Collected papers of

Lord Soumadeep Ghosh

Volume 27

The Alternative Umbrella probability density function

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the Alternative Umbrella probability density function which is never 1.
The paper ends with "The End"

Introduction

In this paper, I describe the Alternative Umbrella probability density function which is never 1.

The Alternative Umbrella probability density function

The Alternative Umbrella probability density function is

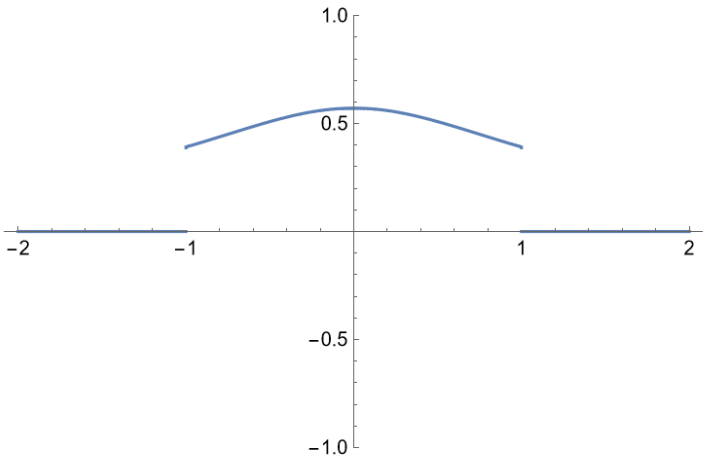
$$f(x) = \frac{\sqrt{3}}{4\tan^{-1}(\sqrt{3}\tan(\frac{1}{2}))} \begin{cases} \frac{1}{2-\cos(x)} & -1 \leq x \leq 1 \\ 0 & x < -1 \vee x > 1 \end{cases}$$

Then

1. $0 \leq f(x) \leq 1$ for all real x
2. $\int_{-\infty}^{\infty} f(x)dx = 1$

Thus $f(x)$ is a probability density function which is never 1 for any real x.

Plot of the Alternative Umbrella probability density function



The End

Islands of monetary stability

Soumadeep Ghosh, Sahin Aftab Mondal

Kolkata, India

Abstract

In this paper, I describe Islands of monetary stability. The paper ends with "The End"

Introduction

Mathematical stability exists even in time series of monetary aggregates. In this paper, I describe Islands of monetary stability.

Islands of monetary stability

Islands of monetary stability are given by

$$\frac{2+\bar{e}}{2-\bar{c}} = \left(\bar{s} + \frac{1}{\bar{g}}\right)^2$$

where
$\bar{e}$ is estimated expansionary force
$\bar{c}$ is estimated contractionary force
$\bar{s}$ is a **Sahin constant**
$\bar{g}$ is a **Ghosh constant**

Islands of monetary stability with low contractionary force

1.
$$\bar{e} = \frac{41}{8}, \bar{s} = \frac{391}{206}, \bar{g} = 119, \bar{c} = \frac{173300107}{4368320450}$$

2.
$$\bar{e} = \frac{89}{8}, \bar{s} = \frac{89}{40}, \bar{g} = \frac{179}{69}, \bar{c} = \frac{25845962}{349353481}$$

3.
$$\bar{e} = \frac{355}{8}, \bar{s} = \frac{\sqrt{371}}{4}, \bar{g} = 28, \bar{c} = \frac{14\sqrt{371}+1}{7\sqrt{371}+9090}$$

4.
$$\bar{e} = \frac{265}{4}, \bar{s} = \frac{19}{9}, \bar{g} = \frac{2531}{9640}, \bar{c} = \frac{293769755}{5595154708}$$

5.
$$\bar{e} = \frac{133}{2}, \bar{s} = \frac{59}{18}, \bar{g} = \frac{447}{1166}, \bar{c} = \frac{5729744}{249229369}$$

6.
$$\bar{e} = \frac{535}{8}, \bar{s} = \frac{3946}{663}, \bar{g} = 108, \bar{c} = \frac{1248681380}{20242744729}$$

7.
$$\bar{e} = 77, \bar{s} = \sqrt{\frac{79}{2}}, \bar{g} = 26, \bar{c} = \frac{2(26\sqrt{158}+1)}{26\sqrt{158}+26703}$$

Islands of monetary stability with high contractionary force

1. $$\bar{e} = \frac{89}{351}, \bar{s} = 121, \bar{g} = 24, \bar{c} = \frac{94027618}{47017425}$$

