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## 1. Introduction to machine learning

- The process of machine learning
- Why use machine learning
- Application scenarios of machine learning
- Three key problems of machine learning

## 2. linear regression

- The concept of linear regression
- Loss function of logistic regression
  - mean square error
- The solution of logistic regression
  - Gradient descent method
  - least square method(Matrix of full rank,maximum likelihood)
- Methods to solve the underfitting and overfitting

## 3. logistic regression

- Logistic distribution and density function
- The concept of logistic regression
- Loss function of logistic regression
  - maximum likelihood
- The solution of logistic regression
  - Gradient descent method
  - Newton method
- The method and significance of regularization
  - L1 regularization: LASSO regularization
  - L2 regularization: Ridge regularization
  - the difference between L1 and L2
- Parallelization of gradient computation of objective function
- Comparison with other models
  - linear regression
  - maximum entropy model
  - SVM
  - Naive Bayes

## 4. K-nearest neighbor model

- concept
  - Distance measurement
  - Selection of K value
  - Classification decision rules
- kd tree
  - The construction of KD tree
  - The search of KD tree

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