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Contents

Chapter 1

Related Work

1.1 Activity recognition

Activity recognition is an important research area in the context of automated perception. It has many applications as surveillance, inspection, verification, generation of automated reports, etc. The main goal is to automatically analyse the ongoing activities from an unknown sensory source (a video sequence in most of the cases). Activities play a relevant role in the interpretation of a scene, not only in physical terms, but also symbolically as they can usually be associated with a meaning or an interpretation, [Heider and Simmel, 1944].

The problem has been studied in AI from different areas, principally in computer vision or as a knowledge processing problem.

Early work in work in computer vision can be traced back to the 1960s, as part of the effort to mimic human-like intelligence using visual perception components in the context of the recently created field of Artificial Intelligence. The main difference between computer vision and image processing was a desire to recover the three-dimensional structure of the world from images, and to use this as a stepping stone towards full scene understanding [Winston and Horn, 1975].

In the early 1970s, simple motion patterns of dots were studied to describe and recognize complex motion patterns (e.g. walking, shaking hands), [Johansson, 1973]. Object recognition was treated in [Barrow and Popplestone, 1971] by decomposing an image in regions and describe the relations between them. Finally, in this decade, the *block's world* problem was proposed as a test scenario for artificial intelligent systems, particularly regarding planning, knowledge representation and reasoning. One important characteristic of the problem is the requirement of a symbolic scene representation to do

some reasoning. The block's world was also used with physical systems as the robot *Shakey*, [Nilsson, 1984].

In the context of Artificial Intelligence it has been treated as a Computer Visioandverification, in aabout the problem of interpretation and understanding of a scene from sensory information and also using domain knowledge. It is mostly a perceptual action, however reasoning plays an important role too.

A robot can be roughly conceived as a physical entity capable of sensing and performing actions in the world. With this in mind, it seems clear that a robot, with sufficient sensing capabilities, is a good candidate to perform the task.

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