QT

PROBABILITY

K H ABDU RAZAK
Associate Professor
PG Dept. of Commerce
MES Keveeyam College, Valanchery

Course Objectives

1. *To acquaint students with the important statistical techniques for* ***managerial decision making.***
2. *To make the students learn the process of using statistical tools for validating findings and interpreting statistical results.*

Module I 20 Hours

Probability and Probability Distribution:

- Definitions- Probability Rules
- Application of Probability Rules
- Conditional Probability
- Bayes theorem-
- Random Variable and Probability Distributions
- Binomial Distribution
- Poisson Distribution and Normal Distribution.

Probability

- Probability is a branch of mathematics
- that deals with **calculating the likelihood** of a given event's occurrence,
- which is expressed as a number between **1 and 0**.
- Probability is a measure of how likely it is for an event to happen.

Random experiment

- experiment has 2 or more outcomes which vary in an unpredictable manner from trial to trial
- eg: tossing a coin

features:

- 2 or more outcomes
- outcomes are unpredictable
- experiment is repeatable

event

An **event** is an outcome or a set of outcomes of a random process

Example: Tossing a coin three times

Event A = getting exactly two heads

= {HTH, HHT, THH}

Example: Tossing a fair dice

Event A = result is an even number = {2, 4, 6}

- An event with a probability of 1 can be considered a certainty:
- for example, the probability of a coin toss resulting in either "heads" or "tails" is 1, because there are no other options.
- the probability that the coin will land (flat) without either side facing up is 0, because either "heads" or "tails" must be facing up.

- In the toss of a coin, the probability of **getting a tail** is **1/2:**

$$\frac{\text{The number of outcomes that give a tail(1)}}{\text{The total number of possible outcomes, head /tail (2)}}$$

- In the toss of a die, the probability of getting one dot is 1/6:

$$\frac{\text{the number of outcomes that give one dot (1)}}{\text{the total number of possible outcomes, one through six dots (6)}}$$

$$\text{So } P(a) = \frac{a}{n}$$

Sample point

- ……every decomposable outcome of a random experiment

- when a coin is tossed, getting head is a SP

- when 2 dice are thrown, getting 2,3 is a SP

Sample space

- The **sample space** of an experiment is the set of **all possible outcomes** of that experiment.

- when a coin is tossed {head, tail}
- when 2 coins are tossed {HH, TT, HT, TH}

- So it is the totality of all possible outcomes of random experiment

- A box containing 10 ticket each numbered 1 to 10 . A ticket is drown . What is the sample space

- {1,2,3,4,5,6,7,8,9,10}

- From a lot containing good and bad items, 3 items are chosen. Prepare the sample space.
- GGG
- GGB
- GBG
- BGG
- BBB
- BBG
- BGB
- GBB

Event

- subset of a sample space of a random experiment
- An **event** is an outcome or a set of outcomes of a random process

Event may be simple or compound:

- When a die is thrown , getting 2 is a simple event

……Joint occurrence of two or more simple event is called compound event

- When a die is thrown, getting an event number is compound event (2,4,6)

Sure event

- an event whose occurrence is inevitable

getting a white ball from the bag containing all white ball

(it is the sample space)

Impossible event

- if an event can not occur, then the event is called Impossible event

- t is a empty set (no sample point)

- **uncertain event**
- happening is either sure nor impossible
- occurrence of the event is not predictable
- Eg: Getting a white ball from a bag containing white and black ball

Equally likely event

- two events are said to be equally likely if any of them cannot be expected to occur in preference to the other
- Eg: 1. Getting Head and getting Tail when a coin is tossed
- Getting 1 and getting 2 when a die is thrown

Mutually exclusive event

- if occurrence of an event prevent the occurrence of other event
- Eg: Getting Head and getting Tail when a coin is tossed

- Two mutually exclusive events cannot occur simultaneously in the same trial
- if A and B are Mutually exclusive then A∩ B will be ϕ (null set)

Exhaustive event

- a group of events **include all possible outcomes** of a random experiment
- at least one of the event will happen in any trial of the random experiment

- when die is thrown, outcomes 1,2,3,4,5 and 6 together will form exhaustive event

Independent event

- Event whose **occurrence or non-occurrence** is **not in any way influenced** by the occurrence or non-occurrence of another event.
- Two events, A and B, are **independent** if the fact that A occurs does not affect the probability of B occurring.
- Eg:in tossing of a coin twice, the result of second tossing is not affected by the result of the first toss

Definitions of probability

numerical value given to the likelihood of the occurrence of that event.

it is the number given between 0 and 1 . 1 certain occur, 0 which can not be occur. If the event is uncertain , P will be between 0 to 1

Eg. Toss a coin (getting head is uncertain)

Classical Definition

- when a random experiment produces only finite number of outcomes, say ‘n(s)’. All the events are equally likely and mutually exclusive . Let ‘n(A), favorable to the an event ‘A’. Then the probability of A is
- $P(A) = \frac{n(A)}{n(S)}$

n(A)= favorable

n (S)= total