

Assume set #1 has m vertices; and
Assume set #2 has n vertices; and
The number of edges in the graph is e .

1. Yes, there is an improvement in memory usage. An adjacency matrix will use $\Theta(m * n)$ memory. This is a great improvement than the graph not known to be bipartite, because such a matrix will need $\Theta((m+n)^2) = \Theta(m^2 + n^2 + 2mn)$ memory. Knowing the bipartite property saved us about $\Theta(m^2 + n^2 + mn)$ memory space.

2. No, there is no improvement in memory usage. Since an adjacency list only stores the edge that is present in the graph; and for if there is no edge between two vertices, whether they are allow to be connected or not, need no memory. So the bipartite property in the graph does not change the implementation of the adjacency list. We still need $\Theta(m+n+e)$ memory to implement the adjacency list.