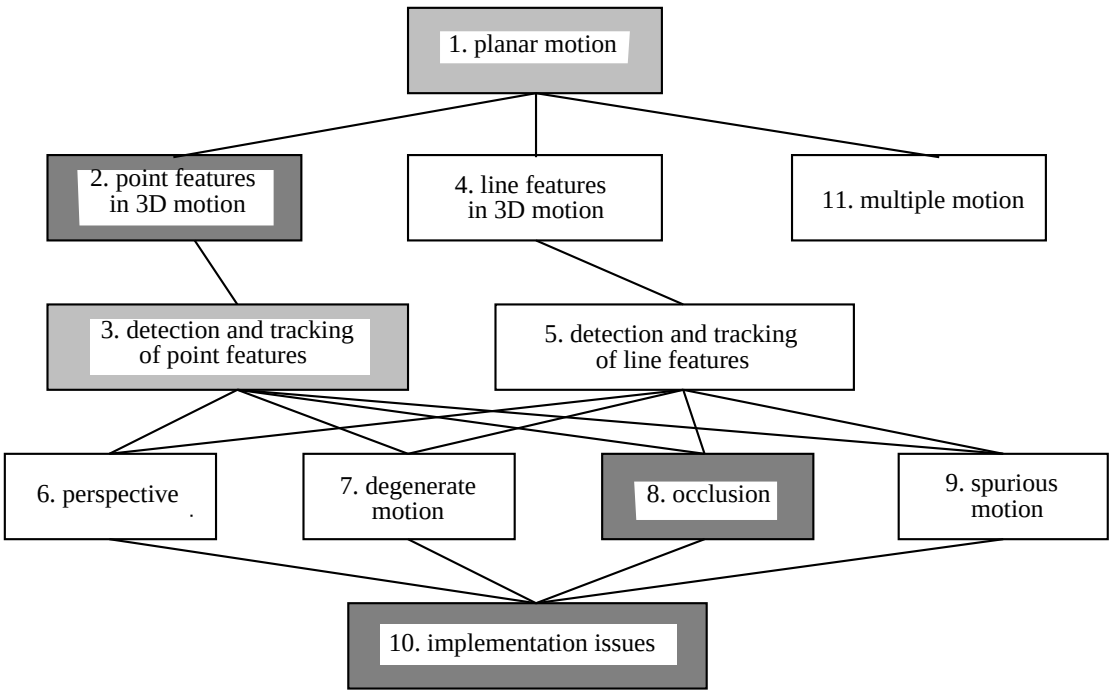
Preface

In principle, the stream of images produced by a moving camera allows the recovery of both the shape of the objects in the field of view, and the motion of the camera. Traditional algorithms recover depth by triangulation, and compute shape by taking differences between depth values. This process, however, is sensitive to noise for distant scenes.

To overcome this problem, we have developed a factorization method to decompose an image stream directly into object shape and camera motion, without computing depth as an intermediate step. To explore this new method, we designed a series of eleven technical reports, as shown in figure 1, going from basic theory to implementation.

This report summarizes our work for the orthographic case, including the basic mathematical formulation, the treatment of occlusions, and the discussion of implementation issues (parts 2, 8, and 10 in the diagram below).



The material covered in the shaded blocks in the diagram has appeared as follows:

1 CMU-CS-90-166, DARPA IUW '90, and IJCV '90

2 CMU-CS-91-105, DARPA IUW '91, and IEEE Workshop on Visual Motion '91

3 CMU-CS-91-132

8 This report and DARPA IUW '91

10 This report and DARPA IUW '91