

A robotic hand with white and grey segments is shown typing on a blue backlit keyboard. The background is dark, and the overall image has a blue tint. The text is overlaid on the center of the image.

# 机器学习基础入门

Introduction to Machine Learning

XDMSC 20170317 技术沙龙

机器学习？

学习机器？





机器学的是什么？

参数



举个栗子？

$$Y = a * X$$

$$Y = F(\text{theta}, X)$$

# 机器学习的数学基础

微积分（高等数学、数学分析）（关键）

矩阵（线性代数、高等代数）（关键）

概率论（概率论与数理统计）（有用）

概率图模型、凸优化、随机过程、泛函分析等（进阶）





# 机器学习的分类

有监督学习 (Supervised Learning)

无监督学习 (Unsupervised Learning)

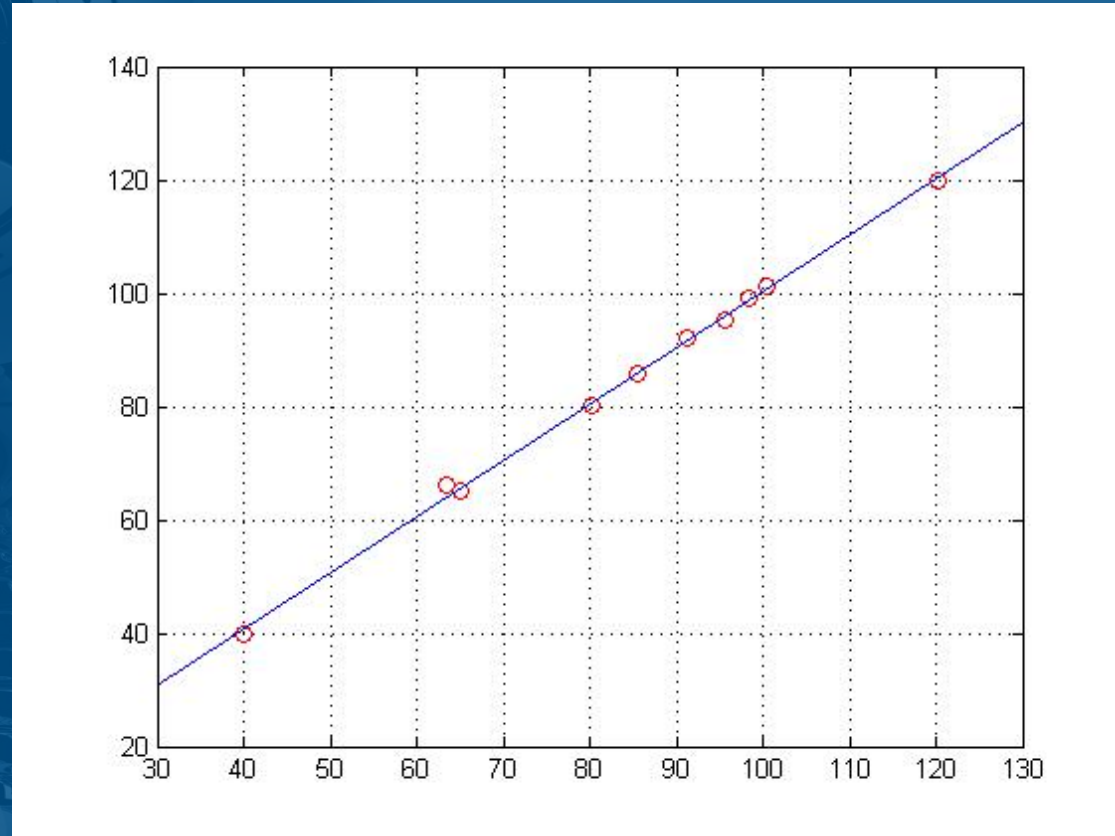
半监督学习 (Semi-supervised Learning)

强化学习 (Reinforcement Learning)

The background of the slide features a detailed, metallic robot head and upper torso. The robot has a human-like face with visible eyes and a mouth, but its body is composed of complex mechanical parts, joints, and wiring. A large, solid blue rectangular area is superimposed over the center of the image, serving as a backdrop for the title text.