2. $$\bar{e} = \frac{134}{351}, \bar{s} = 94, \bar{g} = 93, \bar{c} = \frac{5961520426}{2981161911}$$

3. $$\bar{e} = \frac{530}{351}, \bar{s} = 70, \bar{g} = 48, \bar{c} = \frac{880797646}{440556519}$$

4. $$\bar{e} = \frac{532}{351}, \bar{s} = 91, \bar{g} = 78, \bar{c} = \frac{302310638}{151187403}$$

5. $$\bar{e} = \frac{638}{351}, \bar{s} = 40, \bar{g} = 28, \bar{c} = \frac{881111422}{441080991}$$

6. $$\bar{e} = \frac{214}{117}, \bar{s} = 121, \bar{g} = 49, \bar{c} = \frac{2056877738}{1028573325}$$

7. $$\bar{e} = \frac{17}{9}, \bar{s} = 81, \bar{g} = 55, \bar{c} = \frac{357300973}{178703424}$$

The End

Interpolating polynomials up to order 5

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe interpolating polynomials up to order 5.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe interpolating polynomials up to order 5.

Interpolating polynomial of order 1

The interpolating polynomial of order 1 for 1 known point (x_1, y_1) is

$$f(x) = y_1$$

Interpolating polynomial of order 2

The interpolating polynomial of order 2 for 2 known distinct points (x_1, y_1) and (x_2, y_2) is

$$f(x) = \frac{(x - x_1)(y_1 - y_2)}{x_1 - x_2} + y_1$$

Interpolating polynomial of order 3

The interpolating polynomial of order 3 for 3 known distinct points (x_1, y_1), (x_2, y_2) and (x_3, y_3) is

$$f(x) = (x - x_1)\left(\frac{(x - x_2)(\frac{y_2 - y_1}{x_1 - x_2} + \frac{y_2 - y_3}{x_2 - x_3})}{x_3 - x_1} + \frac{y_1 - y_2}{x_1 - x_2}\right) + y_1$$

Interpolating polynomial of order 4

The interpolating polynomial of order 4 for 4 known distinct points (x_1, y_1), (x_2, y_2), (x_3, y_3) and (x_4, y_4) is

$$f(x) = (x - x_1)\left((x - x_2)\left(\frac{\frac{y_2-y_1}{x_1-x_2} + \frac{y_2-y_3}{x_2-x_3}}{x_3 - x_1} + \frac{(x - x_3)\left(\frac{\frac{y_3-y_2}{x_2-x_3}+\frac{y_3-y_4}{x_3-x_4}}{x_4-x_2} - \frac{\frac{y_2-y_1}{x_1-x_2}+\frac{y_2-y_3}{x_2-x_3}}{x_3-x_1}\right)}{x_4 - x_1}\right) + \frac{y_1 - y_2}{x_1 - x_2}\right) + y_1$$

Interpolating polynomial of order 5

The interpolating polynomial of order 5 for 5 known distinct points (x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4) and (x_5, y_5) is

$$f(x) = (x{-}x_1)\left((x - x_2)\left(\frac{\frac{y_2-y_1}{x_1-x_2} + \frac{y_2-y_3}{x_2-x_3}}{x_3 - x_1} + (x - x_3)\left(\frac{\frac{\frac{y_3-y_2}{x_2-x_3}+\frac{y_3-y_4}{x_3-x_4}}{x_4-x_2} - \frac{\frac{y_2-y_1}{x_1-x_2}+\frac{y_2-y_3}{x_2-x_3}}{x_3-x_1}}{x_4 - x_1} + \frac{(x - x_4)\left(\frac{\frac{\frac{y_4-y_3}{x_3-x_4}+\frac{y_4-y_5}{x_4-x_5}}{x_5-x_3} - \frac{\frac{y_3-y_2}{x_2-x_3}+\frac{y_3-y_4}{x_3-x_4}}{x_4-x_2}}{x_5-x_2} - \frac{\frac{\frac{y_3-y_2}{x_2-x_3}+\frac{y_3-y_4}{x_3-x_4}}{x_4-x_2} - \frac{\frac{y_2-y_1}{x_1-x_2}+\frac{y_2-y_3}{x_2-x_3}}{x_3-x_1}}{x_4-x_1}\right)}{x_5 - x_1}\right)\right) + \frac{y_1 - y_2}{x_1 - x_2}\right) {+} y_1$$

The End

Interpolating polynomial of order 6

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of order 6. The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In a previous paper, I've described interpolating polynomials up to order 5.
In this paper, I describe the interpolating polynomial of order 6.

