Greedy Algorithm: Supplemental Notes

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1 Analysis of Prim's MST Algorithm

(For the analysis of Kruskal's MST Algorithm, consult chapter 5 of DPV.)
Time complexity - $\Theta(V \cdot T_{EXTRACT-MIN} + T \cdot T_{DECREASE-KEY})$

Table 1: Analysis of Prim's MST Algorithm

Queue	$T_{EXTRACT-MIN}$	$T_{DECREASE-KEY}$	Total
Unsorted array	$O(V)$	$O(1)$	$O(V^2)$
Binary Heap	$O(lgV)$	$O(lgV)$	$O(ElgV)$
Fibonacci Heap	$O(lgV)_{amortized}$	$O(1)_{amortized}$	$O(VlgV + E)_{worst}$

For dense graphs, unsorted array is better than binary heap. For sparse graphs, binary heap is better than unsorted array.