

Information Theory, Pattern Recognition and Neural Networks

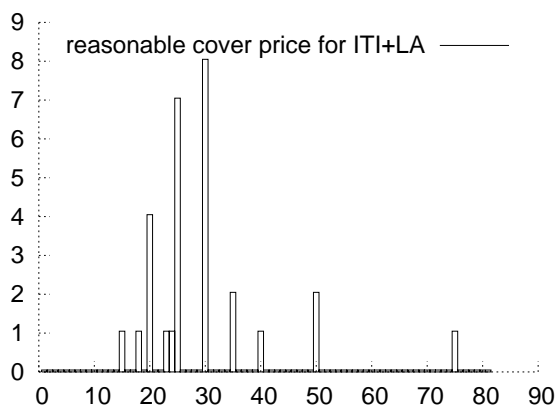
Part III Physics, January 2004

Textbook

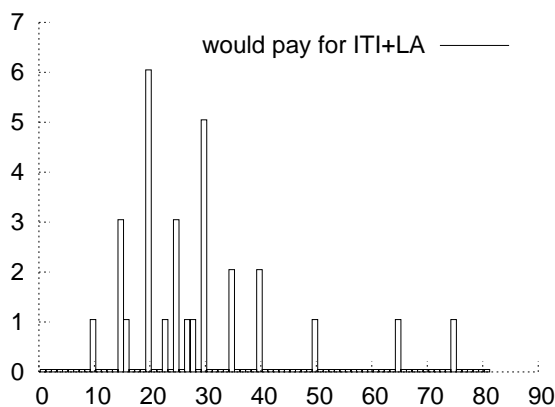
The course textbook is *Information theory, inference, and learning algorithms*, by David J.C. MacKay. Cambridge University Press (2003). (Rayleigh library: 39 M 20.) This 640-page textbook covers the whole course, and a whole lot more. All students are encouraged to buy this textbook. The book is also available for free on-screen viewing at

<http://www.inference.phy.cam.ac.uk/itprnn/>.

I surveyed the 2003 class to find out what they would be willing to pay for the book. The median answer was £25. (See histograms below.) The book's cover price is £30; if you buy it at the CUP bookshop with University ID, it costs £24. You can also buy it from amazon.co.uk for £21.

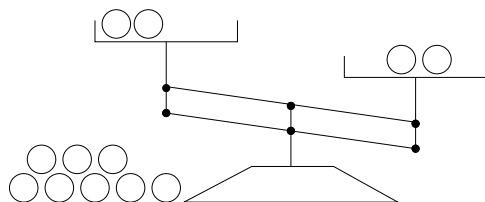


What do you think a reasonable cover price would be for the book?



What would you have been willing to pay for the book?

Please work on the following exercise before lecture 2.



The weighing problem

You are given 12 balls, all equal in weight except for one that is either heavier or lighter. You are also given a two-pan balance to use. In each use of the balance you may put any number of the 12 balls on the left pan, and the same number on the right pan, and push a button to initiate the weighing; there are three possible outcomes: either the weights are equal, or the balls on the left are heavier, or the balls on the left are lighter. Your task is to design a strategy to determine which is the odd ball *and* whether it is heavier or lighter than the others *in as few uses of the balance as possible*.

