CS/SE 2XC3 Lab 8 Report

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This report includes the main observations that we found in this week's lab, along with the analysis of our results.

1 Prim's Algorithm

In this section, we discuss Prim's algorithm for finding the minimum spanning tree.

1.1 Prim's Algorithm Version 1

Explanation of how algorithm works and its time complexity

1.2 List vs. Min Heap

The most expensive functions in the implementation of Prim's algorithm are finding and updating the weight of the minimum edge. Our first implementation uses a list of edges that are sorted by weight. The algorithm re-sorts this list for every edge visited. Our second implementation uses a heap of nodes that are sorted by edge weight. The algorithm calls `build_heap()` at the beginning of its visitation to each node. The Python `sort()` function has a similar time complexity to `build_heap()`, $O(nlogn)$.

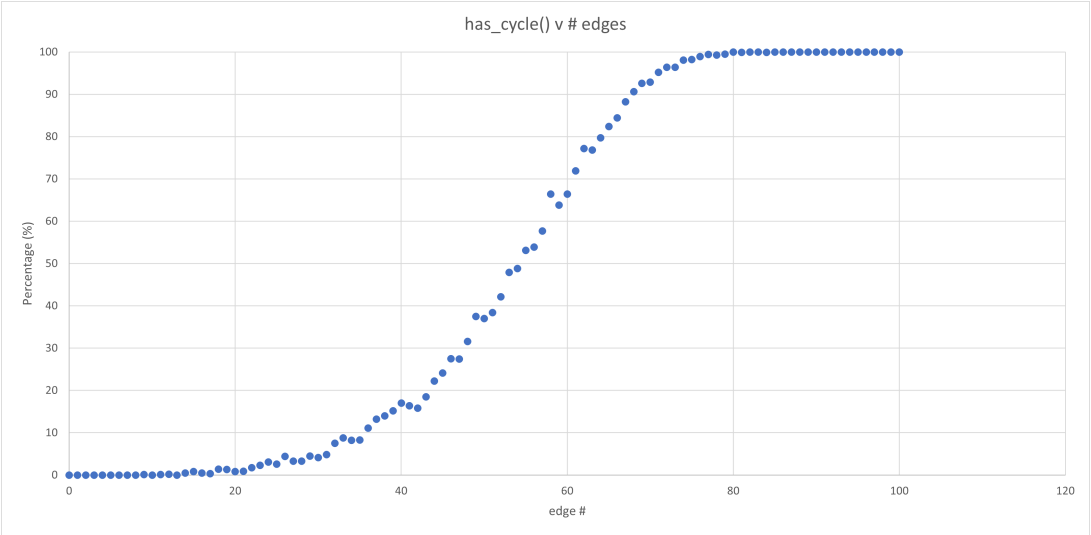

Figure 1: time complexity of prim v1 vs. prim v2

As shown in the graph above, ...