

3D Geometry for Computer Graphics - Exercise 4

19/04/2004

1. Following slide #27 – “Finding the LS solution”. Given matrix $A \in \mathbb{R}^{n \times k}$, $n \geq k$. Prove that if A has full rank (i.e., the columns of A are linearly independent) then the matrix $A^T A$ is invertible.
2. By now we have learned two techniques to fit a linear subspace to a given set of points in \mathbb{R}^n (to fit a line to a set of points in the plane, to fit a plane to a set of points in \mathbb{R}^3 , etc.). The first technique was PCA and the second was least-squares fit. Explain the difference between the two methods, in terms of the error they minimize (and hence the output they produce) and in terms of the computational effort.