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Review Paper on Errors and their Computation

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Abstract: This paper discusses the process of assessing the uncertainty of measurement result through error analysis. Including different types of errors such as Relative errors, Absolute errors, inherent error, round – off error, truncation errors etc. Error play on important gole in
Measurement or any calculation. Any measurement that we make is just an approximation, 100% accuracy is not possible. If we measure are the same thing two times, there will be some variation between their values and this variation introduces an unwanted but unavoidable uncertainty in our measurement so here we discuss a new approach of error calculation and how to overcome from drawback of errors.
Keywords: Relative error, absolute error, inherent error, round off error, truncation error etc.

I. INTRODUCTION

Often in Numerical analysis we have to make approximations to numerically computer things that's the thing in calculus we can take limits and arrive at exact results, but when we use a computer to calculate say something simple like a Derivative. We can't take an infinite limit so we have to approximate the answer and therefore, it has error. computer are limits in their capacity to store and calculate the precision and magnitude of numbers.

A Computer has a finite word length and so only a fixed number of digits are stored and used during computation. This would mean that even in storing an exact decimal number in its converted from in the computer memory an error is introduces. This error is machine dependent and called machine epsilon. After the computation is over, the result in the machine form (with base β) is again converted to decimal form understandable to the users and some more error may be introduced at this stage.

We can characterize error in measurement and computations with respect to their precision accuracy and refers to how closely a calculated value agrees with each other. Inaccuracy (also called bioas) is a systematic deviation from the true values. Imprecision (also called uncertainty) refers to how close together calculate results are to each other.

We now discuss the effect of the errors on the results.

The Quantity,

True value - Approximate value is called the error. In order to determine the accuracy in an approximate solution to a problem, either we find the bound of the

$$\text{Relative error} = \frac{|\text{Error}|}{|\text{true error}|}$$

or of the

Absolute error = $|\text{Error}|$ Neglecting a blunder or mistake

The error may be classified into the following

A. Inherent Error

The inherent enjoy is that quantity which is already present in the statement of the problem before its solution.

The inherent error arises either due to the simplified assumptions in the mathematical formulation of the problem or due to the physical measurements of the parameters of the problem.

B. Round off Error

The round off error the quantity R which must be added to the finite representation of a computed number in order to make it the true representation of that number.

There are two major factors of round off error often involved with numerical calculations

1) Computer have magnitude and precision limits on the number they can store and calculate.

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2) Certain numerical calculations are very sensitive to round off errors. This can be from the mathematical structure of the calculation as well as how the computers performs the operations.

Thus if x is the computer numbers given by.

X = d1 d2 ……..dt dt+1

……x β^e

Then the relative error for t – digit mantissa standard form representation of x becomes.

$^{-(\ )}|\ | \leq |\beta^{1-t}$

for chopping |

$|\ ^1_2$

β^{1-t} for rounding

Thus the bound on the relative error of a floating –point number is reduced by half when rounding is used than chopping. It is for this reason that on most computer rounding is used we write.

( ) = (1 +)

Where = ( ), some number depending on , is called the relative round-off in ( ). The number is called the machine epsilon and is denoted by EPS. We have,

| ( )| = EPS = $|\beta^{1-t \text{ for chopping}}$

$|\ ^1_2\ \beta^{1-t}$ for rounding

C. Truncation Error

The truncation error is the quantity T which must be added to the true representation of the quantity in order that the result be exactly equal to the quantity we are seeking to generate. This error is a result of the approximate formulae used which are generally based on truncated series. The Taylor series with a remainder is an invaluable tool in the study of the truncation error.

II. CONCLUSION

In my views errors plays on important role in measurements or any mathematical calculation. Here we discuss different types of error such as Inherent error Round-off error, Truncation error. In this paper we discuss about the different types of error which is occurs during the operational programs and leach how to eliminate error and what are the issues related to error the basic ideas in my views is that everyone should known about and how to overcome from it.

REFERENCES

[1] Numerical methods for scientific and engineering computation, M.K JAIN, S.R.K IYENGAR, R.K JAIN.
[2] NumericalMathematical Analysis, james B Scarborough ;Oxford & IBH Publishing Co. Pvt. ltd.
[3] Taylor john .An Introduction to error analysis 2nd ed. University Science Books-sous ditto.
[4] Lab report guidelines, Publication of Mercer.
[5] Physical laboratory course at T.V on M.sc level Feld in dept of Physics Amrit Campus, Nepal.

