

# Machine Learning Review

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## Introduction

This is a review work for the Machine Learning course in *Univeristy of Glasgow*.

## 1 Regression

### 1.1 Linear Regression

For  $x = (x_1, x_2, \dots, x_m)$ , where  $x_i$  is the  $i_{th}$  attribute of  $x$ , a lenear model tries to train a linear combination function from these attributes, i.e:

$$f(x) = w_1x_1 + w_2x_2 + \dots + w_mx_m + b$$

which can be written in vector as:

$$f(x) = w^T x + b$$

where  $w = (w_1, w_2, \dots, w_m)$ .

The linear regression model is trained by *loss function*. Generally, we define our *loss function* as:

$$\min \sum_{i=1}^m (y_i - f(x_i))^2$$

#### 1.1.1 Loss Function

There are several kinds of *loss functions* we can choose from.

- **L1-norm**: L1-norm can be represented as follow:

$$S = \sum_{i=1}^m |y_i - f(x_i)|$$

- **L2-norm:** L2-norm is what we used above:

$$S = \sum_{i=1}^m (y_i - f(x_i))^2$$

## 1.2 Conclusion

# 2 Polynomial Regression