Contents

Chapter 1

Introduction

Short-answer questions

S1.1 Vision uses computers to analyze images; graphics uses computers to create images.

S1.2 This is a practical exercise in opening your eyes!

S1.3 This is a moving target, but computational cost plummets and the 'cleverness' of algorithms climbs.

S1.4 No simple 'right' answer exists, but something like Moore's Law will apply.

S1.5 Earlier editions of this book are indicative; new areas of vision, and new application areas, continue to appear.

S1.6 There are many: transport scheduling is a very visible one.

S1.7 Swathes of AI and statistics will use *a priori* reasoning.

S1.8 The best example is natural language.

S1.9 The best example is natural language.

S1.10 The purpose of this question is to illustrate that there is now a rich and accessible vision literature, but that 10, or certainly 20 years ago, this was not true.

S1.11 The purpose of this question is to illustrate that there is massive activity in vision – there has been for some time and some of the older references are still very pertinent.

S1.12 The purpose of this question is to illustrate that vision as an academic area of study as always been present, but 'took off' during the 70s and 80s.

Chapter 2

The image, its representations and properties

Short-answer questions

S2.1 The diagram should make clear that perspective projection implies a cone emanating from the focal point of the camera, while orthographic implies parallel projection lines.

S2.2 These definitions may be taken directly from the text.

S2.3 As a cheap way of achieving the illusion of continuous motion through rapid frame change., without having to recast the whole frame.

S2.4 This is a practical exercise, demonstrated by experiment.

S2.5 These definitions may be taken directly from the text.

S2.6
- R_i is the spectral sensitivity of the sensor, I is the spectral density of the illumination and S describes how the surface patch reflects each wavelength.
- q_i is the spectral response of the i^{th} sensor.

S2.7 This is illustrated in Figures 2.29 and 2.31.

S2.8 Constancy refers to the ability to interpret the same color regardless of illumination and shadow effects. This is important but difficult in interpreting the wide range of, e.g., RGB triples that might represent a single real-world color.

Problems

Solutions to many relevant tasks, and Matlab implementations of selected algorithms that can help solve problems associated with this chapter, are provided in the Matlab Companion to this text:

- Svoboda T., Kybic J., and Hlavac V. Image Processing, Analysis, and Machine Vision: A MATLAB Companion. Thomson Engineering, 2008.

The Matlab Companion homepage http://visionbook.felk.cvut.cz offers images used in the problems. The Matlab code is well commented and is provided for educational purposes.