

Numerical Interpolation

Talk to a Teacher Project

<http://spoken-tutorial.org>

National Mission on Education through ICT

<http://sakshat.ac.in>

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Objectives

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- **Develop Scilab code for different Numerical Interpolation algorithms**



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- **Develop Scilab code for different Numerical Interpolation algorithms**
- **Calculate the function from the given points**



System Requirements

- OS: Ubuntu Linux 12.04



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- **Scilab 5.3.3**



Prerequisites

- **Basic knowledge of Scilab**



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- **Interpolation using numerical methods**



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- Basic knowledge of Scilab
- Interpolation using numerical methods
- Please refer to the relevant Scilab tutorials available on <http://spoken-tutorial.org>



Numerical Interpolation

- Method of constructing new data points



Numerical Interpolation

- **Method of constructing new data points**
- **Within the range of a discrete set of known data points**



Numerical Interpolation

- Method of constructing new data points
- Within the range of a discrete set of known data points
- Solve interpolation problems using numerical methods



Lagrange Interpolation

- **pass a polynomial**



Lagrange Interpolation

- pass a polynomial
- degree $N - 1$



Lagrange Interpolation

- pass a polynomial
- degree $N - 1$
- N points



Lagrange Interpolation

- pass a polynomial
- degree $N - 1$
- N points
- Find the unique order N polynomial $y(x)$ which interpolates the samples



Example

- **Compute $\ln 9.2$ from**

$$\ln 9.0 = 2.1792$$

$$\ln 9.5 = 2.2513$$

$$\ln 11.0 = 2.3979$$



Newton's Divided Difference Method

- Uses Divided differences recursive method



Newton's Divided Difference Method

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Newton's Divided Difference Method

- Uses Divided differences recursive method
- Lesser number of computations than Lagrange method
- Same polynomial



Example

- Find the value of $f(3)$ for the given data

$$x = 2, f(x) = 0.5$$

$$x = 2.5, f(x) = 0.4$$

$$x = 3.25, f(x) = 0.3077$$

$$x = 4, f(x) = 0.25$$



Summary

In this tutorial, we have learnt to:

- **Develop Scilab code for interpolation methods**
- **Find the value of function at new data point**



Assignment

Find y for $x = 3.5$ for the given (x, y) pairs:

$(0, 15), (1, 10), (2, 9), (3, 6), (4, 2), (5, 0)$



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- Conducts workshops using spoken tutorials
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- For more details, please write to contact@spoken-tutorial.org



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- More information on this Mission is available at

<http://spoken-tutorial.org/NMEICT-Intro>

