Module 6 - Discussion Prompt Questions
Adam Rich
Section EN.605.202.87
Spring 2018

1. What are some scenarios in which you are likely to encounter a sparse matrix?

   When studying the relationship between the coincidence of two factors that infrequently are coincident, like first name and brand of car owned, for example

   How about people versus the number of cars owned of a particular brand? Most people only own a few cars and there are more than 20+ makes of cars so the matrix would be at least 95% zeros.

2. Why is it important to select the right data structure for storing and manipulating sparse matrices? What are the important factors to consider?

   One should consider whether row or column operations are important, or just row or just column
   Whether matrix multiplication will be needed
   How often data needs to be accessed randomly, or sequentially

3. What are the pros and cons of using a linked implementation of a sparse matrix, as opposed to an array-based implementation?

   A linked implementation can get quite complicated or require a lot of scanning to find the right data. It depends on what you are trying to do, but if you wanted to be able to find stuff quickly then you might need to have each row and column represented as a doubly-linked list.

   The linked implementation is going to be more space efficient than just storing all the zeros in a proper matrix.

   I don't think we discussed array implementations in the lectures, but I can think of different ways to do it. One could be where you have an array of ordered triples where the first two elements in the triple give the row and column and the third the value. Another way would be to just have a huge array or matrix and store all the zeros.

   The first way is O(N/2), which is really just O(N), to find any random value, but it is more efficient than a true array, and may be easier conceptually than the linked spaghetti of a doubly-linked circular implementation. The least space efficient option makes for really fast random access.