

MOD500 Decision Analysis with Artificial Intelligence Support

Enrico Riccardi¹

Department of Energy Resources, University of Stavanger (UiS).¹

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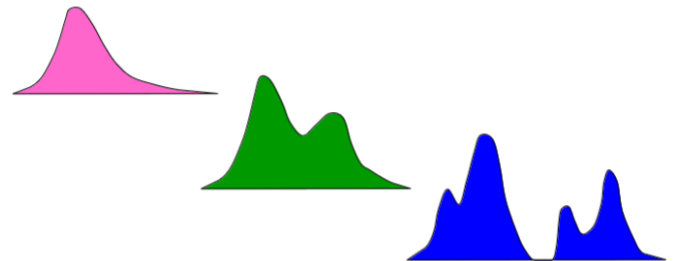


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Probability distribution

Amount of uncertainty

Number of Modes: unimodal, bimodal, polymodal



Task assignment

Code a discrete probability distribution in Python
Calculate the Mean and Standard Deviation
How to get an experiment out of this distribution?

How to relate a distribution to information?

First, the origins:

- Daddy: Claude Shannon (1940)
- His initial work has been done on signal transmission.
- It uses Entropy as key measurement of information uncertainty.

Why is it important/userfull ?

It is an interface between data and decisions.

A question to sum up the idea

Does more data bring value?

It has permitted the advances of several fields:

cryptography, neurobiology, signal processing, linguistics, bioinformatics, statistical physics, black holes, quantum computing, information retrieval, intelligence gathering, plagiarism detection, pattern recognition, anomaly detection, etc
zip files, phones, internet!

Entropy of an information source

$$H = -\sum_i (p_i) \log(p_i)$$

H_X of a discrete random variable X is a measure of the amount of uncertainty associated with the value of X when only its distribution is known

What is p_i ?

It is a numerical descriptions of how likely an event is to occur

Do not mix the concepts!

Assigned probability and computed probability are different

Task assignment	Kullback–Leibler divergence (information gain)
<p>Code a discrete probability distribution in Python</p> <p>Calculate the Mean and Standard Deviation</p> <p>How to get an experiment out of this distribution?</p> <p>Calculate Shannon's Entropy as a function of the number of experiments</p>	$D_{KL} = \sum_i (p_i) \log\left(\frac{p_i}{q_i}\right)$