# 常见的机器学习问题

# 线性回归(Liner Regression)

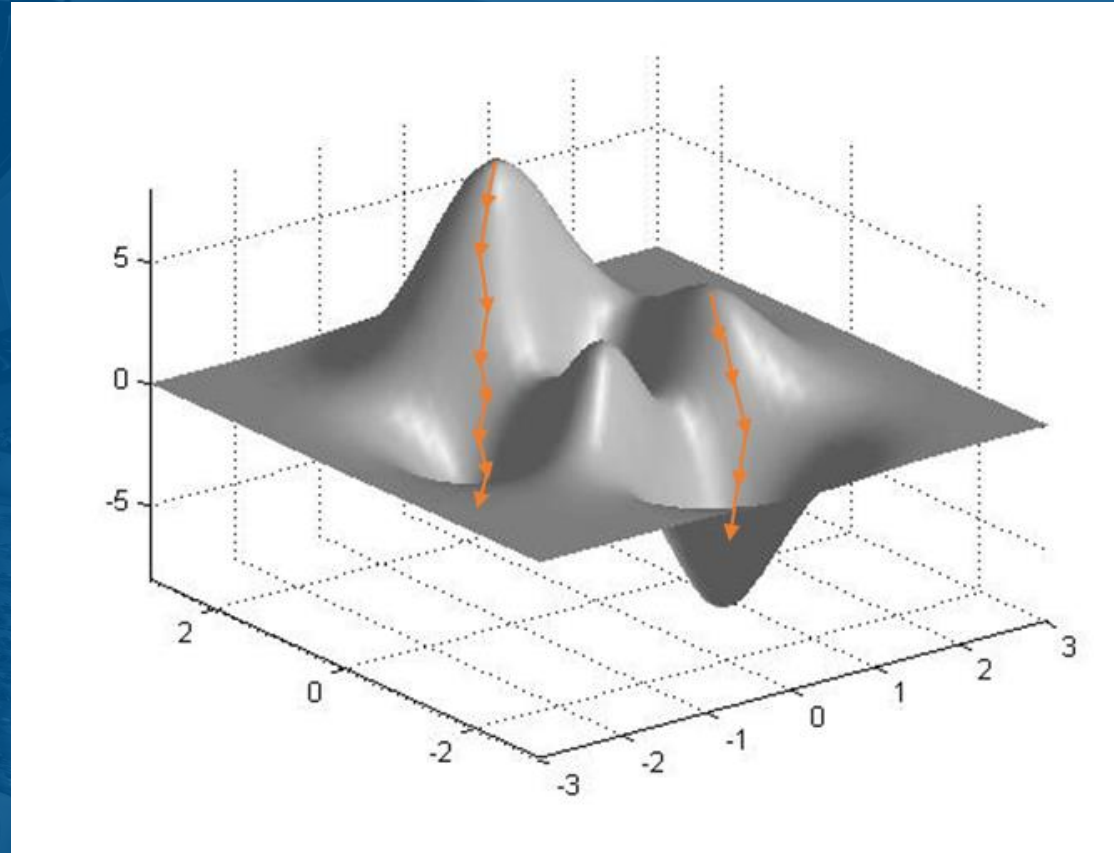


$$Y = a_0 + a_1 * x_1$$

$$\text{Cost} = 1/2m * \text{sum}( (h(x) - y)^2 )$$

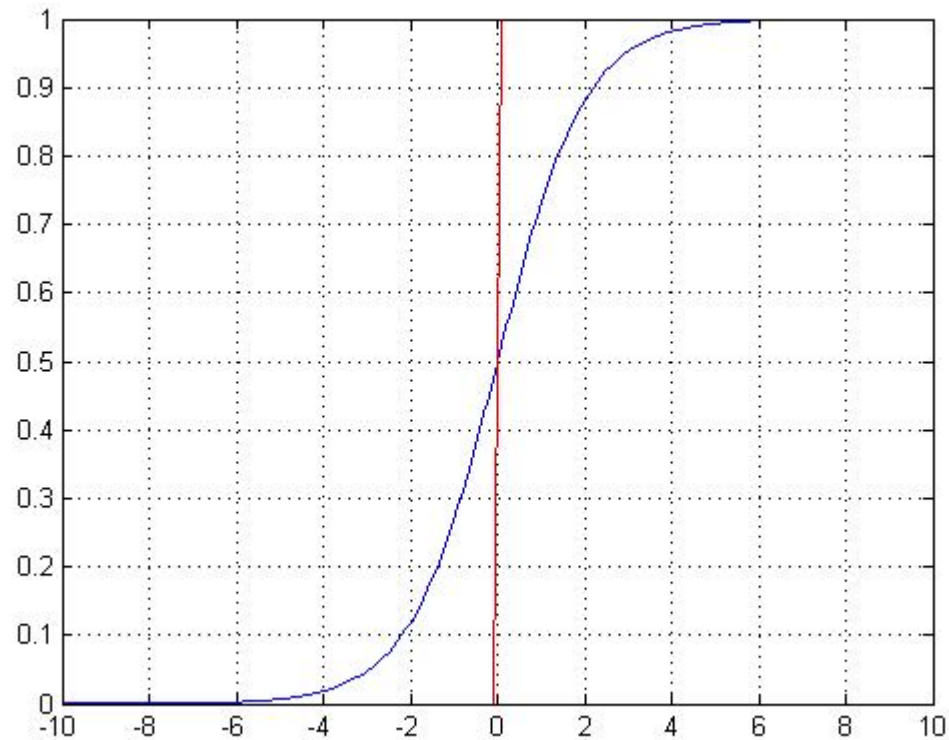


# 梯度下降法(Gradient Descent)



$$\theta = \theta - \alpha * \frac{1}{m} * \sum (h(x) - y) * x$$

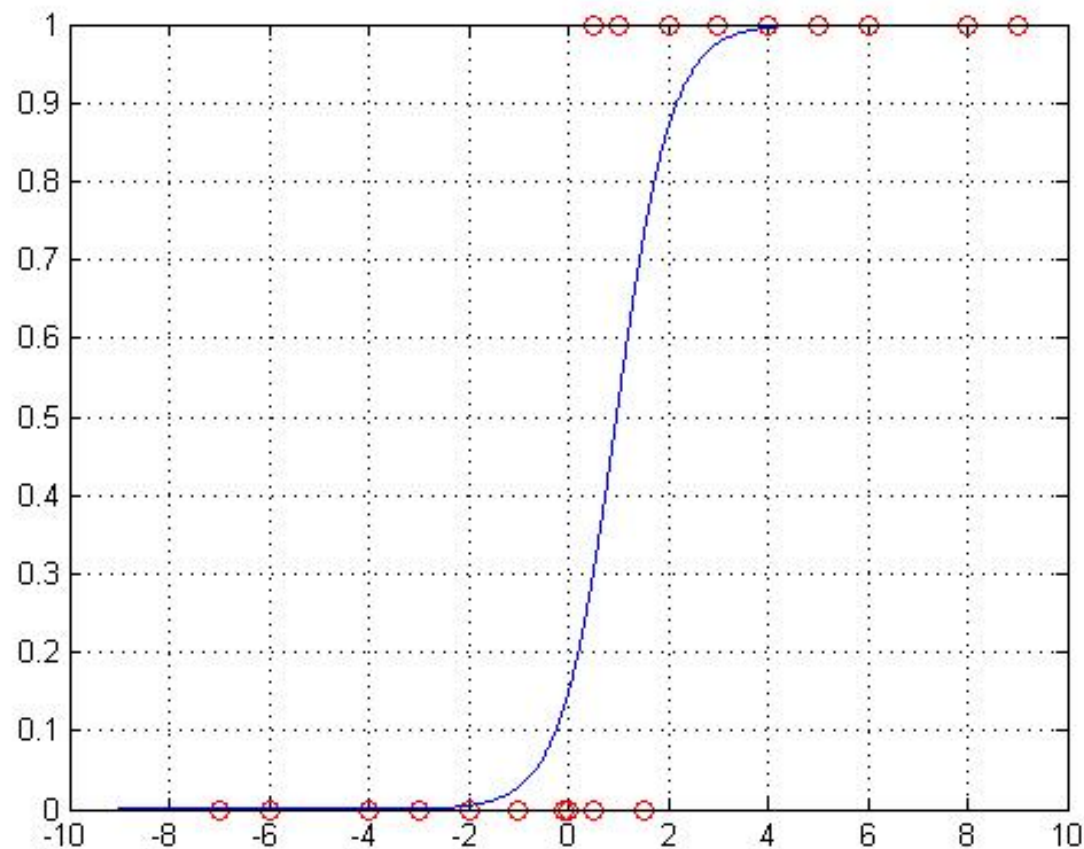
# 对数几率回归(Logistic Regression)



