Bayesian Hierarchical Model:

5 Drinks and 30 people test scores

We have J=5 independent eyperiments, each one with estimate θj. Assume normality for each

Assuming that σ is known and are the same for each.

* One classical approach is to perform each model independently
* The Hierarchical Model:

Assuming is known for each *j*

Assuming improper prior

The joint posterior:

Calculate the conditional probability for Gibbs Sampling

The poster predictive: (draw from

is the new data, draw from

**Bayesian Multivariate Normal Model:**

Jeffrey’s prior is the most popular prior for multivariate Gaussian model. The formula is shown below:

where *d* is the dimension of our data, that is:

or

Let be a random sample set from . The likelihood function of given data is:

where

Then we can have the conditional posterior for and the marginal distribution for given ***S***:

or

**Single Normal Model:**

Jeffrey’s prior is the most popular prior for Gaussian model. The formula is shown below:

where our data *y* is following a normal distribution, that is:

Then under this improper prior, we have the joint posterior distribution:

where

Then, we have the conditional posterior for and the marginal distribution for given *y*: