**Expected value criterion:**

The expected value criterion is one of the criteria in the decision theory. The expected value pertaining to discrete random variable stands to be the average associated with all possible values, taking probability as the weights.

Each possible value which can be assumed by the random variable must be multiplied by probability associated with its occurrence and the expected value is being produced by summing up the resulting products.
Expected value (also known as EV, expectation, average, mean value) is a long-run average value of random variables. It also indicates the probability-weighted average of all possible values.

Expected value is a commonly used financial concept.

Thus, the expected value is also called as the first moment, mean value, average, mathematical expectation.

**Difference:** Mean or "Average" and "Expected Value" only differ by their applications, however they both are same conceptually. Expected Value is used in case of Random Variables (or in other words Probability Distributions). Since, the average is defined as the sum of all the elements divided by the sum of their frequencies.

**Standard Deviation:**

Standard deviation is the measure of dispersion of a set of data from its mean.

It measures the absolute variability of a distribution, the higher the dispersion or variability, the greater is the standard deviation.

 And greater will be the magnitude of the deviation of the value from their mean.

Description: The concept of Standard Deviation was introduced by Karl Pearson in 1893. It is by far the most important and widely used measure of dispersion. Its significance lies in the fact that it is free from those defects which afflicted earlier methods and satisfies most of the properties of a good measure of dispersion.

Standard Deviation is also known as root-mean square deviation as

it is the square root of means of the squared deviations from the arithmetic mean.
In financial terms, standard deviation is used to measure risks involved in an investment instrument.

Standard deviation provides investors a mathematical basis for decisions to be made regarding their investment in financial market.

Standard Deviation is a common term used in deals involving stocks, mutual funds, ETFs and others.

Standard Deviation is also known as instability.

It gives a sense of how dispersed the data in a sample is from the mean.
In case of individual observations,

 Standard Deviation can be computed in any of the two ways:
1. Take the deviation of the items from the actual mean
2. Take the deviation of the item from the assumed mean
In case of a discrete series,

Any of the following methods can be used to calculate Standard Deviation:
1. Actual mean method
2. Assumed mean method
3. Step deviation method

Standard deviation is a measure of risk that an investment will not meet the expected return in a given period. The smaller an investment's standard deviation, the less unstable it is.

The larger the standard deviation, the more dispersed those returns are and thus the riskier the investment is.

Standard deviation is a number used to tell how measurements for a group are spread out from the average (mean), or expected value.

A low standard deviation means that most of the numbers are close to the average.

A high standard deviation means that the numbers are more spread out.

**Properties of Standard Deviation:** Standard deviation is only used to measure spread or dispersion around the mean of a data set.

Standard deviation is never negative.

Standard deviation is sensitive to outliers.

A single outlier can raise the standard deviation and in turn, distort the picture of spread.

## Certainty Equivalent:

The certainty equivalent is a guaranteed return that someone would accept now, rather than taking a chance on a higher, but uncertain, return in the future. Put another way, the certainty equivalent is the guaranteed amount of cash that a person would consider as having the same amount of desirability as a risky asset.

Investments must pay a risk premium to compensate investors for the possibility that they may not get their money back and the higher the risk, the higher premium an investor expects over the average return.

A company seeking investors can use the certainty equivalent as a basis for determining how much more it needs to pay to convince investors to consider the riskier option. The certainty equivalent varies because each investor has a unique risk tolerance. The term is also used in gambling, to represent the amount of payoff someone would require to be indifferent between it and a given gamble. This is called the gamble's certainty equivalent.

The certainty equivalent represents the amount of guaranteed money an investor would accept now instead of taking a risk of getting more money at a future date

The certainty equivalent varies between investors based on their risk tolerance, and a retiree would have a higher certainty equivalent because he's less willing to risk his retirement funds

The certainty equivalent is closely related to the concept of risk premium or the amount of additional return an investor requires to choose a risky investment over a safer investment

**Coefficient of Variation:**

The coefficient of variation (CV) is a statistical measure of the dispersion of data points in a data series around the mean. The coefficient of variation represents the ratio of the standard deviation to the mean, and it is a useful statistic for comparing the degree of variation from one data series to another, even if the means are drastically different from one another.

**The formula for the coefficient of variation is:**

Coefficient of Variation = (Standard Deviation / Mean) \* 100. )

## Multiplying the coefficient by 100 is an optional step to get a percentage, as opposed to a decimal.

The coefficient of variation shows the degree of [variability](https://www.investopedia.com/terms/v/variability.asp) of data in a sample in relation to the mean of the population.

In finance, the coefficient of variation allows investors to determine how much instability, or risk, is assumed in comparison to the amount of return expected from investments. Ideally, the coefficient of variation formula should result in a lower ratio of the [standard deviation](https://www.investopedia.com/terms/s/standarddeviation.asp) to mean return, meaning the better risk-return trade-off.

Note that if the expected return in the denominator is negative or zero, the coefficient of variation could be misleading.

The coefficient of variation is helpful when using the risk/reward ratio to select investments. For example, an investor who is risk-averse may want to consider assets with a historically low degree of [volatility](https://www.investopedia.com/terms/v/volatility.asp) and a high degree of return, in relation to the overall market or its industry.

Conversely, risk-seeking investors may look to invest in assets with a historically high degree of volatility.

The coefficient of variation (CV) is a statistical measure of the dispersion of data points in a data series around the mean.

In finance, the coefficient of variation allows investors to determine how much volatility, or risk, is assumed in comparison to the amount of return expected from investments.

**Decision Tree Analysis:**

In a random forest, multiple decision trees are trained, by using different resample of your data.

In the end, probabilities can be calculated by the proportion of decision trees which vote for each class. This I think is a much more robust approach to estimate probabilities than using individual decision trees.

The Decision Tree Analysis is a schematic representation of several decisions followed by different chances of the occurrence.

Assign value to each decision point equivalent to the NPV of the alternative selected.

It can be of two types: Categorical Variable Decision Tree: Decision Tree which has a categorical target variable then it called a Categorical variable decision tree.

Continuous Variable Decision Tree: Decision Tree has a continuous target variable then it is called Continuous Variable Decision Tree.