# Student Experiment Report

|  |  |  |  |
| --- | --- | --- | --- |
| Student ID |  | School |  |
| Name |  | Major |  |

## Gradient Descent

## Introduction

In this experiment, the gradient descent method is used to solve the coefficient of the linear regression equation y(x,w)=w0+w1\*x. The purpose is to improve students' ability to solve problems by applying the gradient descent method.

## Objective

(1) Help students understand the application of gradient descent method in data science.

(2) Help students master the principles of gradient descent.

## Related theories and knowledge

(1) The principle of gradient descent method.

(2) Gradient descent method to update the understanding of the formula, and flexible use.

(3) Understanding and application of least square method.

## Experimental conditions and environment

|  |  |  |  |
| --- | --- | --- | --- |
| Requirements | Content | Version | Remarks |
| **Programming language** | python | Above 3.6 |  |
| **Development environment** | Jupter | None |  |
| **Third-party toolkits/libraries/plugins** | sklearn | 0.23.1 |  |
| **Third-party toolkits/libraries/plugins** | numpy | 1.16.2 |  |
| **Other tools** | None | None |  |
| **Hardware environment** | Both desktop and laptop | None |  |

## Tasks

|  |  |  |
| --- | --- | --- |
| **Number** | **Task** | **Task specific requirements** |
| **1** | The experimental data | x:[55, 71, 68, 87, 101, 87, 75, 78, 93, 73]  y:[91, 101, 87, 109, 129, 98, 95, 101, 104, 93] |
| **2** | Unary linear regression function | y(x,w)=w0+w1\*x |
| **3** | Use the least square method to find the linear regression equation coefficients w0 and w1 | Write your own function,and use the least square method to get w0, w1 (function input is x,y; return w0, w1) |
| **4** | Use gradient descent method to find the linear regression equation coefficients w0 and w1 | Write your own function,and use gradient descent method to get w0, w1 (function input is x,y and the number of iterations;return w0, w1) |
| **5** | The plot | The unary linear regression function images obtained by least square method and gradient descent are respectively drawn, including data points and unary linear regression function images. |

## Results and Analysis

## Acquisitions and Thoughts

（1）

（2）

（3）