Distinctive Features of the Bayesian Approach

Probability is used not only to describe "physical" randomness, such as errors in labeling, but also uncertainty regarding the true values of the parameters. These prior and posterior probabilities represent **degrees of belief**, before and after seeing the data.

The Bayesian approach takes **modeling** seriously. A Bayesian model includes a suitable prior distribution for model parameters. If the model/prior are chosen without regard for the actual situation, there is *no justification* for believing the results of Bayesian inference.

The model and prior are chosen based on our knowledge of the problem. These choices are **not**, in theory, affected by the amount of data collected, or by the question we are interested in answering. We **do not**, for example, restrict the complexity of the model just because we have only a small amount of data.

Pragmatic compromises are inevitable in practice — eg, no model and prior perfectly express to our knowledge of the situation. The Bayesian approach relies on reducing such flaws to a level where we think they won't seriously affect the results. If this isn't possible, it may be better to use some other approach.