# 

BAHRIA UNIVERSITY KARACHI CAMPUS

**Department of Software Engineering**

**COURSE: GSL 321**

**NUMERICAL ANALYSIS**

**PROJECT Proposal**

**CLASS: BSE – 7B (FALL - 2023)**

**Predictive Modeling using Interpolation Techniques**

**Group Members**

|  |  |  |
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# **INTRODUCTION & BACKGROUND**

Interpolation is a fundamental technique used in mathematics and computer science to estimate values between known data points. It plays a crucial role in various fields, including engineering, physics, finance, and computer graphics. The project aims to implement and compare different interpolation methods to estimate unknown values within a dataset based on given data points.

# **PROBLEM STATEMENT**

The challenge is to develop an efficient algorithmic solution capable of accurately estimating intermediate values from a set of discrete data points using various interpolation techniques. The project aims to compare these techniques based on accuracy, efficiency, and computational complexity.

# **PROPOSED SOLUTION**

In this section, we present an overview of the planned solution to address the implementation of interpolation techniques and their comparative analysis.

## **3.1. FEATURES OF THE PROJECT**

## Implementing Newton's Forward Interpolation, Newton's Backward Interpolation, Lagrange's Interpolation, and Newton's Divided Difference Interpolation.

## Evaluation and comparison of these techniques based on accuracy and computational efficiency.

## Integration of a user-friendly interface allowing users to input data points and specify the target value for interpolation.

## Visualization of efficiency using boxplots to compare execution times of different techniques.

## **3.2. METHODOLOGY**

* Input collection: The user provides the number of data points, x-values, y-values, and the target value for interpolation.
* Implementation of interpolation algorithms: Utilize the chosen interpolation techniques to estimate the target value.
* Performance evaluation: Measure execution times for each technique to assess computational efficiency.
* Visualization: Generate boxplots to compare the execution times of different interpolation methods.

## **3.3. TECHNOLOGIES TO BE USED**

**Programming Language**: Python

**Libraries**: SymPy (for symbolic mathematics), Matplotlib (for data visualization)

**User Interface**: Console-based input and output

# **PROJECT SCOPE**

The project's scope includes implementing different interpolation techniques, analyzing their efficiency, and providing a comparative study of their computational performances. It aims to present a tool that users can utilize to understand the trade-offs between accuracy and computational time when choosing an interpolation method.

# **PROJECT ABSTRACT**

The project involves the development of a Python-based tool for implementing and comparing interpolation techniques. It allows users to input data points and a target value to estimate using various interpolation algorithms. The project evaluates and compares these techniques in terms of accuracy and computational efficiency.

# **PROJECT ABSTRACT**

M Muaz Shahzad (Code)

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Hassan Akhtar (Code)

# **REFERENCES**

* Numerical Methods for Engineers by Steven C. Chapra and Raymond P. Canale
* Numerical Analysis by Richard L. Burden and J. Douglas Faires
* SymPy Documentation: https://docs.sympy.org/
* Matplotlib Documentation: https://matplotlib.org/

Teacher’s Signatures: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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