



# NEWTON'S FORWARD INTERPOLATION

Assignment

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# Paper Title: Newton's forward interpolation: representation of numerical data by a polynomial curve

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## What is Newton's forward interpolation

Newton's forward difference formula is a finite difference identity giving an interpolated value between tabulated points in terms of the first value and the powers of the forward difference.

The formula is particularly useful for interpolating the values of  $f(x)$  near the beginning of the set of values given.

## Why

Newton's forward and backward interpolation aka Newton Gregory technique are only available for equal intervals. Let's say you have some data with equal interval and you want to find any missing value in these. Then the formula is used.

## When?

Newton's forward interpolation technique is to be used when the  $x$  - data point is near the beginning. That is, if you have four data points, say  $X = 1, 3, 5, 9$  and  $10$ . If you are looking for value of  $y$  at  $x = 3$  which is near the beginning of the table, then Newton's forward interpolation works best.

## How?

The formula given below can be used to represent a given set of numerical data on a pair of variables with the help of a polynomial equation. The formula is-

$$f(x) = A_0 + A_1x + A_2x^2 + A_3x^3 + \dots + A_nx^n$$

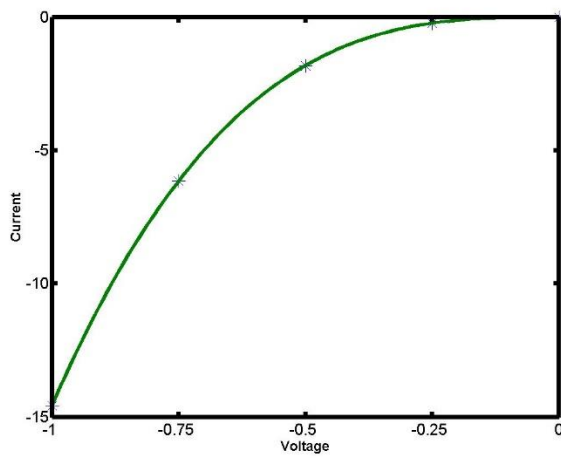
## Limitation

If the data has large number of swings, then the relations take unnatural curve. If we calculate a missing value, it will not be accurate. Here is an example

If we take the data,

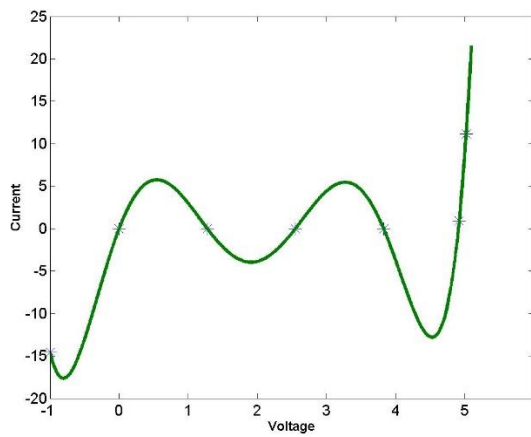
Voltage	-1.000	-.7500	-.500	-.2500	0.000
Current	-14.577	-6.15	-1.82	-.2278	0.000

The graph will be:



Now with a data that has a large amount of swings

Voltage	-1.000	0.000	1.2750	2.550	3.8250	4.925	5.0235
Current	-14.577	0.000	0.000	0.000	0.000	0.8791	11.1683



A missing value predicted by the curve has high error rates.

Future Work: