Solving Nonlinear Equations using Numerical Methods

Talk to a Teacher Project
http://spoken-tutorial.org
National Mission on Education through ICT
http://sakshat.ac.in

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8 January 2014

At the end of this tutorial, you will learn how to:

Objectives

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- Secant method

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- **Develop Scilab code to solve nonlinear equations**

System Requirements

- **OS: Ubuntu Linux 12.04**

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- **Scilab 5.3.3**

- **Basic knowledge of Scilab**

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- **Please refer to the relevant Scilab tutorials available on http://spoken-tutorial.org**

Solving Nonlinear Equations

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- Root finding or zero finding

Bisection Method

- Begins with initial bracket

Bisection Method

- **Begins with initial bracket**
- **Repeatedly halves its length**

Bisection Method

- **Begins with initial bracket**
- **Repeatedly halves its length**
- **Solution is isolated**

Find the solution accurate to within 10^{-5} for

$$f(x) = 2.sinx - \frac{e^x}{4} - 1$$

in the interval [-5, -3]

- **Derivative is approximated**

Secant Method

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- **Finite difference**

Secant Method

- **Derivative is approximated**
- **Finite difference**
- **Two successive iteration values**

Solve :

$$f(x) = x^2 - 6$$

$$p_0 = 2, p_1 = 3$$

Find root using Secant Method

Summary

In this tutorial, we have learnt to:

- **Develop Scilab code for solving nonlinear equations**
- **Find the value of the root of a nonlinear equation**

Solve :
$$f(x) = x^2 - 2 \text{ within } 10^{-6}$$
$$x_0 = 1, x_1 = 2$$
Find root using the two methods in the interval $[0, 5]$

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Acknowledgements

- **Spoken Tutorial Project is a part of the Talk to a Teacher project**
- **It is supported by the National Mission on Education through ICT, MHRD, Government of India**
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