

SANS Homework 4 - Bayesian estimation of a Binomial/Beta

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We defined 3 classes to initiate the Bayesian estimation, we used the Beta distribution to represent our prior information.

It is reflected as hyper parameters a_0 and a_1 .

We use uniform distribution for the prior information with $a_0=1, a_1=1$ this can be change to non-uniform such as $a_0=2, a_1=7$ but this is not our goal here. We keep it as uniform to observe likelihood and posterior distribution graphs.

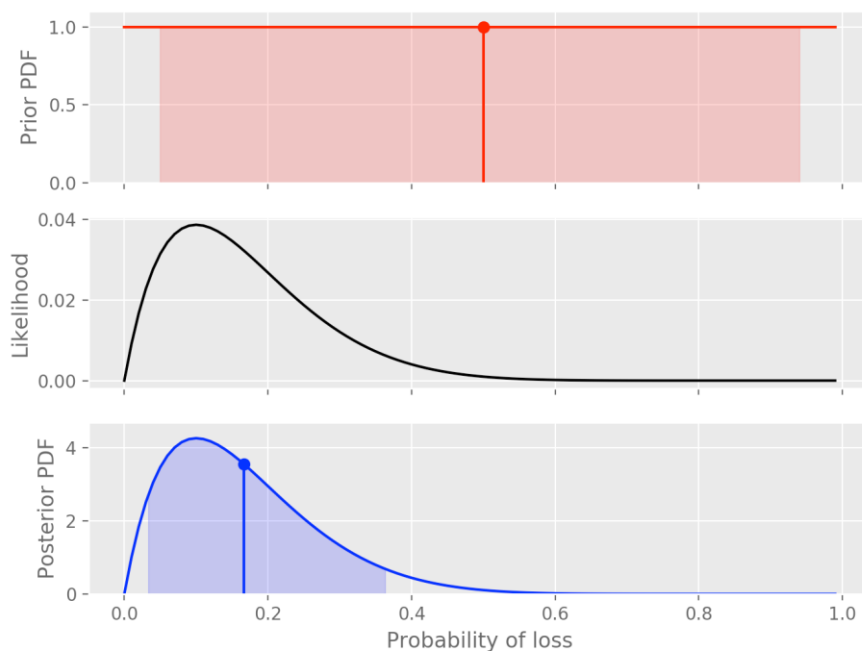
As a data set, we use the ping statistics to examine the posterior and likelihood pdf.

We experimented with 10 pings, and 100 pings to observe the behaviour.

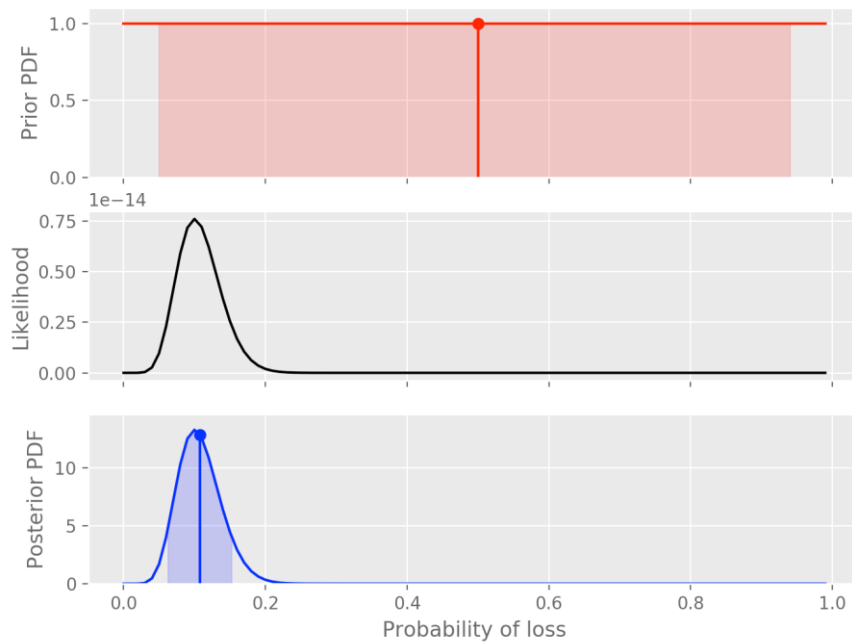
In the data set, we define '0' as received and '1' as lost. Defined as binary data set.

The following is the plots of the loss probability of the different data sets.

This is the example for 10 pings sent. 9 received, 1 lost.



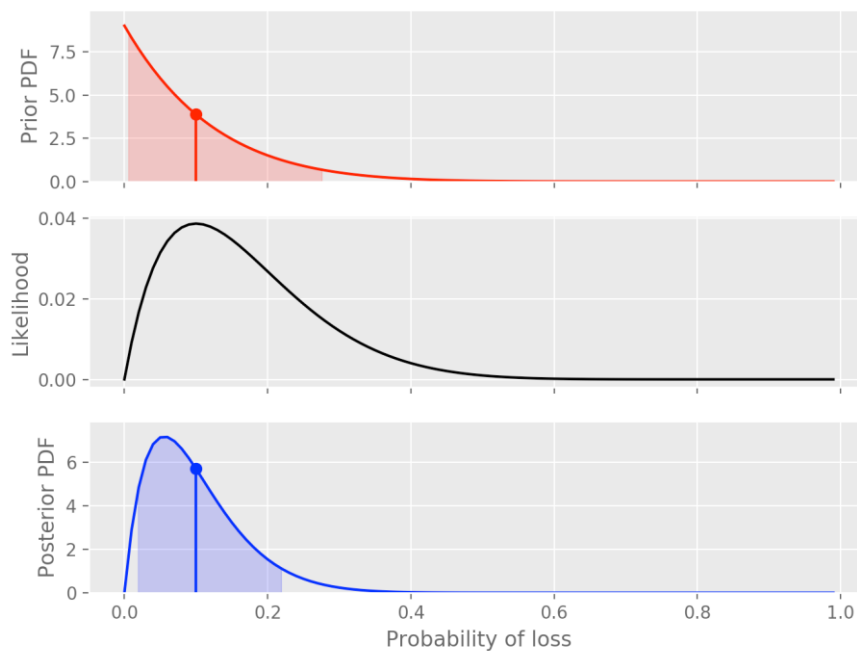
And here, we sent 100 pings, 90 received, 10 lost.



From the previous plots we can observe that; by increasing the number of pings, posterior loss probability gets closer to the steady-state solution, which is 0.10 as expected.

When it goes to infinity, the shape becomes narrower. Let's see it in the following plots.

Our $a_0=1$, $a_1=9$ which are representing the hyper parameters.



For the data 90 pings and 10 lost, we make the $a_0=10$, $a_1=90$. The plot is :

