**Time Complexity:**

* **Initialization:** Initializing thematrices takes constant time and is proportional to *O*(*n*+*m*).
* **Fill in the Score Matrix:** Filling in the score matrix has nested loops. The time complexity is *O*(*n*⋅*m*), where *n* is the length of sequence *a* and *m* is the length of sequence *b*.
* **Traceback:** Reconstructing the alignment in the traceback also takes *O*(*n*+*m*) time.

*Overall Time Complexity:* The dominant factor in the time complexity is the filling in of the score matrix, leading to an overall time complexity of *O*(*n*⋅*m*).

**Description:**

First step is to initialize the score and traceback matrices.

Then, fill in the score matrix by iterating through the matrx, calculating scores for diagonal, left, and up movements and choosing the maximum score for each cell.

The traceback matrix is used to reconstruct the optimal alignment of the input sequences. Starting from the bottom-right corner of the matrices, the algorithm backtracks by following the direction indicated by the maximum scores. Aligned sequences are built step by step, considering diagonal, up, and left.

The final aligned sequences (**aligned\_string1** and **aligned\_string2**) and the total alignment score are returned.