

4 Computer Vision (JGD)

- (a) Present five experimental observations about human vision that support the thesis that what we see is explicable only partly by the optical image itself, but is more strongly determined by top-down knowledge, model-building and inference processes. [5 marks]
- (b) Discuss the use of texture gradients as a depth cue in computer vision. How can texture gradients be measured? What role can Fourier analysis play in this? What ancillary “metaphysical” assumptions must be invoked by a vision algorithm in order to make the inference task well-posed and thereby make such computations possible? You may find it helpful to refer to the following figures: [5 marks]

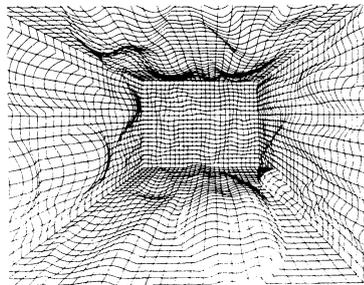


figure 1

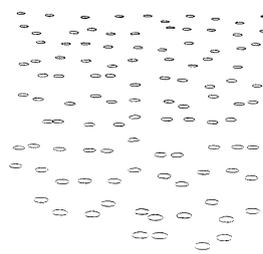


figure 2

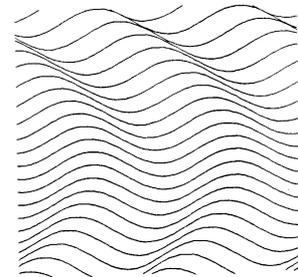


figure 3

- (c) Briefly define each of the following concepts as it relates to vision:
- (i) “signal-to-symbol converter” [2 marks]
 - (ii) Hadamard’s criteria for well-posed problems [2 marks]
 - (iii) correspondence problem [2 marks]
 - (iv) reflectance map [2 marks]
 - (v) Bayesian prior and its role in visual inference [2 marks]