Notes on Statistical Mechanics and Thermodynamics relevant to Machine Learning

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# A Note

This document does not aim to discuss in depth the topics covered in the classic Statistical Mechanics books. Rather the interest here is in the statistical models and underlying physical mechanisms relevant to certain problems in the Machine Learning field in order to establish a clear link to and provide new insights to the certain Machine Learning algorithms.

# Introductory Material

## Classical Ideal Gas

The abstraction ‘Ideal Gas’ and the mathematical model behind it have many applications outside the Physical Sciences. Thus we start our journey into the world of Statistical Mechanics and Thermodynamics with the definition of Ideal Gas.

An ideal gas is different from real gases by the absence of interactions between particles which constitute the gas.

While idea gas is unrealistic model for real gasses it can be thought as a limit scenario for real gasses with sufficiently low densities.

# References

[1] [An Introduction to Statistical Mechanics and Thermodynamics, Robert H. Swendsen, 2012](https://github.com/dimitarpg13/information_theory_and_statistical_mechanics/blob/main/literature/books/An-Introduction-to-Statistical-Mechanics-and-Thermodynamics-Swendsen-2012.pdf)

[2] [Statistical Physics by L.D. Landau and E.M. Lifshitz, 2nd Edition, 1970 (orig. 1958)](https://github.com/dimitarpg13/information_theory_and_statistical_mechanics/blob/main/literature/books/LandauLifshitz-StatisticalPhysics_1958.pdf)