

CMBB – ASSIGNMENT 2

M.Tech. (CS), Second Year, 2024–2025

Deadline: September 15, 2024

Total: 5 marks

SUBMISSION INSTRUCTIONS

1. Submit all the solutions in a single file.
2. Naming convention for your submission file (assuming CS23xx is your roll number): CS23xx-assign2 (.rtf, .docx, .doc, .pdf, .tex, etc.).
3. To submit a solution file (say CS23xx-assign2.pdf), ensure that it is not password protected and mail to <assignisik@gmail.com> with the subject line as follows: CMBB M.Tech. (CS) 2023-25 CS23xx Assignment 2.

NOTE: All the solutions must be self-sufficient and to the point.

Q1. A recent study has reported a single-cell transcriptomic atlas of six different brain regions in the aged human brain, covering 1.3 million cells from 283 post-mortem human brain samples across 48 individuals with and without Alzheimer’s disease [1]. Access the data and identify the important genes (or pair/trio of genes) by performing any standard measures of differential expression, differential co-expression, and co-expression dynamics [2].

[1] H. Mathys, C. A. Boix, L. A. Akay, Z. Xia, J. Davila-Velderrain, A. P. Ng, X. Jiang, G. Abdelhady, K. Galani, J. Mantero and N. Band, Single-cell multiregion dissection of Alzheimer’s disease. *Nature*, 632(8026):858-868, 2024, DOI: <https://doi.org/10.1038/s41586-024-07606-7>.

[2] https://compbio.mit.edu/ad_multiregion