Sparse Sparse Matrix Multiplication - Deadline 12 Apr 2024

There are different formats for representing sparse matrices, such as COO, CSR, and CSC. Therefore, there are different algorithms to compute linear algebra operators on them.
This task focuses on Sparse Sparse Matrix Multiplication (SpSpMM).
A sample code has been provided containing the baseline implementation of SpSpMM. Do the following and send a **report** alongside your **implementation**:

1. Benchmark the baseline with SciPy and TACO
    1.1. Implement SpSpMM in SciPy, using the CSR format for each matrix.
    1.2. Implement SpSpMM in TACO, using the CSR format for each matrix.
    1.3. Benchmark those three implementations for different sparsity factors and dimensions, based on computation time. Create four plots as follows:
        - High dimension, different sparsity levels
        - Low dimension, different sparsity levels
        - High sparsity, different dimensions
        - Low sparsity, different dimensions

    For TACO, you must time both the 'assemble()' and 'compute()' functions.
2. Is there any possible optimization for the baseline implementation to improve runtime performance on a single CPU?
    - If yes, implement it and benchmark its performance (same as task 1).
    - If no, briefly explain your reasoning.
    - If you find more than one possible optimization, implement one and list the others with a short explanation.
3. Parallelize the baseline implementation and benchmark computation times.