Interpolating polynomial of order 6

For 6 known distinct points (x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4), (x_5, y_5) and (x_6, y_6),
Let

$$a = \frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2} - \frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}$$

,

$$b = \frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2} - \frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}$$

$$c = \frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2} - \frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}$$

$$d = \frac{y_3-y_2}{x_3-x_2} - \frac{y_2-y_1}{x_2-x_1}$$

$$e = \frac{y_2-y_1}{x_2-x_1}$$

Then the interpolating polynomial of order 6 for those 6 known distinct points is

$$f(x) = (x-x_1)\left((x-x_2)\left((x-x_3)\left((x-x_4)\left(\frac{a\,(x-x_5)}{x_6-x_1}+\frac{b}{x_5-x_1}\right)+\frac{c}{x_4-x_1}\right)+\frac{d}{x_3-x_1}\right)+e\right)+y_1$$

The End

Interpolating polynomial of order 7

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of order 7. The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In previous papers, I've described interpolating polynomials up to order 6.
In this paper, I describe the interpolating polynomial of order 7.

Interpolating polynomial of order 7

For 7 known distinct points (x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4), (x_5, y_5), (x_6, y_6) and (x_7, y_7),
Let

$$a_1 = \frac{\frac{\frac{\frac{\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}-\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}}{x_7-x_4}-\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}}{x_7-x_3}-\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}}{x_7-x_2}$$

$$a_2 = \frac{\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}-\frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}}{x_6-x_1}$$

,

$$a = a_1 - a_2$$

$$b = \frac{\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}-\frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}}{x_6-x_1}$$

$$c = \frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}$$

$$d = \frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}$$

$$e = \frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}$$

$$f = \frac{y_2-y_1}{x_2-x_1}$$

Then the interpolating polynomial of order 7 for those 7 known distinct points is

$$f(x) = (x-x_1)\left((x-x_2)\left((x-x_3)\left((x-x_4)\left((x-x_5)\left(\frac{a\,(x-x_6)}{x_7-x_1}+b\right)+c\right)+d\right)+e\right)+f\right)+y_1$$

The End

Interpolating polynomial of order 8

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of order 8. The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In previous papers, I've described interpolating polynomials up to order 7.
In this paper, I describe the interpolating polynomial of order 8.

Interpolating polynomial of order 8

For 8 known distinct points (x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4), (x_5, y_5), (x_6, y_6), (x_7, y_7) and (x_8, y_8),
Let

$$a_{11} = \frac{\frac{\frac{\frac{\frac{y_8-y_7}{x_8-x_7}-\frac{y_7-y_6}{x_7-x_6}}{x_8-x_6}-\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}}{x_8-x_5}-\frac{\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}-\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}}{x_7-x_4}}{x_8-x_4}-\frac{\frac{\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}-\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}}{x_7-x_4}-\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}}{x_7-x_3}}{x_8-x_3}$$

$$a_{12} = \frac{\frac{\frac{\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}-\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}}{x_7-x_4}-\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}}{x_7-x_3}-\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}}{x_7-x_2}$$

$$a_{21} = \frac{\frac{\frac{\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}-\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}}{x_7-x_4}-\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}}{x_7-x_3}-\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}}{x_7-x_2}$$

$$a_{22} = \frac{\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}-\frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}}{x_6-x_1}$$

$$a_1 = \frac{a_{11} - a_{12}}{x_8 - x_2}$$

$$a_2 = \frac{a21 - a22}{x_7 - x_1}$$

$$a = a_1 - a_2$$

$$b_1 = \frac{\frac{\frac{\frac{\frac{y_7-y_6}{x_7-x_6}-\frac{y_6-y_5}{x_6-x_5}}{x_7-x_5}-\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}}{x_7-x_4}-\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}}{x_7-x_3}-\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}}{x_7-x_2}$$

$$b_2 = \frac{\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}-\frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}}{x_6-x_1}$$

$$b = \frac{b_1 - b_2}{x_7 - x_1}$$

$$c = \frac{\frac{\frac{\frac{\frac{y_6-y_5}{x_6-x_5}-\frac{y_5-y_4}{x_5-x_4}}{x_6-x_4}-\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}}{x_6-x_3}-\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}}{x_6-x_2}-\frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}}{x_6-x_1}$$

