

1 Introduction

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Worldwide, the number of cheap digital image capturing devices is growing at a steady pace. This leads to the availability of vast amounts of visual data. The large collections of visual data pave the way for the development of new computer vision systems. The main problems that need to be addressed in the development of such systems are the dimensionality problem and the variance problem of image-space representations. The dimensionality problem is the result of the large number of pixels in an image. The variance problem is the result of the drastic changes of pixel values under small variations in the imaging conditions. Both problems may be addressed with success by extracting features from the visual data that are non-redundant and invariant under the variations in images. In the thesis, we study the extraction of features from visual data by investigating two research questions, which focus on the dimensionality problem and the variance problem, respectively. This chapter introduces the problem statement of the thesis, as well the two research questions.

Outline

In Section 1.1, we introduce feature extraction, which is an essential part of many artificially intelligent systems that process visual inputs. Section 1.2 presents the problem statement of the thesis, as well as the research questions that the thesis aims to answer. Section 1.3 presents the research methodology that is employed in order to answer the research questions. The chapter concludes by a description of the structure of the thesis in Section 1.4.