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

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Introduction: The word interpolation refers to interpolating some unknown information from a given set of known information. The technique of interpolation is widely used as a valuable tool in science and engineering. This formula is about newton forward interpolation. Newton’s forward interpolation formula for representing the numerical data on a pair of variables by a polynomial curve. Application of the formula to numerical data has been shown in the case of representing the data on the total population of India corresponding as a function of time. The formula is suitable in the situation where the values of the argument (i.e. independent variable) are at equal interval.

# Why need?

1.There are several numerical methods for differentiation, integration, and the solution of ordinary and partial differential equations. Another very useful application of the calculus of finite differences is in the derivation of interpolation/extrapolation formulas, the so called interpolating polynomials which can be used to represent experimental data when the actual functionality of these data is not known.

2.In order to reduce the numerical computations associated to the repeated application of the existing interpolation formula in computing a large number of interpolated values, a formula has been derived from Newton’s forward interpolation formula for representing the numerical data on a pair of variables by a polynomial curve. Application of the formula to numerical data has been shown in the case of representing the data on the total population of India corresponding as a function of time. The formula is suitable in the situation where the values of the argument (i.e. independent variable) are at equal interval.

3.In order to find population estimation or any kind of estimation this formula is needed.

# How to do?

In case of the interpolation by the existing formulae, the value of the dependent variable corresponding to each value of the independent variable is to be computed afresh from the used formula putting the value of the independent variable in it. That is if it is wanted to interpolate the values of the dependent variable corresponding to a number of values of the independent variable by a suitable existing interpolation formula, it is required to apply the formula for each value separately and thus the numerical computation of the value of the dependent variable based on the given data are to be performed in each of the cases. In order to get rid of these repeated numerical computations from the given data, one can think of an approach which consists of the representation of the given numerical data by a suitable polynomial and then to compute the value of the dependent variable from the polynomial corresponding to any given value of the independent variable from the polynomial corresponding to any given value of the independent variable. However, a method/formula is necessary for representing a given set of numerical data on a pair of variables by a suitable polynomial. One such formula has been developed in this study. The formula has been derived from Newton’s forward interpolation formula.

The degree of the polynomial is one less than the number of pairs of observations. The polynomial that represents the given set of numerical data can be used for interpolation at any position of the independent variable lying within its two extreme values.

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# Limitation

For apply this formula there must have some condition

Newton’s forward interpolation formula is valid for estimating the value of the dependent variable under the following two conditions:

1. The given values of the independent variable are at equal interval.

2. The value of the independent variable corresponding to which the value of the dependent variable is to be estimated lies in the first half of the series of the given values of the independent variable.

# Future work