山东大学 计算机科学与技术 学院

机器学习与模式识别 课程实验报告

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| 实验题目： | | | |
| 实验学时：2 | | 实验日期：2025/ | |
| 实验环境：  软件环境：  系统：Windows 11 家庭中文版23H2 22631.4317  计算软件：MATLAB 版本: 9.8.0.1323502 (R2020a)  Java 版本: Java 1.8.0\_202-b08 with Oracle Corporation Java HotSpot(TM) 64-Bit Server VM mixed mode  硬件环境：  CPU：13th Gen Intel(R) Core(TM) i9-13980HX 2.20 GHz  内存：32.0 GB (31.6 GB 可用)  磁盘驱动器：NVMe WD\_BLACKSN850X2000GB  显示适配器：NVIDIA GeForce RTX 4080 Laptop GPU | | | |
| 1. 实验内容 2. 实验步骤 3. 测试结果      1. 附录：实现源代码  |  | | --- | | %% 清空工作区  clear;  clc;  %% 全局变量声明  global alpha;  global theta;  alpha = 0.07; %学习率设置  theta = [0,0]; %参数初始值  sum\_times = 1500; %梯度下降次数  %% 初始数据处理  x = load("ex1Data/ex1x.dat");  y = load("ex1Data/ex1y.dat");  % disp(x);  % disp(y);  figure;  plot(x,y,'o');  ylabel("Height/m");  xlabel("Age/y");  m = length(y);  x = [ones(m,1),x];  %% 循环进行梯度下降的部分  for times\_cnt = 1:sum\_times  h\_ans = h(x(1,:));  disp(h\_ans);  sum\_w = 0;  sum\_b = 0;  for i = 1:size(x,1)  sum\_w = sum\_w + (h(x(i,:)) - y(i)) \* x(i,2);  sum\_b = sum\_b + (h(x(i,:)) - y(i)) \* x(i,1);  end  disp(sum\_w);  disp(sum\_b);  theta(1) = theta(1) - alpha \* sum\_b / size(x,1);  theta(2) = theta(2) - alpha \* sum\_w / size(x,1);  end  % 以上为一次更新  %% 打印参数结果  disp(theta);  fprintf("y = %fx + %f\n",theta(2),theta(1));  %% 检验模型效果  hold on;  plot(x(:,2),h(x),'-');  legend('Training data','Linear regression');  %% 测试预测效果  fprintf("height of boy who has age 3.5: %f m\n",h([1,3.5]));  fprintf("height of boy who has age 7 : %f m\n",h([1,7 ]));  J\_vals = zeros(100,100);  theta0\_vals = linspace(-3,3,100);  theta1\_vals = linspace(-1,1,100);  for i = 1:length(theta0\_vals)  for j = 1:length(theta1\_vals)  t = [theta0\_vals(i);theta1\_vals(j)];  J\_vals(i,j) = h\_j(x,y,t);  end  end  J\_vals = J\_vals';  figure;  surf(theta0\_vals,theta1\_vals,J\_vals);  xlabel('\theta\_0');  ylabel('\theta\_1');  %% 模型使用的函数  function result = h(x)  global theta;  % sum = 0;  %  % for i = 1:size(x,1)  % sum = sum + theta .\* x(i,:);  % end  result = theta \* x';  end  %% 构造J平面使用的函数  function result = h\_j(x,y,tem\_theta)  sum\_j = 0;  % sum\_b = 0;  % disp(tem\_theta);  % disp(x(1,:));  % disp(x(1,:)\*tem\_theta);  % disp([1.0,2.0]\*[-3;-1]);  for i = 1:size(x,1)  sum\_j = sum\_j + ((x(i,:) \* tem\_theta) - y(i)) \* ((x(i,:) \* tem\_theta) - y(i));  end  % disp(sum\_w);  % disp(sum\_b);  % sum\_w = sum\_w / size(x,1);  % sum\_b = sum\_b / size(x,1);  result = sum\_j / size(x,1);  end | | | | |