$$y = \frac{1}{1 + e^{-z}}$$

$$Z = \text{theta} * x$$

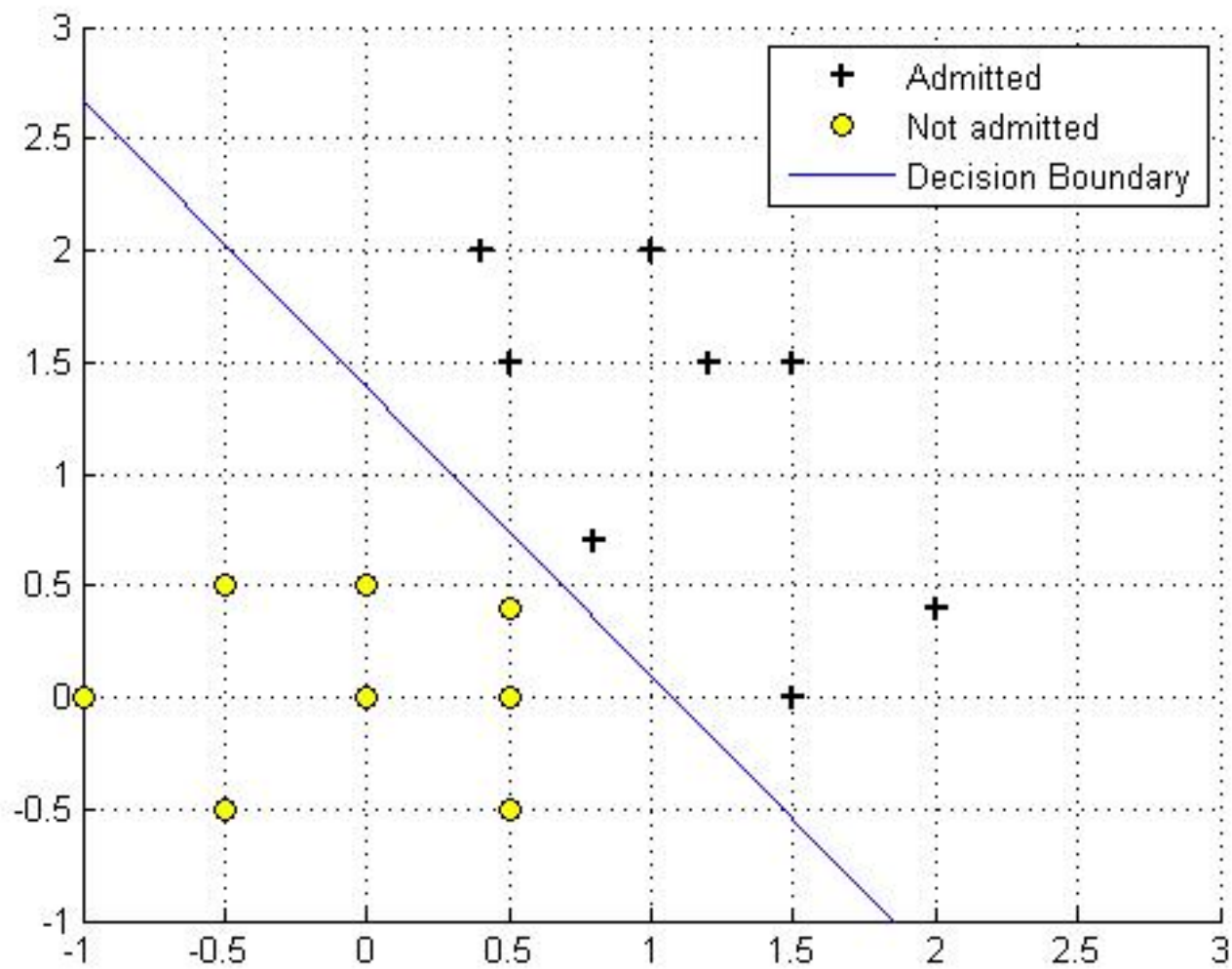




$$\frac{\partial J(\theta)}{\partial \theta_j} = \frac{1}{m} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)}) x_j^{(i)}$$

$$\theta_j = \theta_j - \alpha * \text{Grad}$$

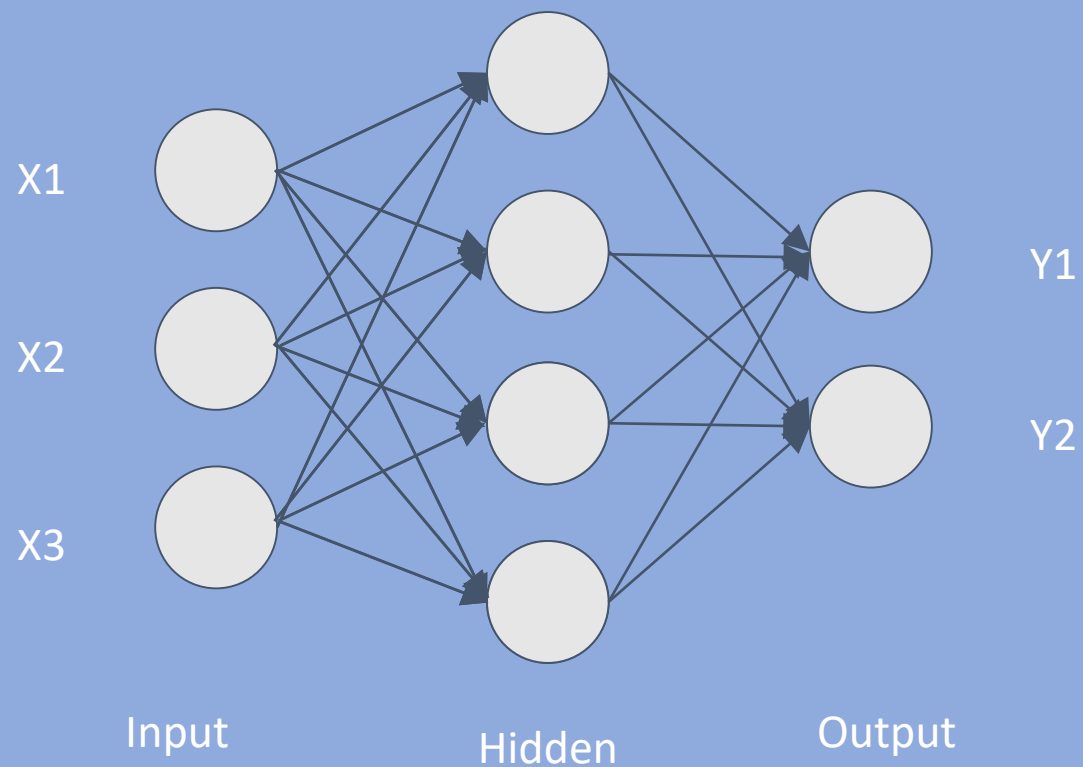
$$J(\theta) = \frac{1}{m} \sum_{i=1}^m [-y^{(i)} \log(h_{\theta}(x^{(i)})) - (1 - y^{(i)}) \log(1 - h_{\theta}(x^{(i)}))]$$



