

2.02 Discrete Distributions

Discrete Probability Distributions

- These distributions model the probabilities of random variables that can have discrete values as outcomes.
- Example:
 - the possible values for the random variable X that represents the number of heads that can occur when a coin is tossed twice are the set $\{0, 1, 2\}$ and not any value from 0 to 2 like 0.1 or 1.6.

Why Probability Distributions?

- Each Prob Distr. provides us extra information on the behaviour of the data involved.
- Each Prob Distr. is given by a **probability function** that generalizes the probabilities of the outcomes.
 - Using this, we can estimate the prob of a particular outcome
 - The prob function is called a Probability Mass function (PMF) for discrete
 - The total value of PMF over the entire domain is always equal to one.

Discrete Distributions – Bernoulli Distribution

- This distribution is generated when we perform an experiment once and it has only two possible outcomes – success and failure.
- Let p be the probability of success and $1 - p$ is the probability of failure.

Discrete Distributions – Binomial Distribution

- This is generated for random variables with only two possible outcomes.
- Parameters are p (probability of success), n (number of trials) and x (number of times we obtain a success)
- Performing the experiment repeatedly and plotting the probability each time gives us the Binomial distribution.

Discrete Distributions – Poisson Distribution

- This distribution describes the events that occur in a fixed interval of time or space.
- Key parameter is λ (number of times the event has occurred in a certain period of time)