$$d = \frac{\frac{\frac{\frac{y_5-y_4}{x_5-x_4}-\frac{y_4-y_3}{x_4-x_3}}{x_5-x_3}-\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}}{x_5-x_2}-\frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}}{x_5-x_1}$$

$$e = \frac{\frac{\frac{y_4-y_3}{x_4-x_3}-\frac{y_3-y_2}{x_3-x_2}}{x_4-x_2}-\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_4-x_1}$$

$$f = \frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}$$

$$g = \frac{y_2 - y_1}{x_2 - x_1}$$

Then the interpolating polynomial of order 8 for those 8 known distinct points is

$$f(x) = (x-x_1)\left((x-x_2)\left((x-x_3)\left((x-x_4)\left((x-x_5)\left((x-x_6)\left(\frac{a\,(x-x_7)}{x_8-x_1}+b\right)+c\right)+d\right)+e\right)+f\right)+g\right)+y_1$$

The End

Interpolating polynomial of 1 known point with 1 known derivative

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of 1 known point with 1 known derivative.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe the interpolating polynomial of 1 known point with 1 known derivative.

Interpolating polynomial of 1 known point with 1 known derivative

For 1 known point (x_1, y_1) with known derivative $tan(\theta_1)$, the interpolating polynomial is

$$f(x) = (x - x_1)\tan(\theta_1) + y_1$$

The End

Interpolating polynomials of 2 known distinct points with 1 known derivative

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe interpolating polynomials of 2 known distinct points with 1 known derivative.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe interpolating polynomials of 2 known distinct points with 1 known derivative.

Interpolating polynomial of 2 known distinct points with known derivative at the 1^{st} point

For 2 known distinct points (x_1, y_1) with known derivative $tan(\theta_1)$ and (x_2, y_2), the interpolating polynomial is

$$f(x) = (x - x_1)\left(\tan(\theta_1) + \frac{(x - x_1)\left(\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)\right)}{x_2 - x_1}\right) + y_1$$

Interpolating polynomial of 2 known distinct points with known derivative at the 2^{nd} point

For 2 known distinct points (x_1, y_1) and (x_2, y_2) with known derivative $tan(\theta_2)$, the interpolating polynomial is

$$f(x) = (x - x_1)\left(\frac{(x - x_2)\left(\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}\right)}{x_2 - x_1} + \frac{y_2 - y_1}{x_2 - x_1}\right) + y_1$$

The End

Interpolating polynomial of 2 known distinct points with 2 known derivatives

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of 2 known distinct points with 2 known derivatives.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe the interpolating polynomial of 2 known distinct points with 2 known derivatives.

Interpolating polynomial of 2 known distinct points with 2 known derivatives

For 2 known distinct points (x_1, y_1) with known derivative $tan(\theta_1)$ and (x_2, y_2) with known derivative $tan(\theta_2)$, the interpolating polynomial is

$$f(x) = (x - x_1)\left(\tan(\theta_1) + (x - x_1)\left(\frac{(x - x_2)\left(\frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1} - \frac{\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)}{x_2 - x_1}\right)}{x_2 - x_1} + \frac{\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)}{x_2 - x_1}\right)\right) + y_1$$

The End

Interpolating polynomial of 3 known distinct points with 1 known derivative

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of 3 known distinct points with 1 known derivative.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe the interpolating polynomial of 3 known distinct points with 1 known derivative.

Interpolating polynomial of 3 known distinct points with known derivative at 1^{st} point

For 3 known distinct points (x_1, y_1) with known derivative $tan(\theta_1)$, (x_2, y_2) and (x_3, y_3), the interpolating polynomial is

$$f(x) = (x - x_1)\left(\tan(\theta_1) + (x - x_1)\left(\frac{(x - x_2)\left(\frac{\frac{y_3-y_2}{x_3-x_2} - \frac{y_2-y_1}{x_2-x_1}}{x_3-x_1} - \frac{\frac{y_2-y_1}{x_2-x_1} - \tan(\theta_1)}{x_2-x_1}\right)}{x_3 - x_1} + \frac{\frac{y_2-y_1}{x_2-x_1} - \tan(\theta_1)}{x_2 - x_1}\right)\right) + y_1$$