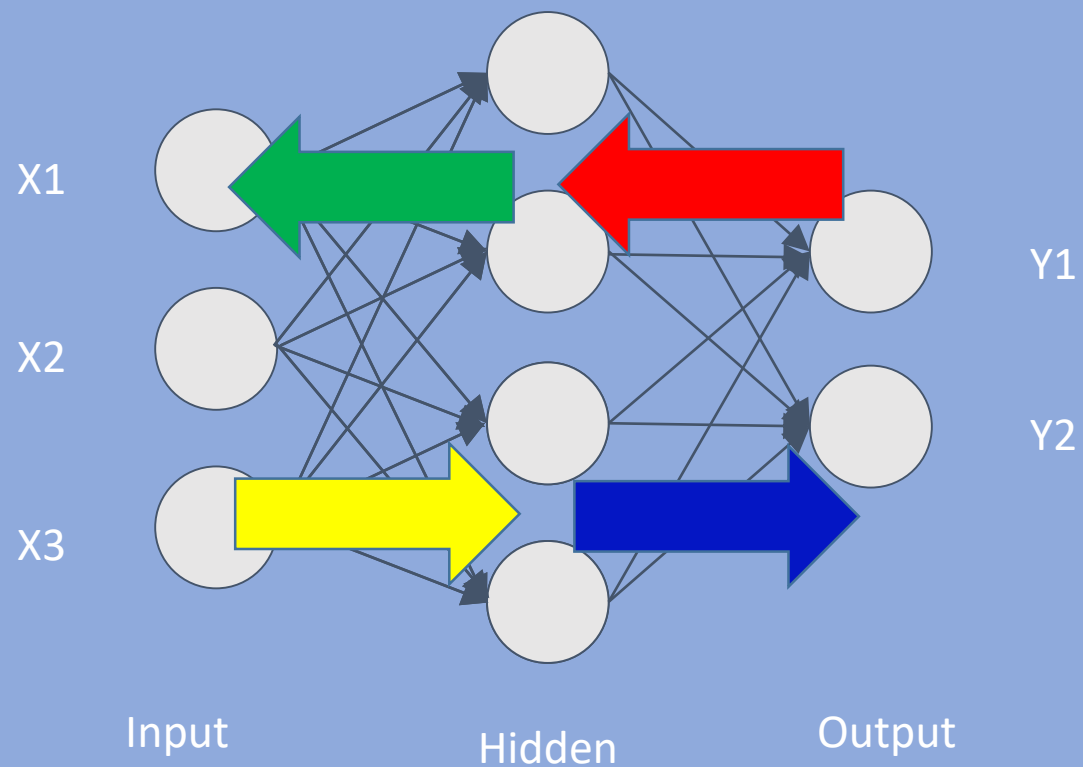


# 神经网络(Neural Network)

分层的有向图



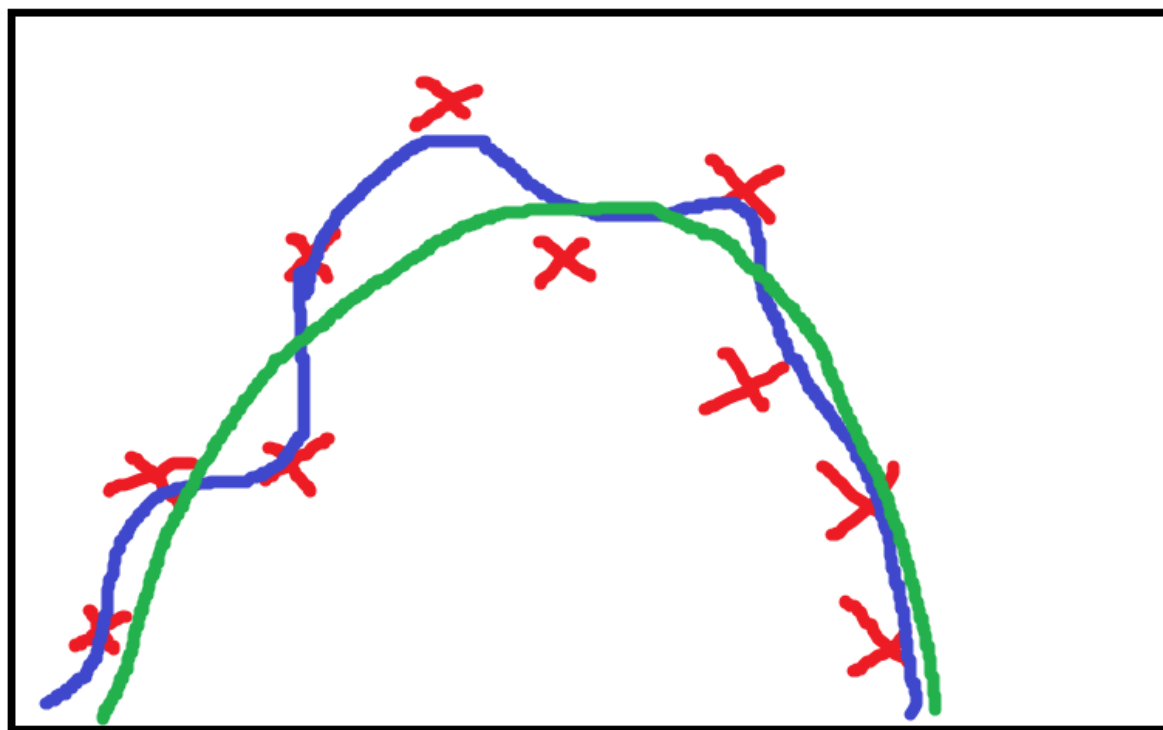
# 反向传播算法 (Backpropagation, BP)



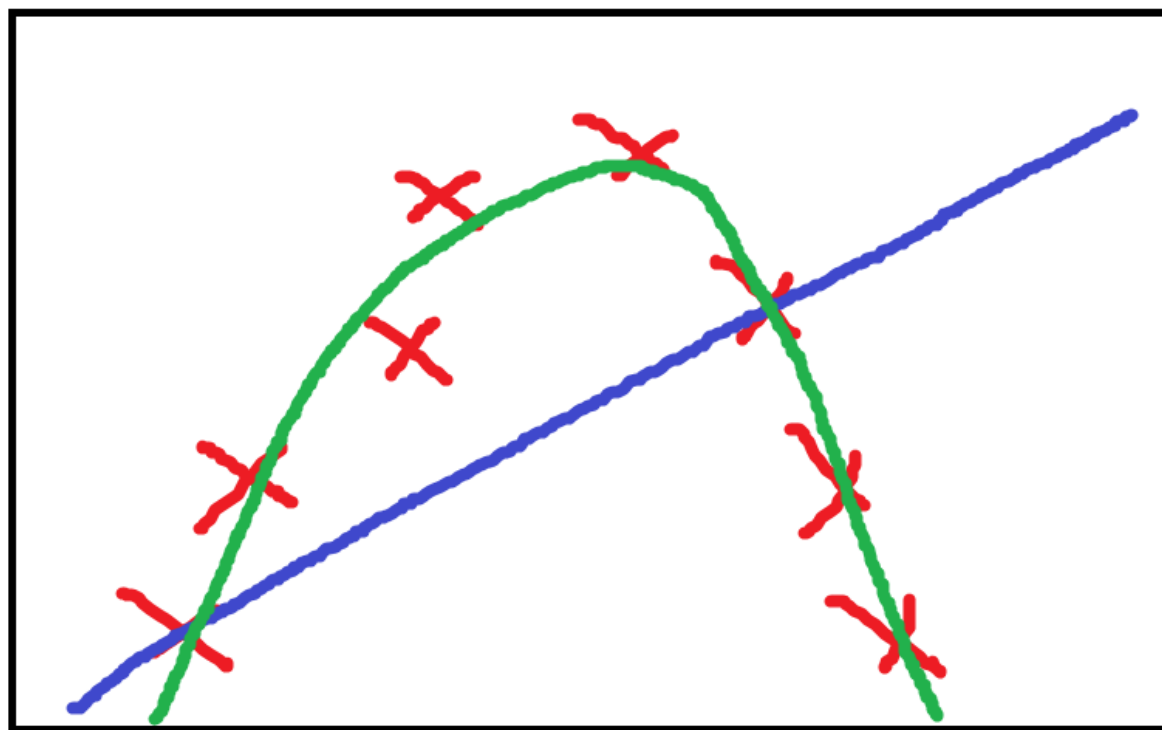


# 过拟合与欠拟合

(Overfitting and Under-fitting)



