t-SNE vs di-SNE

Partners: Nimrit Kaur (A16864390), Kathryn Chen (A16828890), Tanvi Jain (A16832726)

A brief description of the tool you would like to build and which tool from labs you will compare to. Include how you plan to implement your tool (e.g. python script, R package, etc.) (4 pts)

- We will be implementing a tool (di-SNE) to perform a t-SNE (t-distributed stochastic neighbor embedding) algorithm to visualize the results of clustering and create a t-SNE plot, similar to what we did in Lab 6.
- We will be implementing the tool in a python script.
- We will benchmark our tool against Scanpy, which we used in Lab 6.

A brief description of your plan to benchmark your tool. (3 pts)

- To benchmark our tool, we will visually compare the t-SNE plot outputs on the dataset we pick to the output we get using Scanpy, and will also be comparing the memory/time/CPU requirements.
- t-SNE also has different parameters required by the user to run the algorithm, so we will be playing around with them and benchmarking the outputs.

A brief description and link to the public dataset you plan to apply your tool to. (3 pts)

- We aimed to choose datasets that have at most 2 treatment groups so that t-SNE plots will show cell type heterogeneity. We also chose datasets that are not too small or too big (around 500-800 Mb) so that comparing runtimes and memory will not be too tedious.
- We narrowed it down to these two scRNA-seq datasets found on Gene Expression Omnibus (GEO), but have not yet decided which we will use for the final tests:
  - Therapeutic radiation drives leptomeningeal dissemination of medulloblastoma
    - Data consists of cerebellar tumors from SmoA1 mice treated with radiation, collected at 5h and 24h after treatment, and compared to sham-radiated controls by single cell RNA sequencing
    - https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE266048
  - Gene expression profile at single cell level of xenograft tumors
    - Data consists of scRNA-seq of xenograft tumors developed by presc cells with Crebbp WT and KO injected on the back of nude mice.
    - https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE202311