This chapter describes how and to what extent the spatial layout of a scene and the cameras can be recovered from two views. Suppose that a set of image correspondences **x***i ↔* **x** *i* are given. It is assumed that these correspondences come from a set of 3D points **X***i*, which are unknown. Similarly, the position, orientation and calibration of the cameras are not known. The reconstruction ask is to find the camera matrices P and P , as well as the 3D points **X***i* such that

Este capítulo describe cómo y en qué medida se puede recuperar el diseño espacial de una escena y las cámaras desde dos vistas. Supongamos que se da un conjunto de correspondencias de imágenes xi ↔ x i. Se supone que estas correspondencias provienen de un conjunto de puntos 3D Xi, que son desconocidos. Del mismo modo, la posición, orientación y calibración de las cámaras no se conocen. La solicitud de reconstrucción es encontrar las matrices de cámara P y P, así como los puntos 3D Xi de modo que

**x***i* = P**X***i* **x** *i* = P **X***i* for all *i.*

Given too few points, this task is not possible. However, if there are sufficiently many point correspondences to allow the fundamental matrix to be computed uniquely, then the scene may be reconstructed up to a projective ambiguity. This is a very significant result, and one of the major achievements of the uncalibrated approach. The ambiguity in the reconstruction may be reduced if additional information is supplied on the cameras or scene. We describe a two-stage approach where the ambiguity is first reduced to affine, and second to metric; each stage requiring information of the appropriate class.

N-VIEW

This chapter introduces the quadrifocal tensor *Qijkl* between four views, which is the analogue of the fundamental matrix for two and the trifocal tensor for three views. The quadrifocal tensor encapsulates the relationships between imaged points and lines seen in four views. It is shown that multiple view relations may be derived directly and uniformly from the intersection properties of back-projected lines and points. From this analysis the fundamental matrix F, trifocal tensor *Tijk*, and quadrifocal tensor *Qijkl* appear in a common framework involving matrix determinants. Specific formulae are given for each of these tensors in terms of the camera matrices. We also develop general counting arguments for the degrees of freedom of the tensors and the number of point and line correspondences required for tensor computation. These are given for configurations in general position and for the important special case where four or more of the elements are coplanar.