construct an appropriate spatial network. Subsequently, in the `STAligner.train_STAligner_subgraph()` function, the parameters `knn_neigh` and `n_epochs` could be prioritized for tuning.

GPSA

https://github.com/andrewcharlesjones/spatial-alignment/blob/main/examples/grid_example.py

When running GPSA results in memory overflow, prioritize reducing the `N_EPOCHS` parameter (e.g., to 3000); however, this may lead to poorer alignment performance.

SLAT

<https://slat.readthedocs.io/en/latest/tutorials.html>

During preprocessing, when using the `Cal_Spatial_Net` function, users are recommended to test different values of the `k_cutoff` parameter depending on the specific dataset to construct an appropriate spatial network. When running the `run_SLAT` function, the `LGCN_layer` parameter could be prioritized for tuning (e.g., testing values of 5 or 6).

STalign

<https://jef.works/STalign/tutorials.html>

Regarding the parameter selection for the STalign method, you can refer to the author's reply in this post to choose appropriate values for sigmaM, sigmaA, and sigmaB(<https://github.com/JEFworks-Lab/STalign/issues/19>).

CAST

<https://cast-tutorial.readthedocs.io/en/latest/>

Please refer to the parameter explanation page in the CAST tutorial for detailed descriptions of various parameters.

(https://cast-tutorial.readthedocs.io/en/latest/notebooks/demo2_CAST_Stack_Align_S4_to_S1.html)

STAIR

<https://stair-tutorial.readthedocs.io/en/latest/STAIR-Tutorial.html>

During clustering, please adjust the parameter cluster_num (i.e., the number of clusters) in cluster_func() based on the characteristics of your data. Additionally, we recommend prioritizing the tuning of the alpha value in the loc_align.detect_fine_points() function, with suggested values of 70 and 500.

SPACEL

<https://spacel.readthedocs.io/en/latest/>

We recommend prioritizing the tuning of the n_neighbors and p parameters in the Scube.align() function. The n_neighbors affect how much neighbors are considered when calculate similarity of two slices. p affects the exponent of overlap penalty, and a larger p means stronger partial alignment capability.

Spateo

<https://spateo-release.readthedocs.io/en/latest/tutorials/index.html>

The tutorials in Spateo provide a very detailed and comprehensive guide to parameter tuning. We strongly recommend that users follow these tutorials for testing and optimization.

SANTO

<https://github.com/leihouyeung/SANTO/blob/main/SANTO.ipynb>

We recommend prioritizing the tuning of the following four parameters: args.epochs (suggested values: 20 or 40), args.lr (suggested values: 0.01 or 0.001), args.k (suggested values: 5, 10, or 20), and args.alpha (suggested values: 0.1 or 0.9). The SANTO tutorial provides guidance for datasets from three distinct technological platforms, users are advised to select the tutorial and corresponding parameter configuration that most closely matches their own data acquisition technology.