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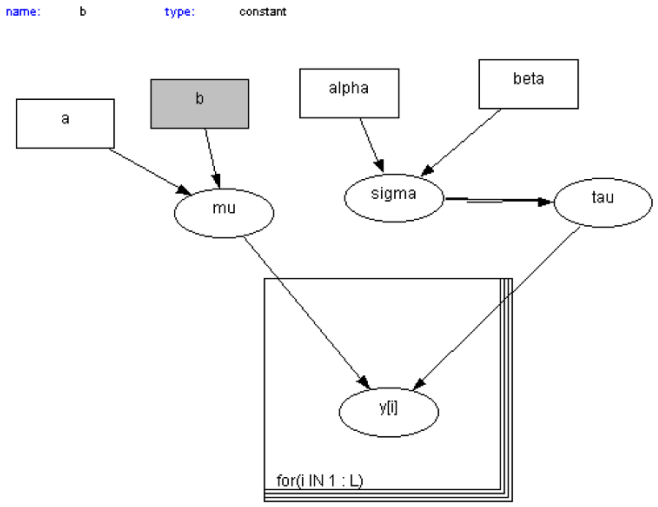
HW3 Part B – Doodle Summary:

2. With this model at hand, initialize and then run 3 chains + a reasonable burn-in, to make inference on μ and σ. Report the relevant point estimates and credible intervals, qualitatively commenting on the mixing of the chain(s) by looking at the trace plots + autocorrelations (if you want, you can go deeper. . .)

At first I have created required doodle model as shown in the below picture.



With this model at hand, I have initialized and then run 3 chains and burn in of 5000 to start sampling. Initial values and data values are given in required text file let me post a snapshot.

```
#required data
list(
L = 208,
a = 0,
b = 0.0001,
alpha = 1, # it is written somewhere that it is good value for bell shapped distribution
beta = 0.00625,
y=c(0.678,0.402,0.132,0.27,0.284,0.12,0.32,0.086,0.316,0.579,0.08,0
.479,0.299,0.028,0.2,0.085,0.377,0.768,0.525,0.337,0.576,0.068,0.18,0.091,0.364,0.671,0.071,0.095,0.316,0.221,0.239,0.518,0.03
9,0.395,0.409,0.375,0.255,0.584,0.581,0.231,0.237,0.76,0.543,0.649,0.768,0.415,0.548,0.236,0.052,0.056,0.575,0.174,0.447,0.368
,0.019,0.265,0.037,0.062,0.203,0.074,0.698,0.55,0.435,0.699,0.137,0.054,0.025,0.693,0.063,0.32,0.585,0.644,0.061,0.349,0.352,0
.745,0.111,0.545,0.182,0.599,0.2,0.373,0.236,0.067,0.293,0.671,0.058,0.419,0.782,0.324,0.729,0.51,0.029,0.042,0.392,0.481,0.72
7,0.185,0.269,0.732,0.243,0.695,0.291,0.703,0.595,0.191,0.059,0.573,0.081,0.571,0.615,0.084,0.274,0.196,0.383,0.195,0.585,0.47
7,0.118,0.25,0.375,0.066,0.072,0.082,0.354,0.158,0.78,0.126,0.043,0.241,0.038,0.034,0.536,0.198,0.066,0.284,0.19,0.026,0.05,0.
079,0.742,0.231,0.474,0.05,0.042,0.136,0.032,0.157,0.163,0.063,0.289,0.854,0.341,0.274,0.205,0.654,0.269,0.106,0.366,0.34,0.11
2,0.35,1.018,0.791,0.711,0.796,0.289,0.345,0.298,0.672,0.04,0.502,0.841,0.243,0.05,0.699,0.863,0.816,0.854,0.594,0.375,0.316,1
.03,0.951,0.79,0.772,0.859,0.951,0.933,1.129,0.739,0.925,0.796,1.029,1.136,1.092,1.036,0.818,1.413,1.022,0.663,1.078,1.461,1.1
9,0.986,1.099,0.924,1.23)
)

list(
mu = 0.5¡
sigma=0.002
)
list(
mu=0.6,
sigma=0.001
)
list(
mu=0.4,
sigma=0.002
)
```

After that I have used sample monitor tool for monitoring the **mu** and **sigma** values. After actually running the model I have got these values for **mu** and **sigma**.
Here are the different chains values I will post the pictures here. These are the **point estimates.**

	chain[1]	chain[2]	chain[3]
mu	-1.254	-1.32	-1.345

	chain[1]	chain[2]	chain[3]
sigma	1.001	0.9962	0.9363

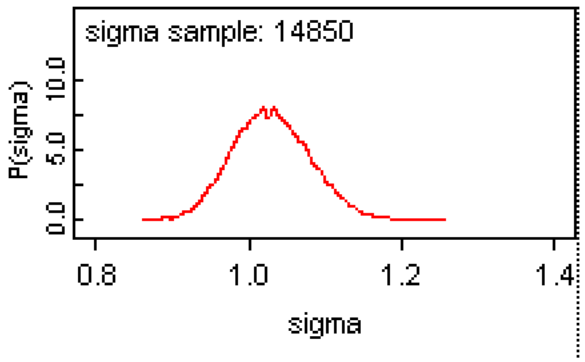
To get the different credible intervals values we can select it from the **OpenBugs** using sample monitor tools window. Here you can see it as **val2.5pc**, **median**, **val97.5c**.

