Chapter 1. Basic Concepts

1.1. Introduction

Note. Berger states (see page 1): "Statistical decision theory is concerned with the making of decisions in the presence of statistical knowledge which sheds light on some of the uncertainties involved in the decision problem." We take the "uncertainties" to be numerical in nature and represent them by θ (though this may be a number, a vector, or a matrix, depending on the setting).

Note 1.1.A. Consider the situation where a drug company is deciding whether or not to sell a new pain reliever. They consider two factors in their decision, the proportion θ_1 of people for which the drug will prove effective, and the proportion θ_2 of the market the drug will capture. Based on the values of θ_1 and θ_2, a decision is to be made as to whether or not to market the drug, how much to distribute, and what to charge. In a statistical analysis, sample information is used to make inferences about the values of θ_1 and θ_2. In decision theory, the sample information is combined with other relevant ideas to make the best decision. This relevant information can include a measure of the consequences of the decision in the form of a loss function. Another source of information (other than the sample information) is *prior information*. This might include information from similar situations related to the marketing of another pain reliever.

Note. "Bayesian analysis" is the branch of statistics that incorporates prior information. It meshes with decision theory , both theoretically and practically (in their common goal of using nonexperimental source of information).