

CS685: DATA MINING REGRESSION

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Regression

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- Can also be viewed as a classifier but with a continuum of classes
- Describe how the **response** variable Y is generated given a set of k **predictors**, denoted by X

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- Two main forms, **linear regression** and **logistic regression**

Linear Regression

- Function f is **linear**
- Response variable depends only *linearly* on the predictors
- General form of linear regression model is

$$Y = X \cdot W + \varepsilon$$

- W are the **regression coefficients** or *weights* on the predictors
- There are n observations
- Sizes of matrices

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 - $X : n \times k$
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- The least squares estimate \widehat{W} is

$$\widehat{W} = (X^T X)^{-1} X^T Y$$

Logistic Regression

- Function f is the **logistic** function or **sigmoid** function
- General form of logistic regression model is

$$y = \frac{1}{1 + e^{-z}} + \varepsilon \text{ where } z = w \cdot x$$

- w are the **regression coefficients**
- z is linear in x
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- Essentially a single layer perceptron/ANN with sigmoid activation function