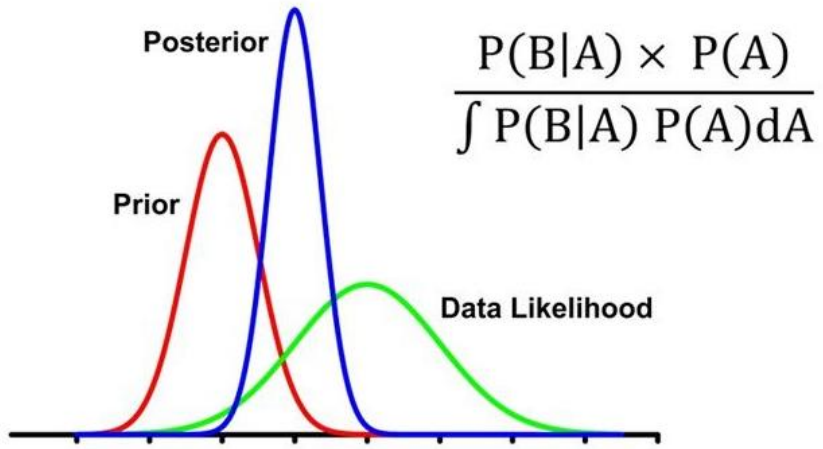
Unit 12, Bayesian Data Analysis→

Bayesian Data Analysis is the concept of combining prior information with observed data to form a posterior distribution. This process involves three main components: the prior distribution, the likelihood, and the posterior distribution.

Prior Distribution (Prior): This represents our initial beliefs about the parameters before observing the data. Priors can range from being very informative, based on previous studies or expert knowledge, to non-informative or weakly informative, which have minimal impact on the posterior distribution.

Likelihood: This is the probability of observing the data given the parameters of the model. It quantifies how well our model explains the observed data. In Bayesian analysis, the likelihood is used to update our beliefs about the parameters.

Posterior Distribution (Posterior): This is the result of combining the prior distribution with the likelihood, using Bayes' Theorem. It reflects our updated beliefs about the parameters after observing the data. The posterior distribution is central to Bayesian inference, as it provides a comprehensive picture of what our beliefs are about the parameters after considering both the prior information and the new data.



Bayesian Data Analysis offers a robust framework for understanding and managing uncertainty in statistical inference. By integrating prior knowledge with observed data and providing a probabilistic foundation for decision-making, Bayesian methods offer a powerful tool for a wide range of applications. Its capacity to handle complex models and embrace uncertainty makes it an invaluable approach in the evolving landscape of data analysis.