

## Multiview Reconstruction of Static and Dynamic Scenes

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**Abstract.** In the last decade or so, projective geometric techniques have led to major advances in the analysis of structure of a scene from a video sequence, or from individual images. This is the problem known as “Structure from Motion”. Much of the research has been centred round the so-called multiview tensors. The most well-known of these tensors is the fundamental matrix, which expresses the relationship between the coordinates of points seen in a pair of images. However, important improvements in stability are achieved by analyzing three views (three-view stereo) using the so-called “trifocal tensor”. The basic assumption in this analysis is that the scene is unchanging, and the camera is moving, or alternatively that the scene is moving rigidly.

More recently, research has turned to the analysis of dynamic scenes, in which one or more objects are moving independently (though rigidly). The problem then becomes one of segmenting the scene into independently moving objects, and determining the motion of each object. There are many variations on this problem, according to the type of motion, and the number of moving objects. It turns out that for dynamic scenes, tensor-based techniques may be used to solve these problems, in a way analogous to the rigid-scene case.

Although great progress, both theoretical and practical, has been achieved in the last decade, there are still many open problems. Such problems range from finding practical algorithms, robust in the presence of noise, to more theoretical problems of finding mathematical closed-form solutions to these problems, or determining their theoretical failure modes.