Space Engineering - Assignment 1

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Part A:

We have 2 images of stars, one large containing about 100-200 stars and one small containing about 10-20 stars, and we need to find a match between them.

Our algorithm will operate in several steps and will use the Hungarian algorithm. In general, the algorithm tries to find the best matching pairs of stars in both images by comparing their characteristics:

1. Finding the coordinates of the stars in each image.
2. Creating a distance matrix of the stars in both images.
3. Using the Hungarian algorithm on the distance matrix:
    - 3.1 Creating a matrix of the same size as the distance matrix, where each value in the new matrix is either 0 or 1 depending on whether the corresponding element in the distance matrix is part of the matching or not.
    - 3.2 Finding the row and column with the lowest sum of distances between values that are not part of the match and adding the corresponding element to the matching list and marking 1 in the corresponding place in the matrix.
    - 3.3 Creating a group of rows and columns that are not part of the matching and have at least one 0 in the corresponding row or column from step 3.1.
    - 3.4 Repeating steps 3.3 and 3.2 until no more matches are found.
4. Create a list of matching star pairs by iterating through the row and column indices of the optimal matching and appending a tuple of corresponding stars from the first and second images to the list.