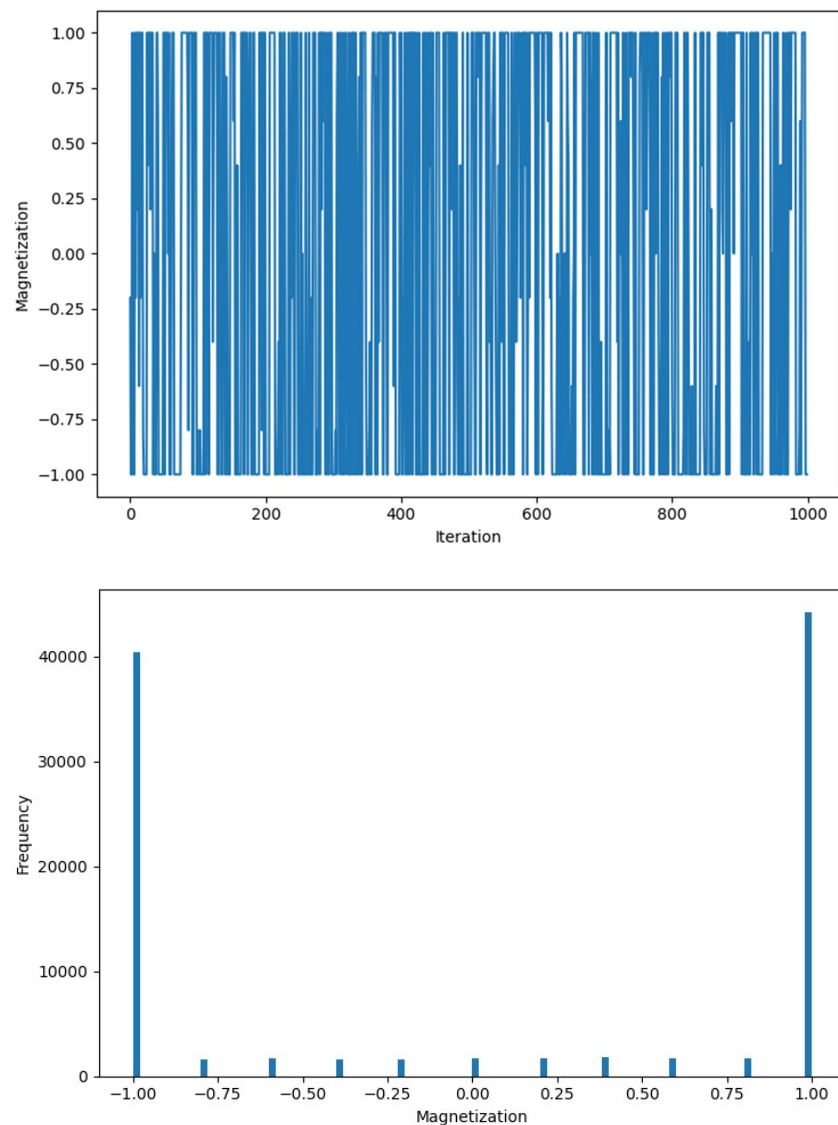


# Advanced Machine Learning: Programming Assignment 2 Report

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## Part 1: Gibbs Sampling

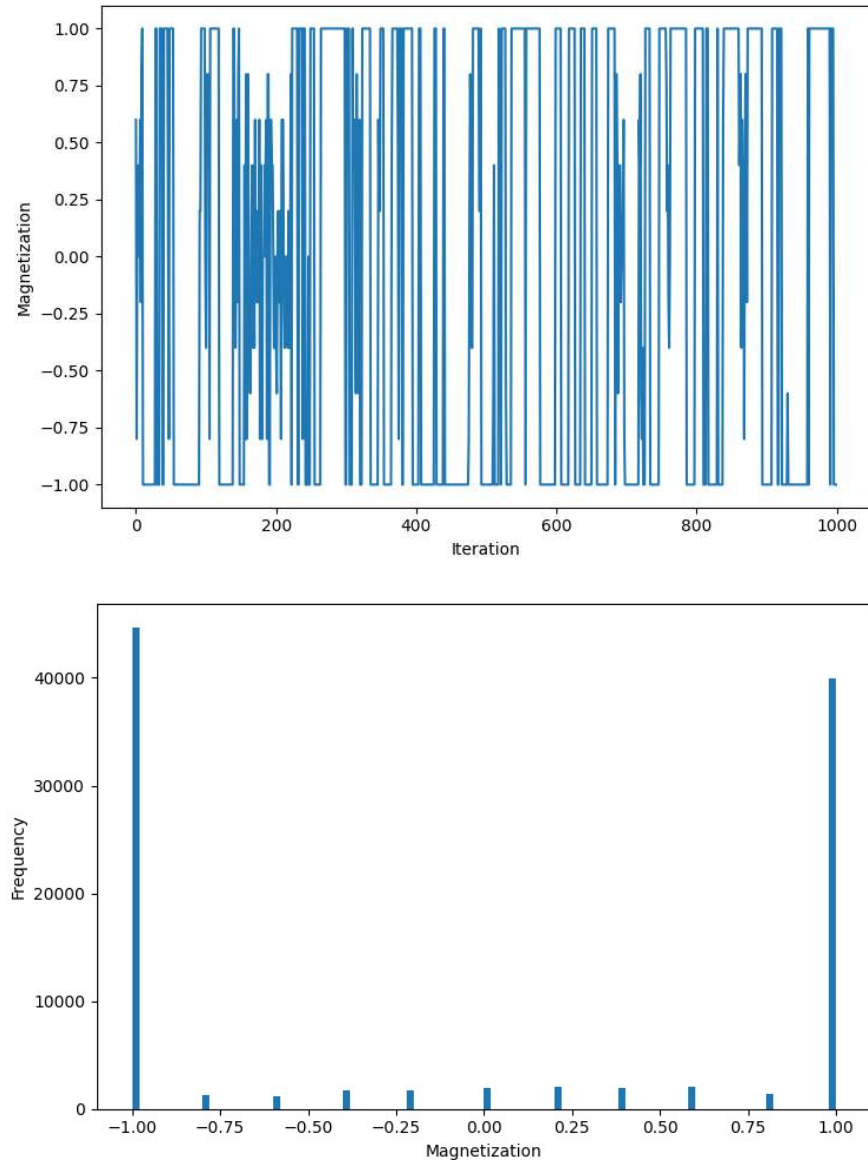
Gibbs Sampling was performed on the given distribution, to generate  $N = 10,000$  samples. The obtained graphs are given as below:



We observe that there's a spike in magnetization values of -1 and +1. Frequency of the rest is low.

## Part 2: Metropolis-Hastings Algorithm

Metropolis-Hastings sampling was performed on the given distribution, taking the proposal distribution to be  $Bernoulli(\theta)$ . The obtained graphs for  $\theta = 0.5$  is shown below.



We observe, yet again, that there's a spike in magnetization values of -1 and +1. Frequency of the rest is low.

MH sampling was performed on a number of  $\theta$  values. Rest of the graphs are there in the accompanying Jupyter Notebook. From the graphs we observe that the magnetization vs frequency graphs are similar for all  $\theta$  values. However, the iteration vs magnetization graph is showing us that for low  $\theta$  the magnetization samples change frequently with each iteration, while for higher values of  $\theta$ , the magnetization doesn't tend to change so frequently.