Interpolation: A Taylor polynomial approach

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Interpolation is a technique that calculates the unknown values from known given values with in the certain range. Whereas the process of calculating unknown values beyond the certain given range is called extrapolation. However, the term interpolation includes extrapolation. Many operators require weak interpolation theory to accurately describe their cartographic properties. For example, Anthony P.Austin (2016) discussed several topics related to interpolation and how it is used in numerical analysis. Biswajit Das, Dhritikesh Chakrabarty (2016) had developed an interpolation formula derived from Lagrange's interpolation formula. The formula obtained had been applied to represent the numerical data, on the total population of India by a suitable polynomial. Slawomir Sujecki (2013) proposed an extension of the concept of Taylor series to arbitrary function that are physically meaningful. Prime objective of our work is to construct a model for interpolation to get better approximation compare to some existing method. In this research we aimed to approximate the Taylor polynomial of unknown function by known data set. We obtained system of equations by substituting known data set to the Taylor polynomial and found the derivatives needed for interpolation model using the system of equations. Then we intended to compare the proposal method with some existing method taking single polynomial, trigonometric and exponential functions as test functions. Also, we compared our model with well-known existing method, polynomial interpolation. The proposed model overlaps on the polynomial function and exponential function when 5 points are taken with even comparatively larger step size. The error of our model is less than the error of polynomial interpolation throughout the range in both cases. However, proposed model deviates from test function when using small number of feed data for trigonometric function. When increased the feed data, our model and the trigonometric function fall on the same curve whereas the usual polynomial interpolation deviates much from the trigonometric function. Consequently, we can conclude that proposed model performs better than polynomial interpolation for polynomial, trigonometric and exponential functions. And in the case of increased amount of feed data, we record improved accuracy at interpolating procedure.