《Computer-Aided Geometric Design》
Assignment 1
September 16, 2025

Assignment requirements:

Input: n points $p_j(x_j, y_j)$ in a known plane, j=1,2⋯,n.

Output: Functions that fit these points.

Requirements: Complete assignment1_interp.m and implement the interpolation fitting method. The input point set can be interactively specified by the mouse or generated by other methods.

I. Interpolation fitting method:

1. Use the polynomial function (linear combination of power basis functions) $f(x) = \sum_{i=0}^{n-1} \alpha_i B_i(x)$ to interpolate $\{p_j\}$, where $B_i(x) = x^i$, $i = 0, 1, 2 \ldots$ n-1。

2. Use the linear combination of radial basis functions (RBF) $f(x) = b_0 + \sum_{i=1}^{n} b_i g_i(x)$ to interpolate $\{p_j\}$, where $g(x) = \frac{1}{|x-p_i|^2+d}$,,

Thinking: (1) How to add constraints when there are more variables than equations?

(2) The constant term b_0 can also be changed to a low-order (such as 2nd or 3rd) polynomial, and corresponding constraints should also be added.

Assignment submission requirements:

1. Implement the interpolation fitting method based on the above two basis functions and compare them; if drawn at the same time, the curves obtained by the two methods are drawn in different colors;

2. Related code and experimental report.

Deadline: September 23, 2025 evening

Assignment purpose:

1. Familiar with the general method of data fitting

2. Preliminary understanding and mastering coding

编程目标：学习和使用 Matlab

掌握基本语法。包括变量声明，赋值，循环及条件语句，区别 function 和 script 文件。在 command window 下执行以下语句

web(fullfile(docroot, 'matlab/learn_matlab/matrices-and-arrays.html'))

学会调试。F9 设置和移除断点，F5 继续执行。

掌握基本矩阵操作，包括矩阵初始化，矩阵元素（单个/整行/多行…）取值和赋值，矩阵乘法(C=A*B)，区别逐个元素乘法(C=A.*B)，线性方程组求解(x=A\b)

web(fullfile(docroot, 'matlab/learn_matlab/matrices-and-arrays.html'))

掌握 help/doc 命令，学会使用文档

Matlab 图形绘制: 画点和线

用户交互: 交互指定拟合点

进阶交互：利用菜单或按钮等选择不同拟合算法