# NLP Bootcamp (1)

2019年01月22日

# Today's Agenda

- 课程介绍
  - 课程安排
  - 课程团队
  - 评分标准
  - 沟通机制
  - 课程结构
  - Capstone项目
  - 技术文章编写
- 自然语言处理介绍
  - 什么是NLP?
  - NLP的应用场景
  - NLP领域关键技术
- 算法复杂度介绍
  - 简单的几个例子

# Course Info

- 直播+录播
- 周期：18周
- 老师答疑时间：每天固定时间（本周三开始）
- 一周一次Review Session（针对于某一个话题）
- 课程材料/视频利用gitlab维护
- 建议每周学习时间：15个小时以上

# Requirements

- 核心课程项目：40%
- 聊天机器人项目：15%
- Capstone项目：25%
- 技术文章（4篇）：每篇1–3%
- 理论作业：10%
- Bonus (up to 5%): Best Capstone项目， Best技术文章

**总分>=75%, 即可以获得学位和招聘推荐服务**

# How to Better Communicate?

- 定期群内答疑
- 有任何课程上的疑惑/帮助，请第一时间联系班主任
- 如有需要，可定期组织线下活动
- 遇到技术问题时：
  - 首先尝试自己去解决，解决不了的来询问助教/老师
- 直播课程：多互动

# Bootcamp Objective

- 培养AI思维、建模能力
- 扎实的AI基础，不做调参侠
- 解决问题能力
- 通过项目深入理解NLP核心技术

# How to succeed in Bootcamp?

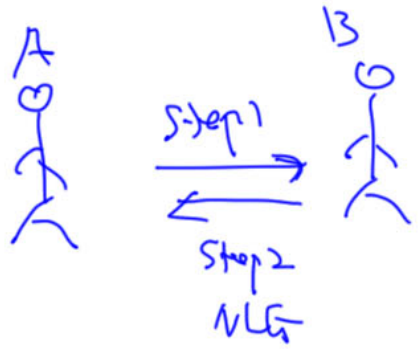
**Check List:**

- Learn： 按时参加直播 + 观看录播视频
- Read： 养成读文章（英文）的习惯，接触课程延伸的内容
- Code：完成项目，一定要自己完成，写过1万行AI程序保证有本质提升
- Write：养成写文章习惯，梳理思路，自我总结
- Discuss：群里多交流，不怕提出低级问题
- Collaboration：鼓励项目合作，这些人很有可能成为AI路上的好朋友

# AI工程师必备的核心技能

# Introduction : the Start of Journey

# What is NLP?



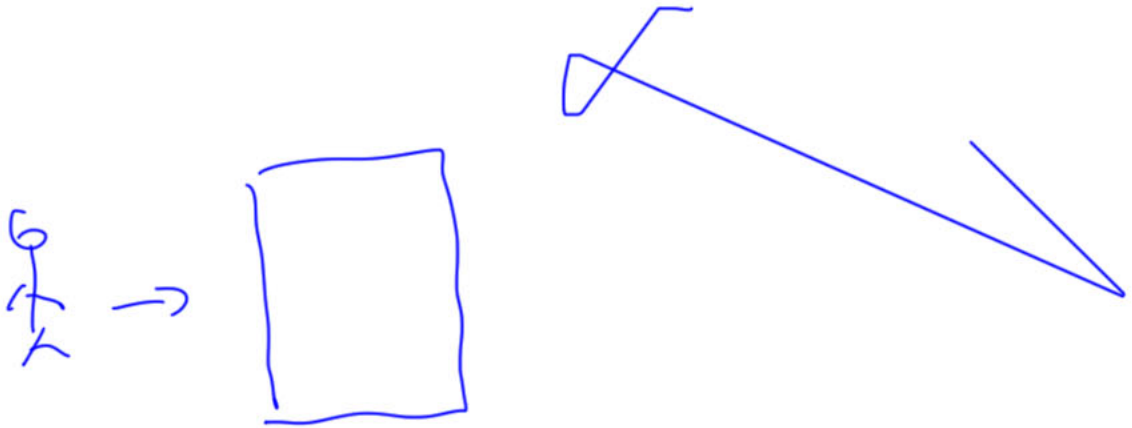

NLP = NLU + NLG

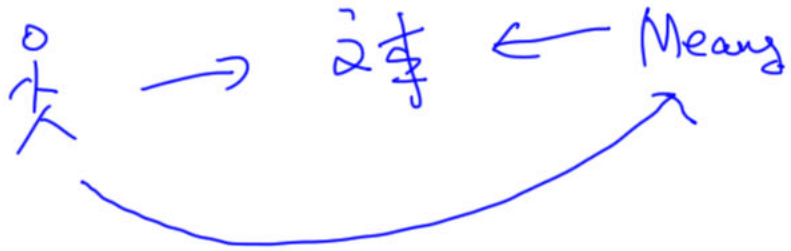
(Natural Language Understanding)

