Q5

Except for the COO, CSR, CSC format we discussed in class, there are so many other formats of sparse matrix that are helpful for the reduction of matrix storage and multiplication. Here I will discuss some other formats.

Block Compressed Row Storage (BCRS)
This format is a little similar to the optimization of blocking algorithms. We partial the whole sparse matrix into several blocks. Let nb be the dimension of each block. Similar to CRS format, we also use 3 arrays to store all the useful information of the matrix. This format has more savings than CRS for matrices with a large nb.

Compressed Diagonal Storage (CDS)
If a matrix is banded with bandwidth that is fairly constant from row to row, then we could use the CDS format, which is to store sub diagonals of the matrix in consecutive locations. By using this format, we could pack the nonzero elements in to make the matrix-vector product more efficient.

Jagged Diagonal Storage (JDS)
Like the Compressed Diagonal format, Jagged Diagonal Storage gives a vector length essentially of the size of the matrix. So, It is more space-efficient than CDS at the cost of a gather/scatter operation.

Skyline Storage (SKS)
The SKS format could be used for handling the diagonal blocks in block matrix factorization methods. A major advantage of solving linear systems having skyline coefficient matrices is that when pivoting is not necessary, the skyline structure is preserved during Gaussian elimination.

References

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