Problem 2146: K Highest Ranked Items Within a Price Range

Problem Information

Difficulty: Medium
Acceptance Rate: 45.88%
Paid Only: No
Tags: Array, Breadth-First Search, Sorting, Heap (Priority Queue), Matrix

Problem Description

You are given a **0-indexed** 2D integer array `grid` of size `m x n` that represents a map of the items in a shop. The integers in the grid represent the following:

* `0` represents a wall that you cannot pass through. * `1` represents an empty cell that you can freely move to and from. * All other positive integers represent the price of an item in that cell. You may also freely move to and from these item cells.

It takes `1` step to travel between adjacent grid cells.

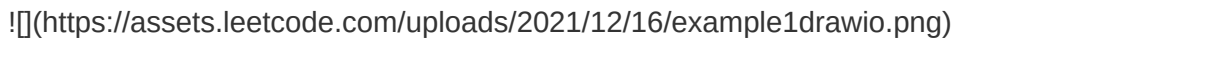
You are also given integer arrays `pricing` and `start` where `pricing = [low, high]` and `start = [row, col]` indicates that you start at the position `(row, col)` and are interested only in items with a price in the range of `[low, high]` (**inclusive**). You are further given an integer `k`.

You are interested in the **positions** of the `k` **highest-ranked** items whose prices are **within** the given price range. The rank is determined by the **first** of these criteria that is different:

1. Distance, defined as the length of the shortest path from the `start` (**shorter** distance has a higher rank). 2. Price (**lower** price has a higher rank, but it must be **in the price range**). 3. The row number (**smaller** row number has a higher rank). 4. The column number (**smaller** column number has a higher rank).

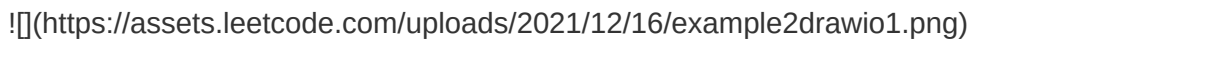
Return _the_`k` _highest-ranked items within the price range**sorted** by their rank (highest to lowest)_. If there are fewer than `k` reachable items within the price range, return _**all** of them_.

Example 1:



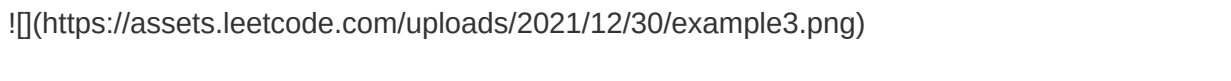
Input: grid = [[1,2,0,1],[1,3,0,1],[0,2,5,1]], pricing = [2,5], start = [0,0], k = 3 **Output:** [[0,1],[1,1],[2,1]] **Explanation:** You start at (0,0). With a price range of [2,5], we can take items from (0,1), (1,1), (2,1) and (2,2). The ranks of these items are: - (0,1) with distance 1 - (1,1) with distance 2 - (2,1) with distance 3 - (2,2) with distance 4 Thus, the 3 highest ranked items in the price range are (0,1), (1,1), and (2,1).

Example 2:



Input: grid = [[1,2,0,1],[1,3,3,1],[0,2,5,1]], pricing = [2,3], start = [2,3], k = 2 **Output:** [[2,1],[1,2]] **Explanation:** You start at (2,3). With a price range of [2,3], we can take items from (0,1), (1,1), (1,2) and (2,1). The ranks of these items are: - (2,1) with distance 2, price 2 - (1,2) with distance 2, price 3 - (1,1) with distance 3 - (0,1) with distance 4 Thus, the 2 highest ranked items in the price range are (2,1) and (1,2).

Example 3:



Input: grid = [[1,1,1],[0,0,1],[2,3,4]], pricing = [2,3], start = [0,0], k = 3 **Output:** [[2,1],[2,0]] **Explanation:** You start at (0,0). With a price range of [2,3], we can take items from (2,0) and (2,1). The ranks of these items are: - (2,1) with distance 5 - (2,0) with distance 6 Thus, the 2 highest ranked items in the price range are (2,1) and (2,0). Note that k = 3 but there are only 2 reachable items within the price range.

Constraints:

* `m == grid.length` * `n == grid[i].length` * `1 <= m, n <= 105` * `1 <= m * n <= 105` * `0 <= grid[i][j] <= 105` * `pricing.length == 2` * `2 <= low <= high <= 105` * `start.length == 2` * `0 <= row <= m - 1` * `0 <= col <= n - 1` * `grid[row][col] > 0` * `1 <= k <= m * n`

Code Snippets

C++:

```
class Solution {
public:
vector<vector<int>> highestRankedKItems(vector<vector<int>>& grid,
vector<int>& pricing, vector<int>& start, int k) {

}
};
```

Java:

```
class Solution {
public List<List<Integer>> highestRankedKItems(int[][] grid, int[] pricing,
int[] start, int k) {

}
}
```

Python3:

```
class Solution:
def highestRankedKItems(self, grid: List[List[int]], pricing: List[int],
start: List[int], k: int) -> List[List[int]]:
```