Statistics for Data Science -1

Lecture 8.3: Discrete and Continuous Random Variable

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Learning objectives

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3. Probability mass function, graph, and examples.

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4. Cumulative distribution function, graphs, and examples.

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4. Cumulative distribution function, graphs, and examples.
5. Expectation and variance of a random variable.

Dicrete and continuous random variable

Discrete and Continuous random variables

Definition

A random variable that can take on at most a countable number of possible values is said to be a discrete random variable.

- Thus, any random variable that can take on only a finite number or countably infinite number of different values is discrete.
- There also exist random variables whose set of possible values is uncountable.

Definition

When outcomes for random event are numerical, but cannot be counted and are infinitely divisible, we have continuous random variables.

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  - Continuous random variables typically involve measuring.

Example: Apartment complex

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Apartment complex data:

- There are four floors in the apartment complex.
- Each floor has three apartments: a one bedroom, a two bedroom and a three bedroom apartment.
- The data on the apartments is summarized in the table

Apartment complex data

Apartment complex data

Apartment number	Floor number	No. of bedrooms	Size of apartment (sq.ft)	Distance of apartment from lift (meters)
1	1	1	900.23	503.5
2	1	2	1175.34	325.6
3	1	3	1785.85	450.8
4	2	1	900.48	500.1
5	2	2	1175.23	324.5
6	2	3	1785.35	456.7
7	3	1	900.53	502.5
8	3	2	1176.34	325.6
9	3	3	1787.85	450.8
10	4	1	900.78	500.1
11	4	2	1176.03	325.4
12	4	3	1784.85	455.7

Apartment complex

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- $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

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   Answer: [900,1800] sq. ft
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   Answer: [324,505] meters

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  - Number of languages a person can speak
  - Number of times a person takes a particualr test before qualifying.
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- Continuous:
  - Temperature of a person.
  - Height of a person.
  - Speed of a vehicle.
  - Time taken by a person to write an exam.

Section summary

- Definitions of Discrete random variable versus continuous random variable
- Identify discrete and continuous random variables.