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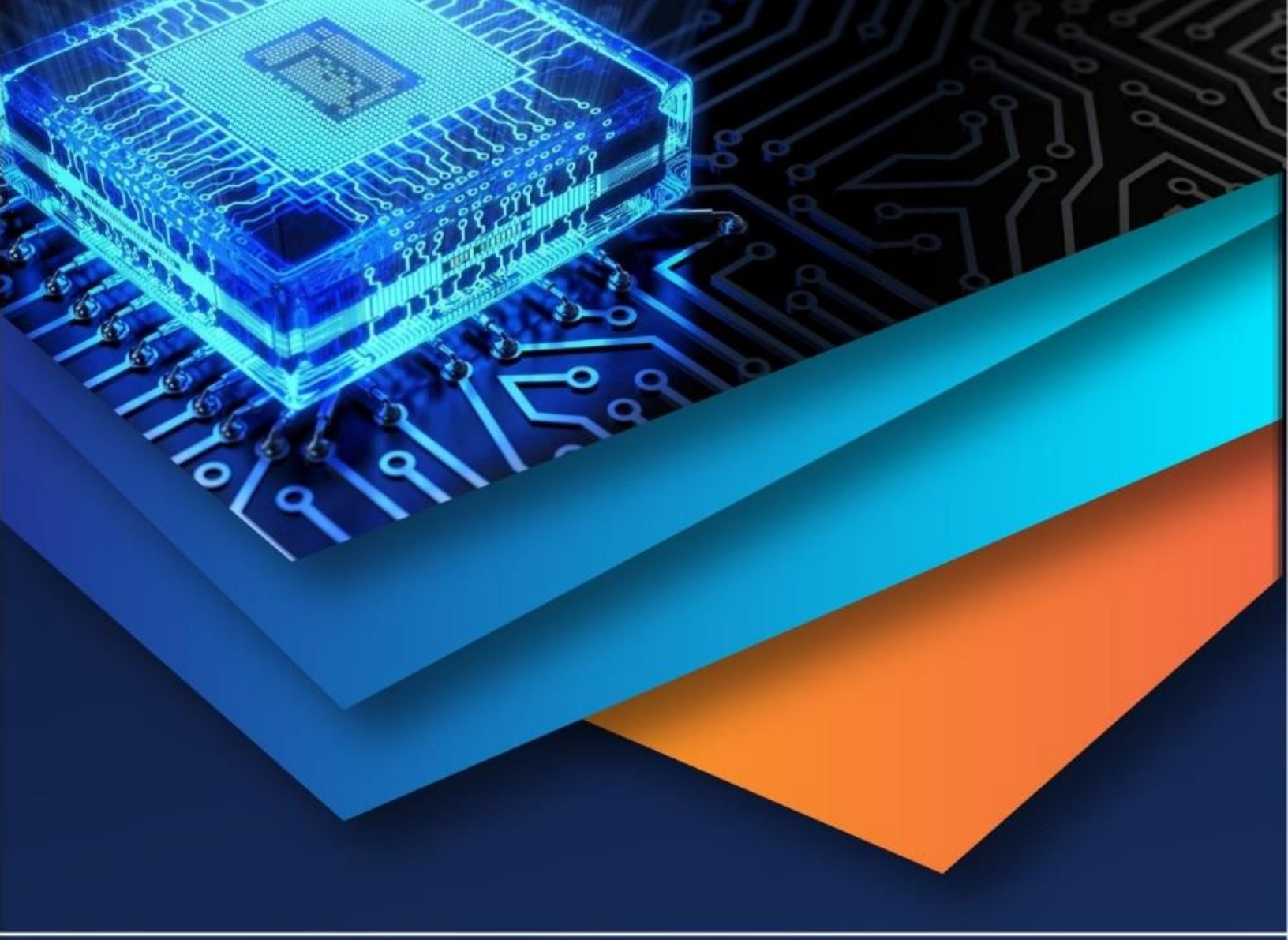

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