过拟合



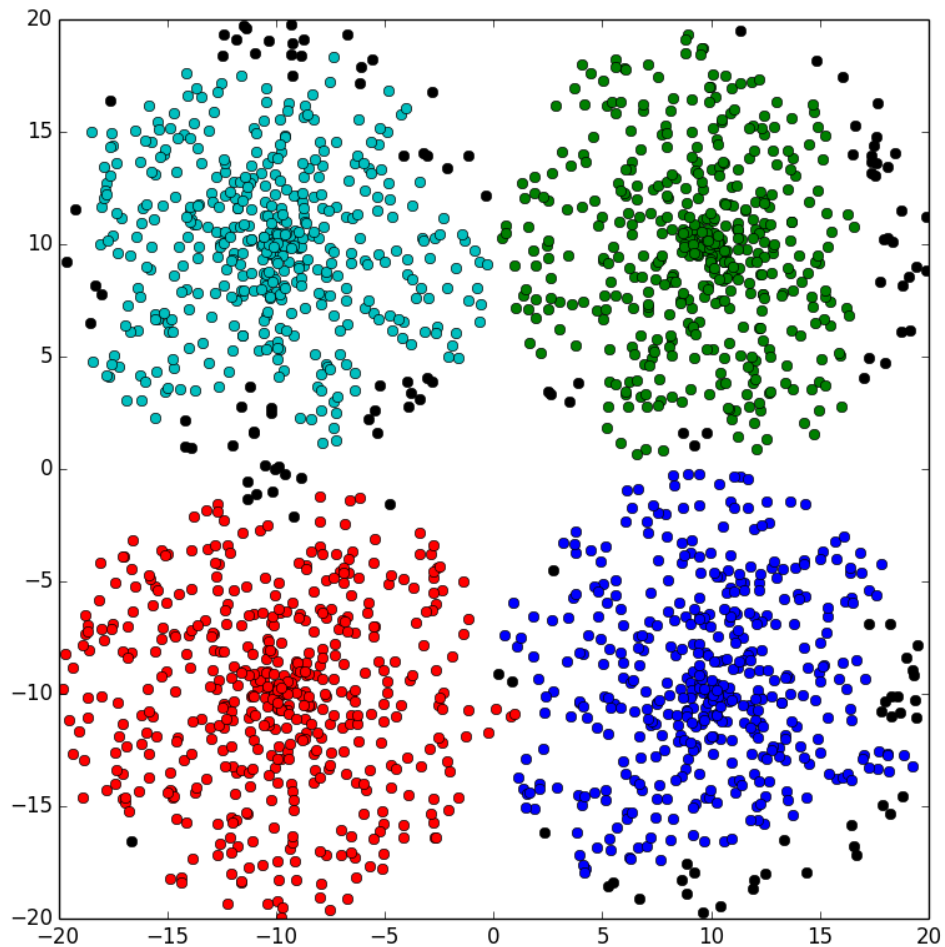
欠拟合



× 样本数据  
— 不合适的拟合曲线  
— 最合适的拟合曲线

# 聚类(Clustering)

物以类聚



# 深度学习(Deep Learning)

深度神经网络  
(Deep Neural Network, DNN)

卷积神经网络  
(Convolutional Neural Network, CNN)

递归（循环）神经网络  
(Recurrent Neural Network, RNN)



