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Chapter XXII

Ankle Bones, Rogues, and Sexual Freedom for Women: Computational Intelligence in Historical Context

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Abstract

In this chapter we review the history of mathematics-based approaches to problem solving. The authors suggest that while the ability of analysts to deal with the extremes of data now available is leading to a new leap in the handling of data analysis, information processing, and control systems, that ability remains grounded in the work of early pioneers of statistical thought. Beginning with pre-history, the paper briefly traces developments in analytical thought to the present day, identifying milestones in this development. The techniques developed in studies of computational intelligence, the applications of which are presented in this volume, form the basis for the next great development in analytical thought.

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Introduction

This book is part of a wave of interest in computational methods that is increasing apace. The ability of the computer to handle large amounts of data has had an inordinate effect on the capacity of business to analyse and refer to vast arrays of information. It is possible — indeed, we are certain that it is so — that we are at the beginning of, and part of, the next great development in statistical analysis. In light of that, we feel it is appropriate to place this development in the context of the history of statistical thought. It has been argued that in business as in life, it is impossible to know where one is going if one does not know where one came from. Equally, it could be said that when a discipline becomes interested in its own history it is in a state of decay! No matter. To be interested in this history places us in the company of great personages, as the reader will see from the references to this chapter. We therefore offer this chapter in part as a tribute to those who went before. As we will see, they were fascinating characters.

The argument that the "… foundations of mathematical statistics were laid between 1890 and 1930…" (Porter, 1986, p. 3) is difficult to refute. That was a time when great minds — Weldon, Karl Pearson, Fisher and Gosset to name only a few — began to apply knowledge gained from genetics to the mathematical expression of statistics. But interest had been shown much earlier, as we shall show. The first use of the word "statistics" occurs in 1589 by Girolamo Ghilini (Kendall, 1960). Ghilini principally was speaking in the public policy sense of the word, but we see an interest here in the concept of dealing with large numbers. Crosby (1997) provides a comprehensive and entertaining account of the transition from qualitative to quantitative thinking that occurred in Western Europe in the period 1250 to 1600, the forerunner to many of the issues discussed below.

Much earlier still, we find that interest in probability had been occurring since the most primitive times, though as an empirical art only. It was only far in the future that it became an object of mathematical science. We can be certain that primitive man played games, some of them based on chance and they can be accounted for as either religious in significance, or as a form of pleasure. Evidence for this can be seen in the large number of astragali found in archaeological digs (David, 1955). Now the astragalus is a small bone from the ankle region with no particular use to anyone after its initial owner has passed away. It has no marrow for eating and no surface that can be used for writing or drawing, due to its size. Its only use is as a toy. Such a use has been identified in Egyptian tomb paintings in the board game of Hounds and Jackals (David, 1955). Fortunately for us, there is also evidence that it was used in early forms of dice gaming. Here, we find possibly the earliest example of an intuitive understanding of the nature of probability. It seems that the game of knucklebones, in which four astragali would be balanced on the large knuckles of the back of the hand and then thrown, was scored in such a fashion as to reflect true odds. For example, the four fours — the throw of Euripides — were valued at 40 (David, 1955). A quick calculation will reveal that the actual odds are approximately 1 in 39.

This is an important step in the development of probability and computation. While the use of dice for divination or for personal profit through gambling allowed pleasure and religious value, it lent the individual with an inherent, though crude, understanding of the nature of probability an immense advantage. That advantage could be employed

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