









to assess the failure potential and the efficiency of Bayesian inference.

A new performance measure for evaluating an agent's performance and determining the criteria for when to apply it is introduced in this book. The new performance measure is called *efficiency*, and it is established and analyzed within a new mathematical framework introduced herein. The efficiency is deduced herein independent of any particular agent and can be used by particular agent implementation as a criterion for performance improvements. The *cycle of operation* or the diagnostic cycle of an intelligent agent is defined herein. It is shown how, during a cycle of operation, an intelligent agent can receive an amount of information  $I$ , related to the amount of  $U$ , the agent's built-in knowledge. The amount  $I$  is introduced as a function of the *volume* and of the *average expected utility* of the built-in knowledge. It is also described herein how the agent generates an amount of *diagnostic knowledge*,  $K$ , related to  $I$  and  $U$ , and how, due to limited resources, the agent must prepare for the next cycle of operation. The efficiency of an agent's cycle of operation is defined as  $\eta = K_{\text{CYCLE}}/I_{\text{RECEIVED}}$ , where  $K_{\text{CYCLE}}$  represents the net amount of knowledge exchanged, and  $I_{\text{RECEIVED}}$  the total amount of information received by the agent throughout the cycle. The word *infodynamics* has been selected by the author to describe the mathematical framework introduced herein because of two reasons. On one hand, during the cycle of operation, the information that an intelligent agent processes has its own dynamics. The agent receives information, and based on this information, it generates knowledge. In addition to generating knowledge, the agent executes an appropriate action in response to the received information. As a result of its actions, the agent receives feedback knowledge. The word *infodynamics* captures the idea of the dynamics of information and its transformation into knowledge in intelligent agents. In a certain way,