# 机器学习的应用

计算机视觉（Computer Vision）

语音识别（Speech Recognition）

自然语言处理（Natural Language Processing）

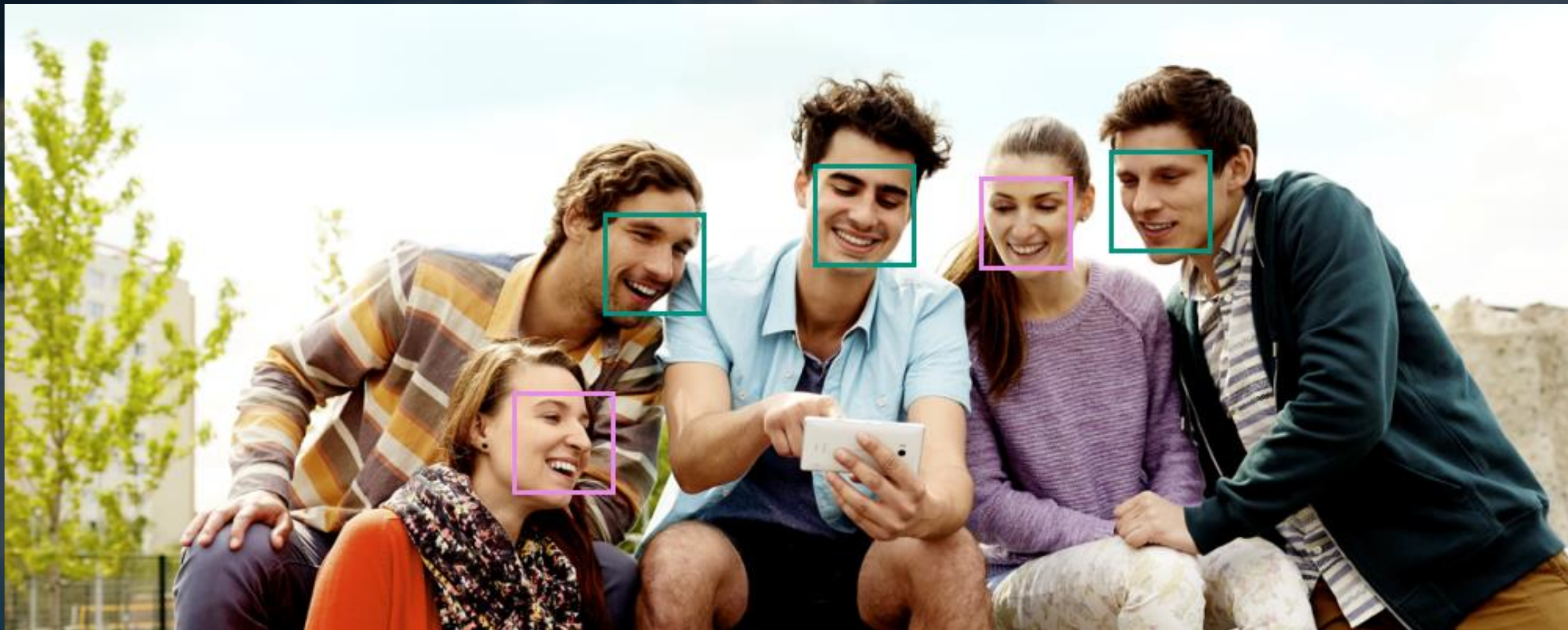
专家系统（Expert System）

推荐系统（Recommendation System）

数据挖掘（Data Mining）

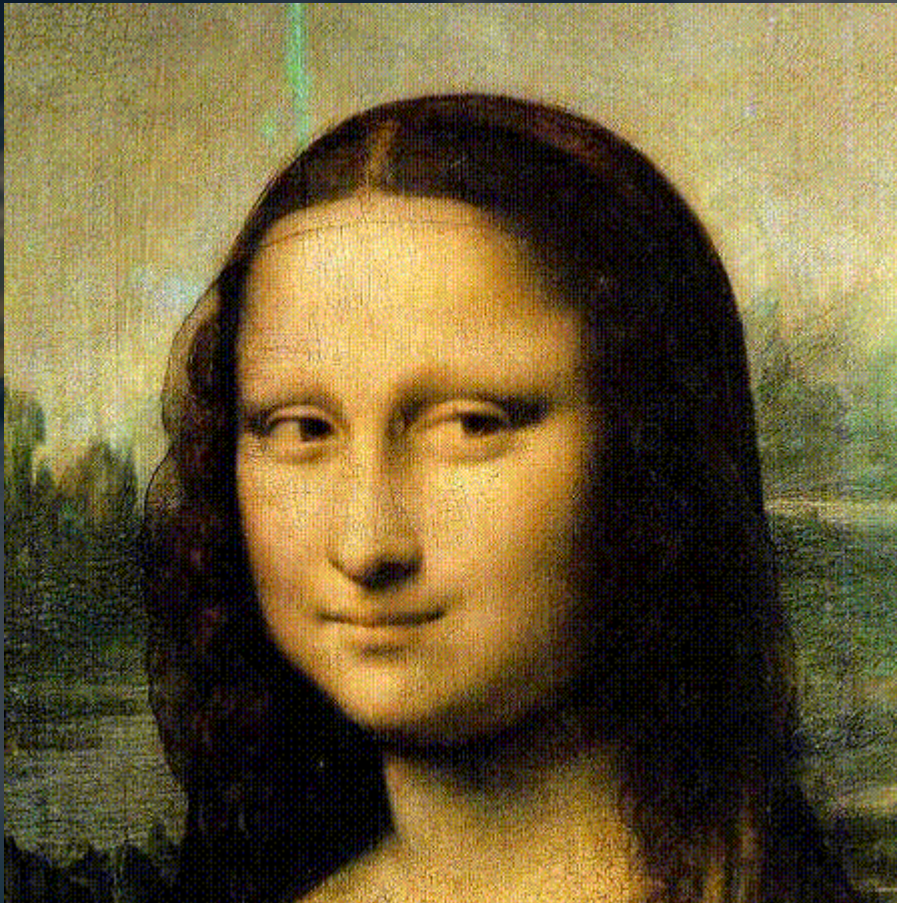


# 人脸识别

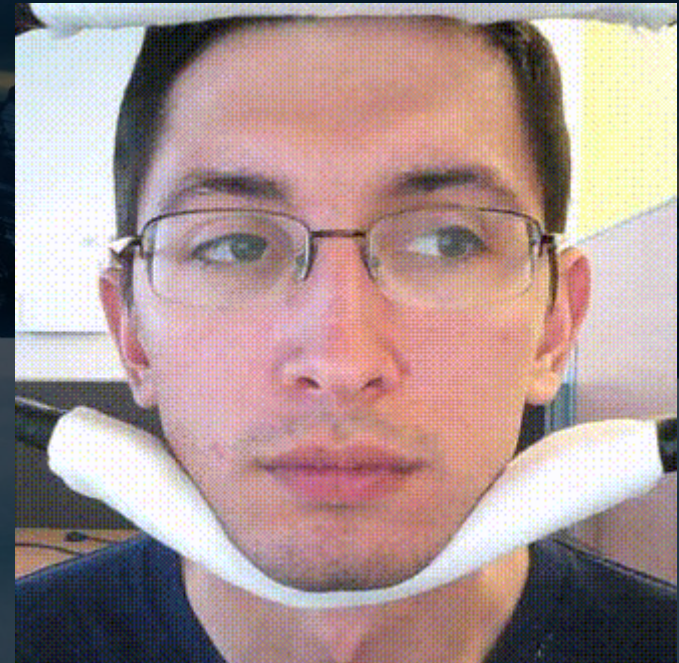




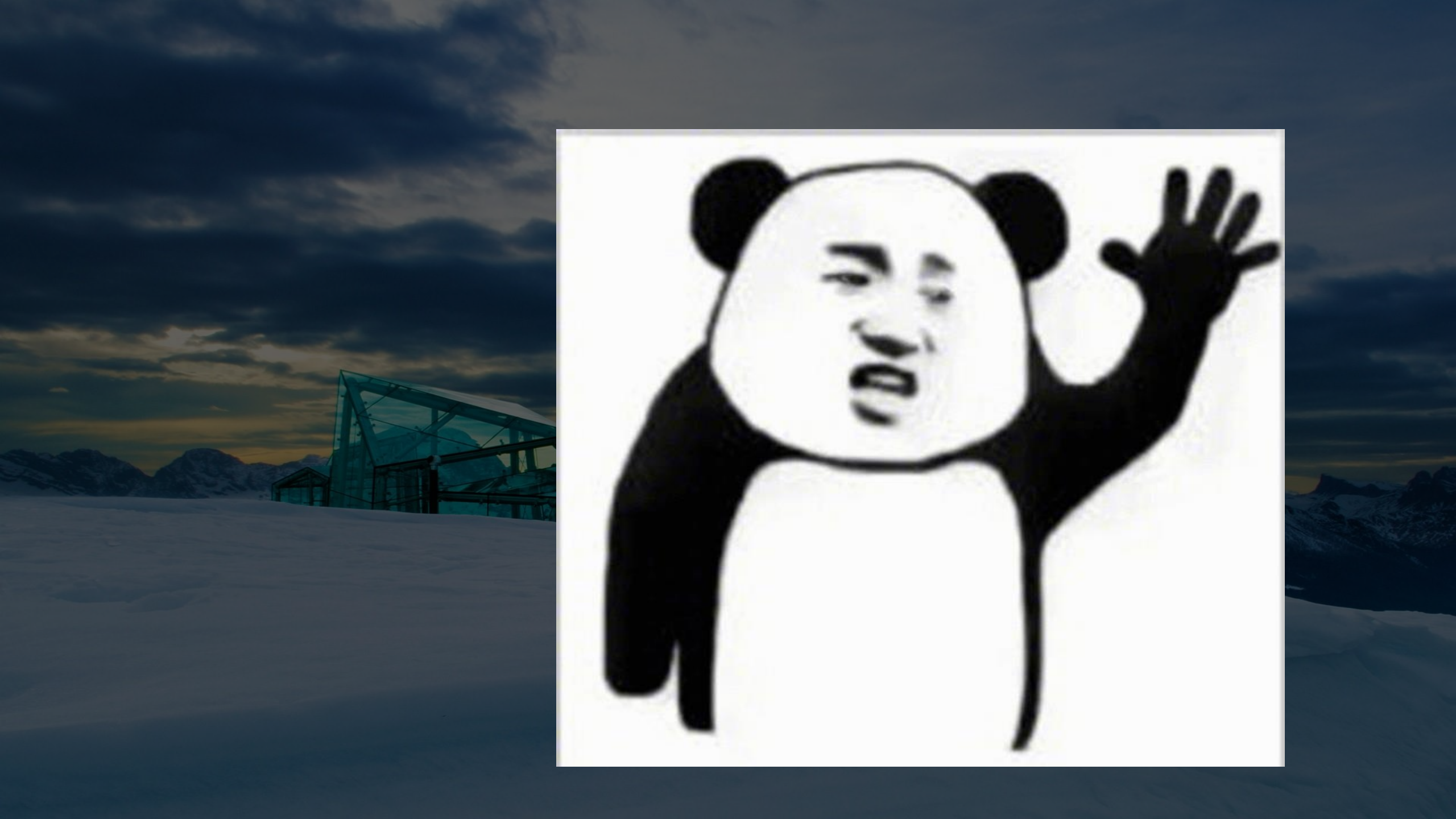
# DeepWarp: 蒙娜丽莎蜜汁转眼珠的微笑



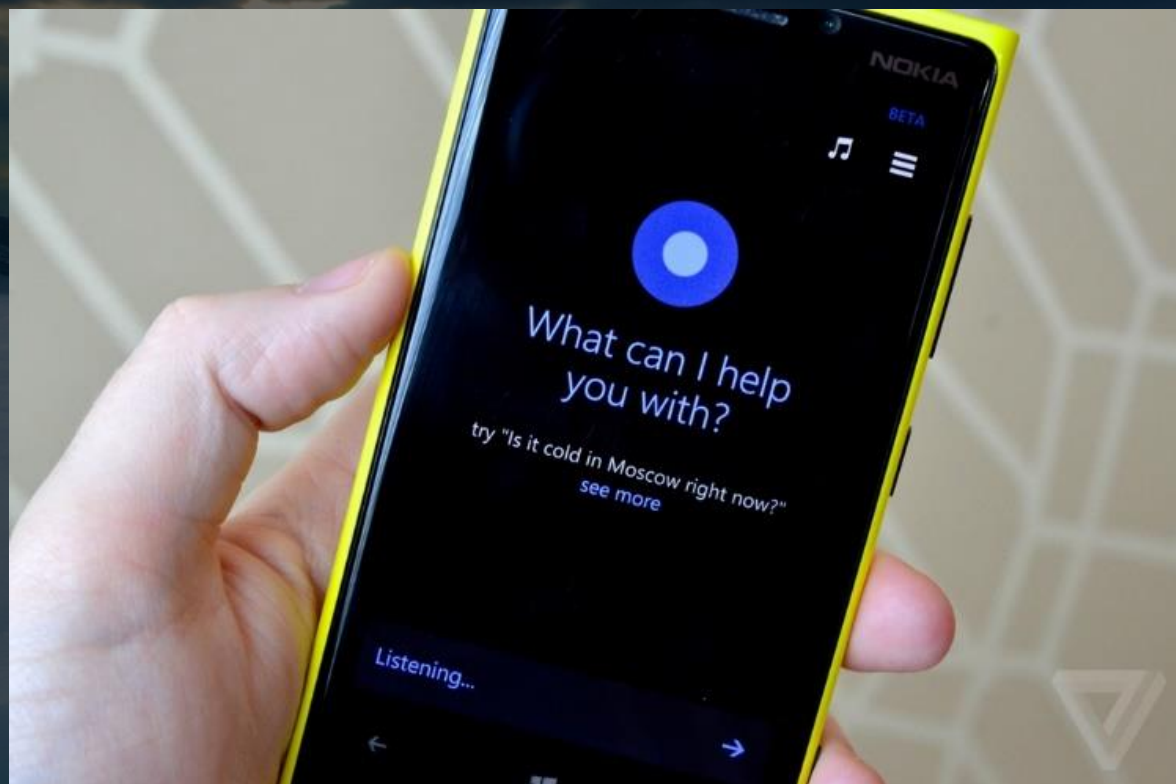
<http://163.172.78.19/>



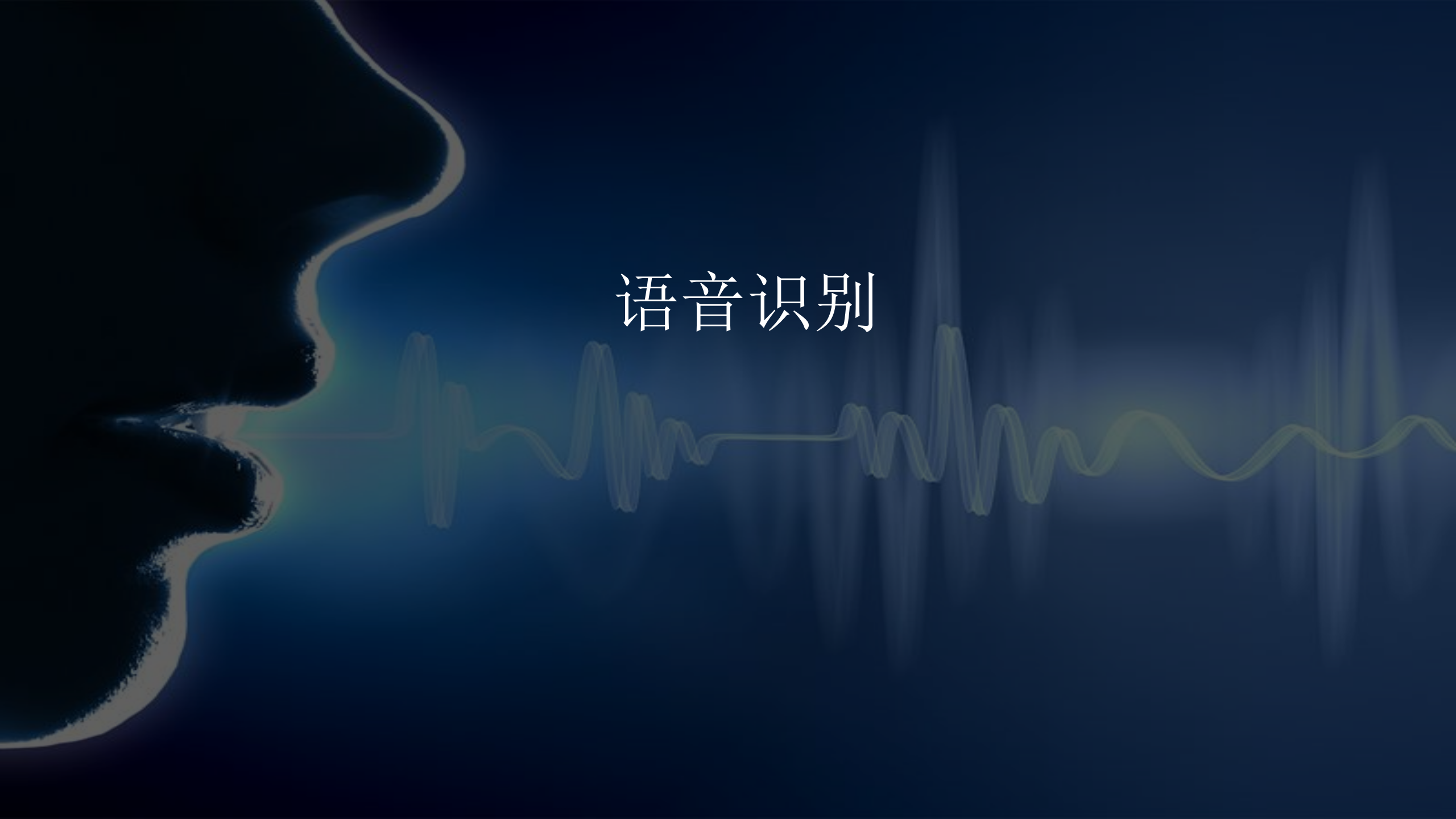




# 自然语言处理



# 语音识别





# 推荐系统



根据您的关注为您推荐

1 / 4



自然语言处理原理与技术实现  
¥66.20



神经网络与机器学习  
¥67.80



写给大家看的算法书  
¥50.20



机器学习导论 (原书第3版)  
