Information theory for physicists

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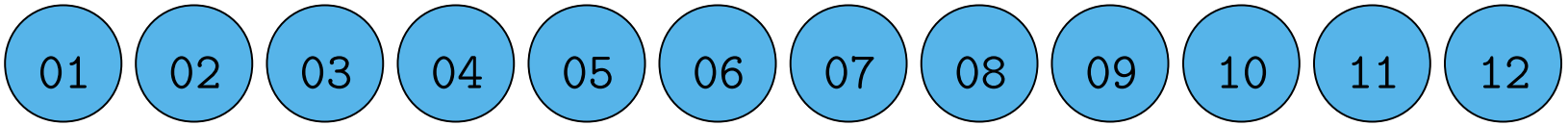
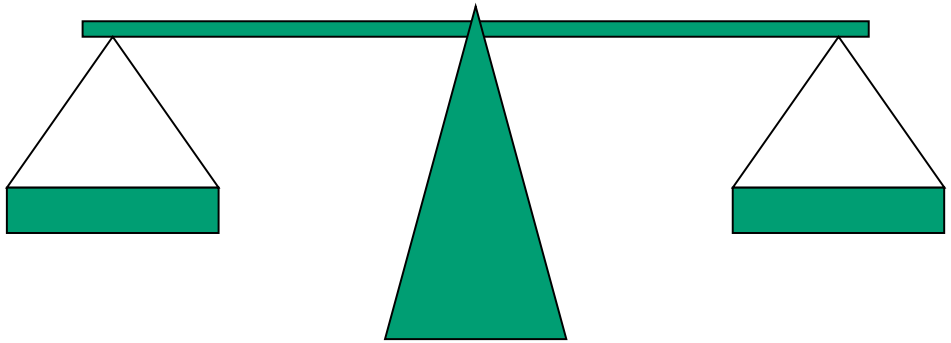
Weighing problem



12 balls, 1 is different weight to the others.



What is the minimum number of weighings needed to determine which is the odd ball and if it is lighter or heavier?

Synopsis

- **Lecture 1:** Probabilities, inference and information content
- **Lecture 2:** Entropy and probability distances
- **Lecture 3:** Maximising entropy and thermodynamics

Information Theory, Inference & Learning Algorithms

David J.C. Mackay

http://www.inference.phy.cam.ac.uk/mackay/itila/book.html

Chapters: 2, 4, 8

The Bell System Technical Journal

Vol. XXVII *July, 1948* *No. 3*

A Mathematical Theory of Communication

By C. E. SHANNON

Introduction

THE recent development of various methods of modulation such as PCM and PPM which exchange bandwidth for signal-to-noise ratio has intensified the interest in a general theory of communication. A basis for such a theory is contained in the important papers of Nyquist[1] and Hartley[2] on this subject. In the present paper we will extend the theory to include a

Shannon, C. E.; *The Bell System Technical Journal;* **27**(3):379–423; 1948.
Shannon, C. E.; *The Bell System Technical Journal;* **27**(4):623–656; 1948.

Entropy and probability distances

Course on Information Theory, Pattern Recognition, and Neural Networks

David J.C. Mackay

http://videolectures.net/course_information_theory_pattern_recognition/

Lectures: 2, 3, 6 (extension to coding)

Exercises: 2.14, 2.27, 8.6, **8.10**

Methods of Information Geometry

Shun-ichi Amari & Hiroshi Nagaoka