

## 1998 Paper 9 Question 12

### Computer Vision

It could be said that the central problem of pattern recognition is the relation between the within-class variability and the between-class variability for the patterns that one would like to recognise. Explain this problem in the case of face recognition, treating separately the problems of

- (a) *face detection* (distinguishing faces from non-faces)
- (b) *face identification*
- (c) *face interpretation* (classifying the expression and pose angle of the face)

How do the forms of variability for faces influence each of the three tasks? Is within-class variability ever helpful, and between-class variability ever harmful, to the performance of the task? What role can statistical decision-theory play in formalising and solving these problems?

[20 marks]