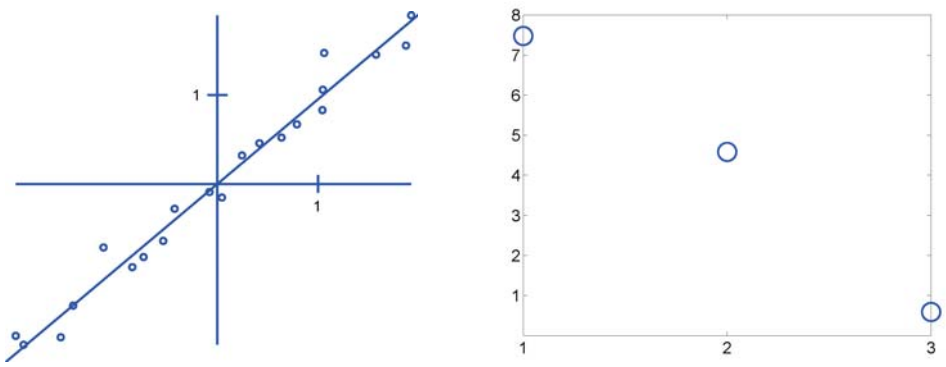

Figure 11.7: Left: the same point set as in Figure 11.3 after a H-normalization. This figure also shows the line that is estimated by algebraic minimization based on the homogeneous method. Right: the singular values of the corresponding data matrix.

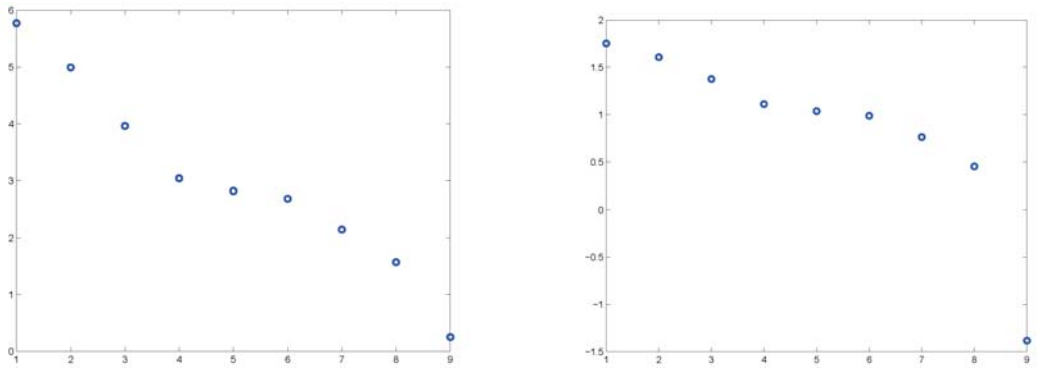

Figure 11.8: The SVD profile corresponding to the points in Figure 11.4 after H-normalization. To the right on a logarithmic scale.

scale for algebraic errors, this increase does not mean that the estimated line is worse in this case, we are simply minimizing a different algebraic error this time. The estimated line is shown in Figure 11.7, left. Comparing this line to the one this is estimated from the original dataset in Figure 11.3, left, we see that they are almost identical, although represented in two different coordinate systems. Hence, for this particular example, the gain of applying H-normalization is mainly in a less ambiguous SVD profile than obtaining a better estimate.

This is not the situation when we apply H-normalization to the data presented in Figure 11.4, from which a homography is estimated. In this case the normalization implies that each of the two subsets, before and after the homography transformation, are treated separately: each subset is H-normalized independent of the other. The normalized datasets produce a new data matrix with an SVD profile illustrated in Figure 11.8, left, and to the right on a logarithmic scale. First, we see that the ambiguity of the SVD profile has decreased since there is now only one singular values that is much smaller than the other, instead of three. Second, when H-normalization is applied to the dataset, $\mathbf{H}_9$, the homography corresponding to the smallest singular value σ_9, has approximately half the geometric error compared to $\mathbf{H}_9$ derived from the original data. This is illustrated in Figure 11.9 showing the same type plot as in Figure 11.6 but now for $\mathbf{H}_9$ derived from the normalized data. Third, for the original dataset it was the case that $\mathbf{H}_8$, the homography corresponding to the second smallest singular value, in fact gave a smaller geometric error than $\mathbf{H}_9$ did. For the normalized data, however, $\mathbf{H}_8$, has a geometric error that is very much larger than for $\mathbf{H}_9$, and does not represent a useful estimate for the normalized dataset.