¥62.80



华章数学译丛：矩阵分析 (原书第2...)  
¥94.60



猜你喜欢  
实时推荐最适合你的宝贝



裕弘玻璃茶壶耐高温玻璃茶具耐热花茶壶泡茶壶不锈钢过滤玻璃加厚

¥38



古古旧旧\_他的中国风原创中式男装亚麻上衣外套立领盘扣大码春

¥427.7

销量:1



MSI/微星 GTX 1080 SEA HAWK X 台式电竞游戏独立水冷显卡

¥5099



纯棉包邮

长袖女t恤打底衫女秋冬修身圆领棉大码打底

¥29.9

销量:1310



陶梦器  
健康陶磁器の品质の生活をしてい

梅花日本进口陶磁器釉下彩日式茶壶水杯和风土瓶茶杯茶具礼品套装

¥258

销量:2



包邮耐热玻璃煮茶壶养生壶煮茶器加厚泡茶壶电陶壶专用壶烧水壶

¥45.8



兰和铸铁茶壶日本南部铁壶手工功夫茶具无涂层特价 煮水铁茶壶

¥178



银壶茶具纯银手工999千足银云南茶海日本公道杯精品出口送礼包邮

¥1250

销量:1



T恤短袖纤维速干运动型圆领纯色跑步跳操TEE

¥78.01

销量:82



经典袖珍双耳耐热玻璃 红茶壶普洱茶具 三件杯七件套

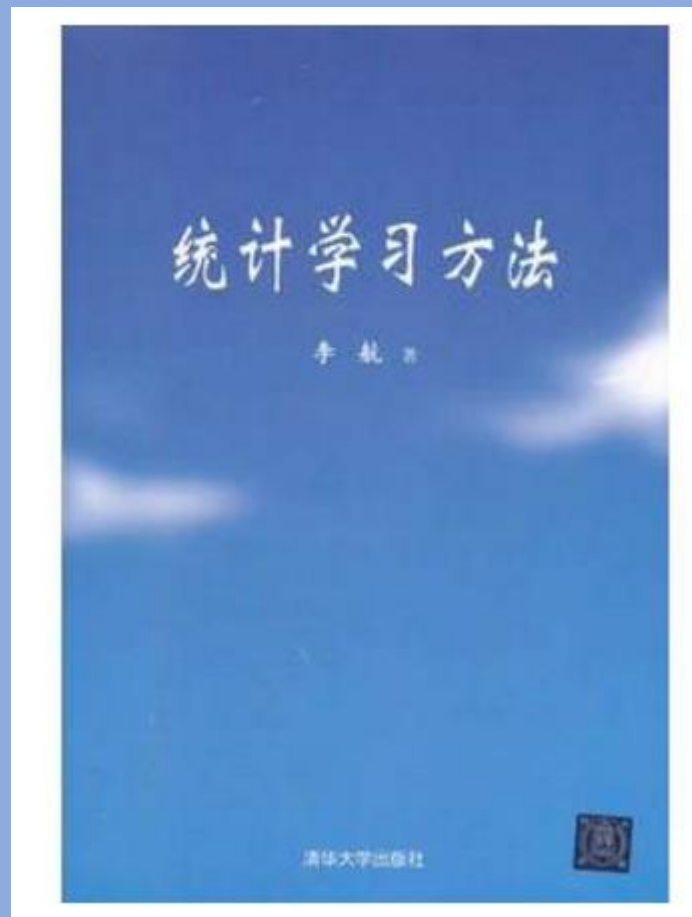
¥19.8

销量:1

# 书籍推荐



《机器学习》 周志华 清华大学出版社

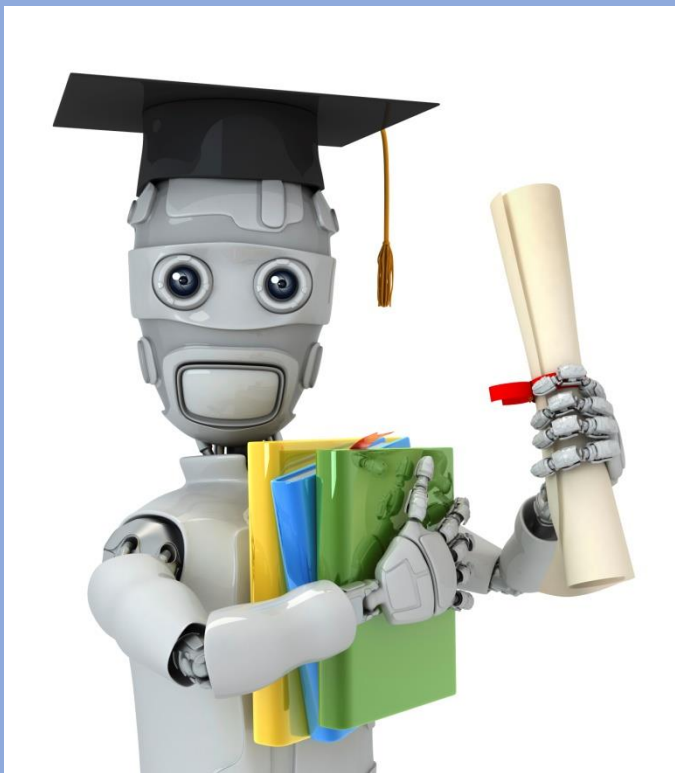


《统计学习方法》 李航 清华大学出版社





# 在线课程视频推荐




Machine Learning

Andrew Ng *Machine Learning*

Stanford University

<https://www.coursera.org/learn/machine-learning>



努力学习 修炼技术



A close-up, high-angle shot of a white robotic hand with blue joints, positioned over a blue backlit keyboard. The hand is in the process of typing, with its fingers pressing down on the keys. The keyboard is illuminated with a bright blue light, and the keys are clearly visible. The background is dark, making the blue light of the keyboard stand out. The overall scene suggests a futuristic or technological theme.

$O(n_n)$ 谢谢~