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

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.

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?

This formula is particularly useful for interpolating the values of f(x) near the beginning of the set of values given. h is called the interval of difference and $u = (x - a) / h$, Here a is the first term. It is like as below:

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x    y
0    1
1    4    > (4-1)/(1-0) = 3
2    9    > (9-4)/(2-1) = 5    > (5-3)/(2-0) = 1
3    16   > (16-9)/(3-2) = 7   > (7-5)/(3-1) = 1        > 0/(3-0)
```

So Newton's forward interpolating polynomial requirements is that the step size or the distance is constant. So the x distance or the step size is uniform and the degree is equal to the number of points.
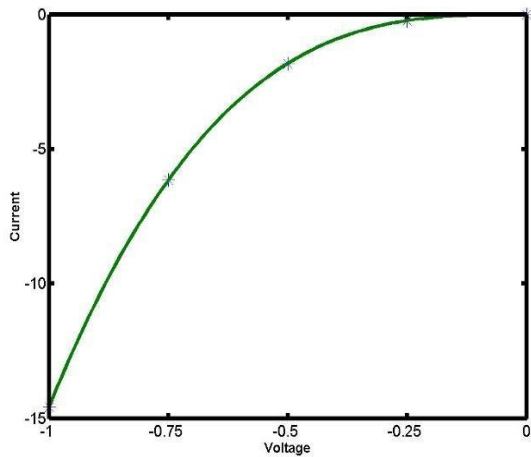
Limitation:

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:
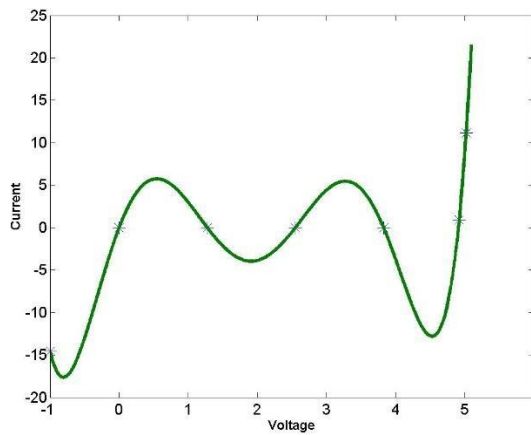
If we take the data,

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

So, the relations gave an unnatural curve. A missing value predicted by the curve has high error rates.