Interpolating polynomial of 3 known distinct points with known derivative at 2^{nd} point

For 3 known distinct points (x_1, y_1), (x_2, y_2) with known derivative $tan(\theta_2)$ and (x_3, y_3), the interpolating polynomial is

$$f(x) = (x - x_1)\left((x - x_2)\left(\frac{(x - x_2)\left(\frac{\frac{y_3-y_2}{x_3-x_2} - \tan(\theta_2)}{x_3-x_2} - \frac{\tan(\theta_2) - \frac{y_2-y_1}{x_2-x_1}}{x_2-x_1}\right)}{x_3 - x_1} + \frac{\tan(\theta_2) - \frac{y_2-y_1}{x_2-x_1}}{x_2 - x_1}\right) + \frac{y_2 - y_1}{x_2 - x_1}\right) + y_1$$

Interpolating polynomial of 3 known distinct points with known derivative at 3^{rd} point

For 3 known distinct points (x_1, y_1), (x_2, y_2) and (x_3, y_3) with known derivative $tan(\theta_3)$, the interpolating polynomial is

$$f(x) = (x - x_1)\left((x - x_2)\left(\frac{(x - x_3)\left(\frac{\tan(\theta_3) - \frac{y_3 - y_2}{x_3 - x_2}}{x_3 - x_2} - \frac{\frac{y_3 - y_2}{x_3 - x_2} - \frac{y_2 - y_1}{x_2 - x_1}}{x_3 - x_1}\right)}{x_3 - x_1} + \frac{\frac{y_3 - y_2}{x_3 - x_2} - \frac{y_2 - y_1}{x_2 - x_1}}{x_3 - x_1}\right) + \frac{y_2 - y_1}{x_2 - x_1}\right) + y_1$$

The End

Interpolating polynomial of 3 known distinct points with 2 known derivatives

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of 3 known distinct points with 2 known derivatives.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe the interpolating polynomial of 3 known distinct points with 2 known derivatives.

Interpolating polynomial of 3 known distinct points with known derivatives at 1^{st} and 2^{nd} points

For 3 known distinct points (x_1, y_1) with known derivative $tan(\theta_1)$, (x_2, y_2) with known derivative $tan(\theta_2)$ and (x_3, y_3), the interpolating polynomial is

$$f(x) = (x-x_1)\left(\tan(\theta_1) + (x-x_1)\left((x-x_2)\left(\frac{\frac{\tan(\theta_2)-\frac{y_2-y_1}{x_2-x_1}}{x_2-x_1} - \frac{\frac{y_2-y_1}{x_2-x_1}-\tan(\theta_1)}{x_2-x_1}}{x_2-x_1} + \frac{(x-x_2)\left(\frac{\frac{\frac{y_3-y_2}{x_3-x_2}-\tan(\theta_2)}{x_3-x_2} - \frac{\tan(\theta_2)-\frac{y_2-y_1}{x_2-x_1}}{x_2-x_1}}{x_3-x_1} - \frac{\frac{\tan(\theta_2)-\frac{y_2-y_1}{x_2-x_1}}{x_2-x_1} - \frac{\frac{y_2-y_1}{x_2-x_1}-\tan(\theta_1)}{x_2-x_1}}{x_2-x_1}\right)}{x_3-x_1}\right) + \frac{\frac{y_2-y_1}{x_2-x_1}-\tan(\theta_1)}{x_2-x_1}\right)\right) + y_1$$

Interpolating polynomial of 3 known distinct points with known derivatives at 1^{st} and 3^{rd} points

For 3 known distinct points (x_1, y_1) with known derivative $tan(\theta_1)$, (x_2, y_2) and (x_3, y_3) with known derivative $tan(\theta_3)$, the interpolating polynomial is

$$f(x) = (x-x_1)\left(\tan(\theta_1) + (x-x_1)\left((x-x_2)\left(\frac{\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1} - \frac{\frac{y_2-y_1}{x_2-x_1}-\tan(\theta_1)}{x_2-x_1}}{x_3-x_1} + \frac{(x-x_3)\left(\frac{\frac{\tan(\theta_3)-\frac{y_3-y_2}{x_3-x_2}}{x_3-x_2} - \frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1}}{x_3-x_1} - \frac{\frac{\frac{y_3-y_2}{x_3-x_2}-\frac{y_2-y_1}{x_2-x_1}}{x_3-x_1} - \frac{\frac{y_2-y_1}{x_2-x_1}-\tan(\theta_1)}{x_2-x_1}}{x_3-x_1}\right)}{x_3-x_1}\right) + \frac{\frac{y_2-y_1}{x_2-x_1}-\tan(\theta_1)}{x_2-x_1}\right)\right) + y_1$$

Interpolating polynomial of 3 known distinct points with known derivatives at 2^{nd} and 3^{rd} points

For 3 known distinct points (x_1, y_1), (x_2, y_2) with known derivative $tan(\theta_2)$ and (x_3, y_3) with known derivative $tan(\theta_3)$, the interpolating polynomial is

$$f(x) = (x - x_1)\left((x - x_2)\left((x - x_2)\left(\frac{\frac{\frac{y_3-y_2}{x_3-x_2}-\tan(\theta_2)}{x_3-x_2} - \frac{\tan(\theta_2)-\frac{y_2-y_1}{x_2-x_1}}{x_2-x_1}}{x_3 - x_1} + \frac{(x - x_3)\left(\frac{\frac{\tan(\theta_3)-\frac{y_3-y_2}{x_3-x_2}}{x_3-x_2} - \frac{\frac{y_3-y_2}{x_3-x_2}-\tan(\theta_2)}{x_3-x_2}}{x_3-x_2} - \frac{\frac{\frac{y_3-y_2}{x_3-x_2}-\tan(\theta_2)}{x_3-x_2} - \frac{\tan(\theta_2)-\frac{y_2-y_1}{x_2-x_1}}{x_2-x_1}}{x_3-x_1}\right)}{x_3 - x_1}\right) + \frac{\tan(\theta_2) - \frac{y_2-y_1}{x_2-x_1}}{x_2 - x_1}\right) + \frac{y_2 - y_1}{x_2 - x_1}\right) + y_1$$

The End

Interpolating polynomial of 3 known distinct points with 3 known derivatives

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the interpolating polynomial of 3 known distinct points with 3 known derivatives.
The paper ends with "The End"

Introduction

Interpolating polynomials are useful to many fields when there is a lack of data.
In this paper, I describe the interpolating polynomial of 3 known distinct points with 3 known derivatives.

Interpolating polynomial of 3 known distinct points with 3 known derivatives

For 3 known distinct points (x_1, y_1) with known derivative $tan(\theta_1)$, (x_2, y_2) with known derivative $tan(\theta_2)$ and (x_3, y_3) with known derivative $tan(\theta_3)$,
Let

$$a = \tan(\theta_1)$$

$$b = \frac{\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)}{x_2 - x_1}$$

$$c = \frac{\frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1} - \frac{\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)}{x_2 - x_1}}{x_2 - x_1}$$

$$d = \frac{\frac{\frac{\frac{y_3 - y_2}{x_3 - x_2} - \tan(\theta_2)}{x_3 - x_2} - \frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1}}{x_3 - x_1} - \frac{\frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1} - \frac{\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)}{x_2 - x_1}}{x_2 - x_1}}{x_3 - x_1}$$

$$e = \frac{\frac{\frac{\frac{\tan(\theta_3) - \frac{y_3 - y_2}{x_3 - x_2}}{x_3 - x_2} - \frac{\frac{y_3 - y_2}{x_3 - x_2} - \tan(\theta_2)}{x_3 - x_2}}{x_3 - x_2} - \frac{\frac{\frac{y_3 - y_2}{x_3 - x_2} - \tan(\theta_2)}{x_3 - x_2} - \frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1}}{x_3 - x_1}}{x_3 - x_1} - \frac{\frac{\frac{\frac{y_3 - y_2}{x_3 - x_2} - \tan(\theta_2)}{x_3 - x_2} - \frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1}}{x_3 - x_1} - \frac{\frac{\tan(\theta_2) - \frac{y_2 - y_1}{x_2 - x_1}}{x_2 - x_1} - \frac{\frac{y_2 - y_1}{x_2 - x_1} - \tan(\theta_1)}{x_2 - x_1}}{x_2 - x_1}}{x_3 - x_1}}{}$$

Then the interpolating polynomial of those 3 known distinct points with those 3 known derivatives is

$$f(x) = (x - x_1)\left(a + (x - x_1)\left(b + (x - x_2)\left(c + (x - x_2)\left(d + \frac{e\,(x - x_3)}{x_3 - x_1}\right)\right)\right)\right) + y_1$$

The End