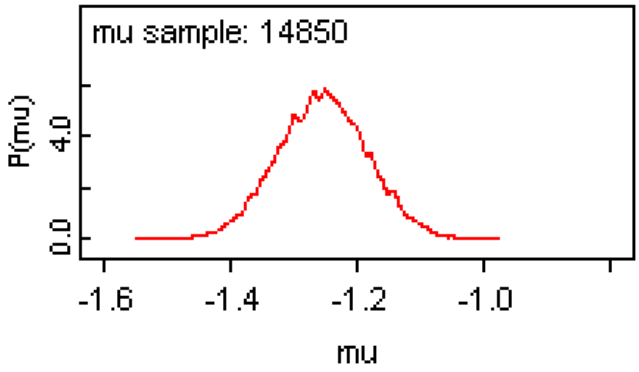
	mean	sd	MC_error	val2.5pc	median	val97.5pc	start	sample
mu	-1.255	0.07148	6.08E-4	-1.395	-1.255	-1.114	51	14850

	mean	sd	MC_error	val2.5pc	median	val97.5pc	start	sample
sigma	1.03	0.05087	3.752E-4	0.9356	1.028	1.133	51	14850

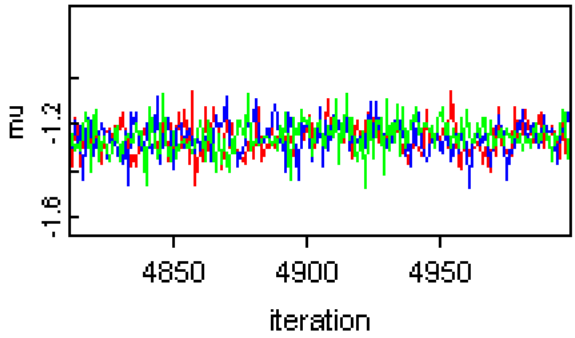
After that I have mixed chains e.g 2 to 3, 1 to 2 but it always gave me same values for **mu** and **sigma** as given above for **mean**, **sd** etc.

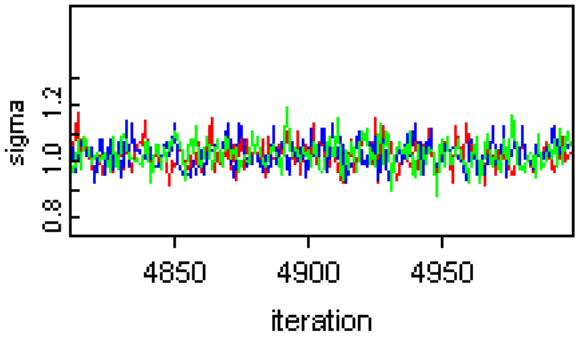
After that I have looked at both densities as well.



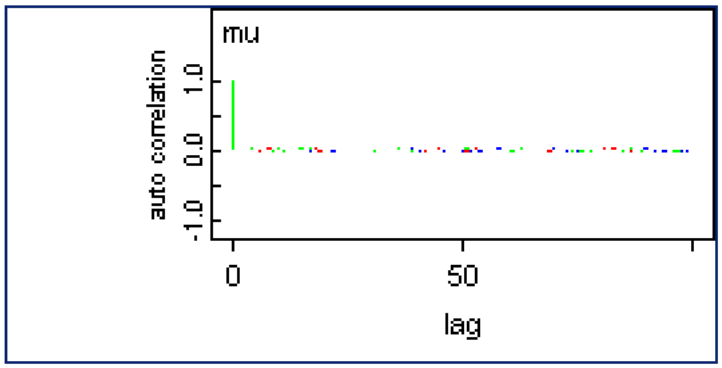


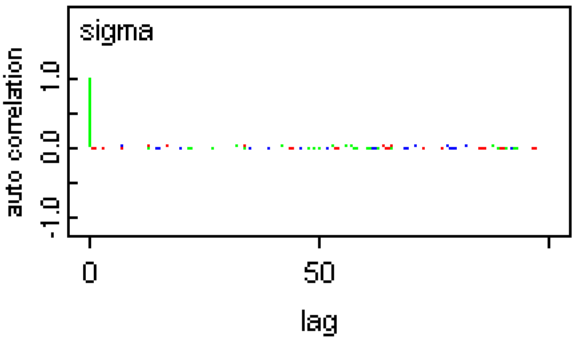
After that I have looked at their traces. Let me post graphs here.





Now lets look at autocorrelations of both.





I have displayed all the things requested in Part B part 3. There is so much we can do with OpenBugs that I can't even display here. Particularly we can use the logs window of the WinBugs to get this whole documentation procedure directly from Open Bugs.

How to enable logs:
https://www.youtube.com/watch?v=ZwLpOzc5k7c
Everything that we need in documentation are written here:
http://homepage.stat.uiowa.edu/~gwoodwor/BBIText/AppendixBWinbugs.pdf