It is well known that the set of edges of a graph with $v$ vertices, where we label the vertices $1, 2, \ldots, v$, can be represented by a $v \times v$ matrix $E$, where $E_{i,j}$ is 1 if there is an edge from vertex $i$ to vertex $j$, and 0 otherwise. Further well known is that there is a path of length $n$ from vertex $i$ to vertex $j$ if $E_{i,j}^n$ is non-zero; the number represents the number of distinct paths from $i$ to $j$.

Here we describe a process for actually storing the paths rather than just counting them, using a matrix which contains lists of linked lists rather than numbers. We describe the modified matrix, give a couple of examples of choices for the implementation details, and describe how the algorithm can be modified for some specific cases where certain types of paths are required. In particular, we will work with non-looping paths so that the maximum length of any path is predetermined.