



CSC1103 Laboratory/Tutorial 2 : Problem Solving

1. When a set of values has a sufficiently strong central tendency, which is the tendency to cluster around some particular value, finding the central moment statistics of such samples (the mean) is a very useful methodology to solve some of the problem statement especially in the unsupervised k -means clustering machine learning.

By applying computational thinking, write an algorithm in terms of flowchart and pseudocode to compute the mean of the values $x_1, x_2 \dots x_N$ with equal probability of occurrence for all values of x

$$E(x) = \bar{x} = \frac{1}{N} \sum_{n=1}^N x_n$$

which estimates the values around which central clustering occurs and N is the total number of samples.

2. In elementary algebra, the Binomial theorem describes the algebraic expansion of powers of a binomial which break $(x + y)^n$ into sum involving terms of the form $ax^b y^c$ where the exponent b and c are nonnegative integers with $b + c = n$, and the coefficient a is known as binomial coefficient deriving from Pascal's triangle. The coefficient a can be obtained from

$$a = \binom{n}{b} = \binom{n}{c} = \frac{n!}{b!(n-b)!} \quad b = 0, 1, 2 \dots n$$

For example

$$(x + y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

Binomial theorem is a very useful in both engineering and computer science such as assigning Internet address (IP) address to computer host or in machine learning algorithm such as ensemble learning method classification

By applying computational thinking, write pseudocode to read a value of n numbers of two number x and y and obtain the binomial expansion of $(x + y)^n$.