

Topic to discuss

- Interpolation
- Extrapolation
- Difference between Interpolation & Extrapolation
- Graph Representation
- Operators in interpolation
- Methods to solve interpolation

Interpolation : Interpolation is the process of estimating unknown values within the range of known data points

x	y
2	5
4	8
6	13
8	22
10	35

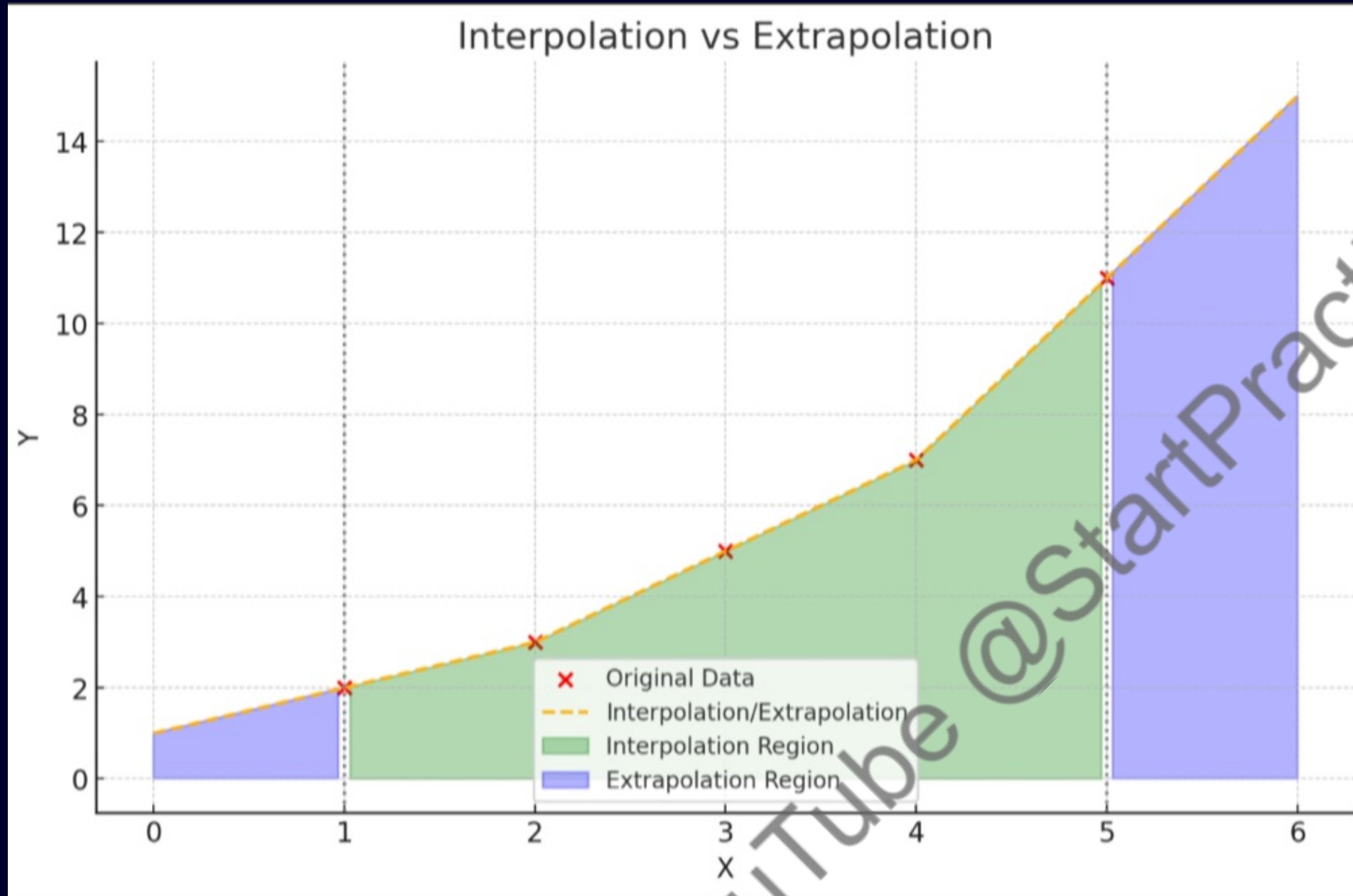
Extrapolation : Extrapolation is the process of estimating unknown values outside the range of known data points.

x	y
2	5
4	8
6	13
8	22
10	35

Comparison

Aspect	Interpolation	Extrapolation
Data Range	Within the range of known data points	Outside the range of known data points
Accuracy	Generally higher, more reliable	Generally lower, more prone to errors
Risk	Lower risk, as estimates are within the observed range	Higher risk, as estimates rely on the assumption that trends continue beyond the known data
Common Methods	Linear, polynomial (Lagrange, Newton), spline	Linear, polynomial, various models
Application	Estimating intermediate values	Predicting future values or values beyond observed range

Graph Representation



Operators in Numerical Method

Operators are used to facilitate the process of estimating unknown values between known data points.

Difference Operators :

- 1) Forward difference operators (Δ)
- 2) Backward difference operators (∇)
- 3) Central difference operators (δ)

Shift Operators

- 1) Forward shift operators (E)
- 2) Backward shift operators (E^{-1})

Averaging Operator (μ)

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Methods to solve Interpolation

For Equal Intervals :

- Newton Forward
- Newton Backward
- central difference
 - Gauss forward
 - Gauss backward
 - Stirling central difference
 - Bessel's central difference

x	y
2	5
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forward (3)

Backward (9)

Unequal Intervals :

- Lagrange's interpolation
- Newton divide and difference

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