## Singular value decomposition and its applications on 3D models reconstruction

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## Abstract

This study focuses on some issues from the theory of structure from motion which deal with the recovery of 3D structure from 2D images taken in different ways (or places); in particular we analyze the two-visual geometry, essentially based on an algorithm called the *eight-point algorithm*, which allows us to start from a set of correspondence points in order to obtain the projection matrices and the 3D coordinates points.

The eight-point algorithm makes an extensive use of the singular value decomposition, a method which splits a matrix into two orthogonal matrices  $U \in V$  and a diagonal matrix  $\Sigma$  (whose elements are called singular values):

$$A = U\Sigma V^{\top}$$

We discuss about the main results about singular value decomposition, pointing out its strong numerical stability. Some numerical examples are given, in order to highlight the main issues associated; finally we provide some suggestions for a possible improvement of the present technique.

## References

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