- NLU: 语音/文本 -> 意思（meaning）
- NLG: 意思-> 文本/语音

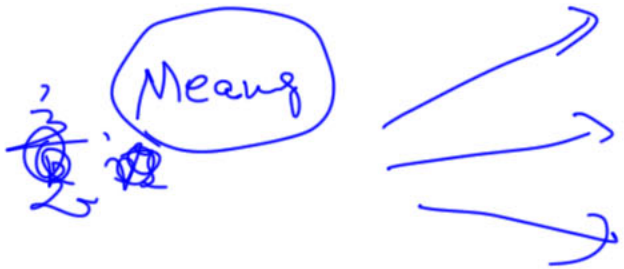
(Natural Language Generation)

# Why NLP is Harder (i.e. than Computer Vision)






# The Challenge：Multiple Ways to Express（多种表达方式）

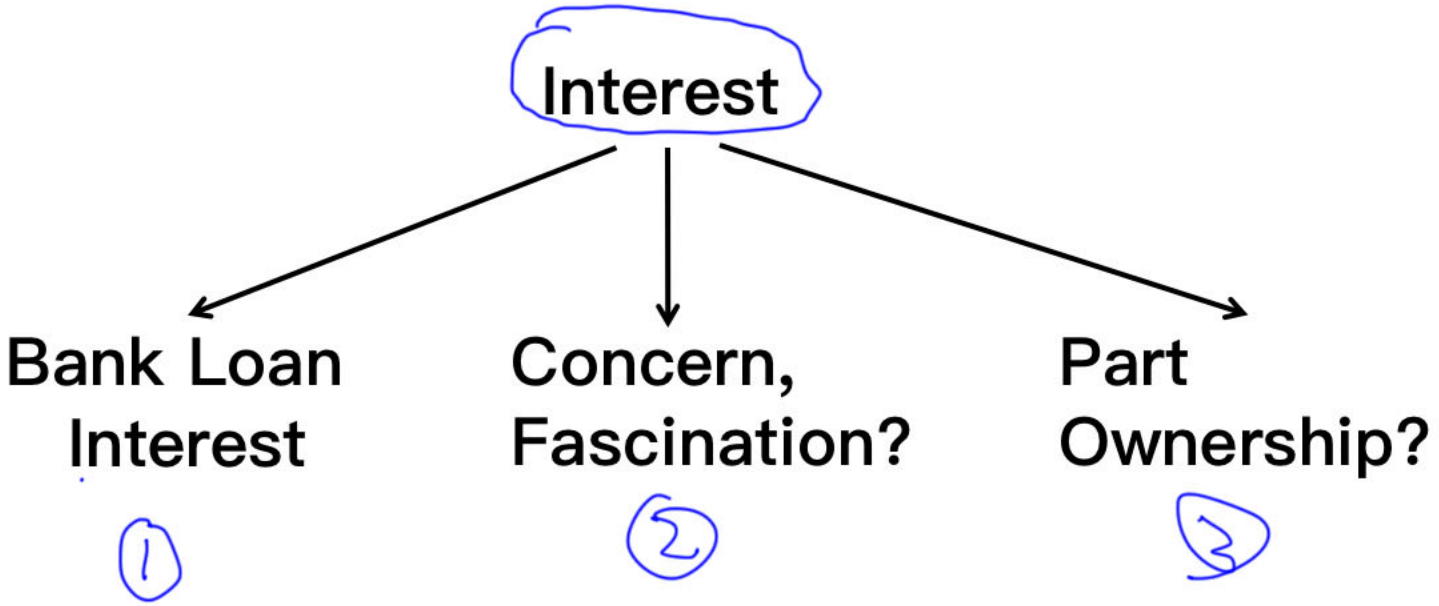



- 贪心科技开设了NLP训练营
- 贪心科技新出了NLP训练营
- 新出的NLP训练营是贪心科技出的
- ……

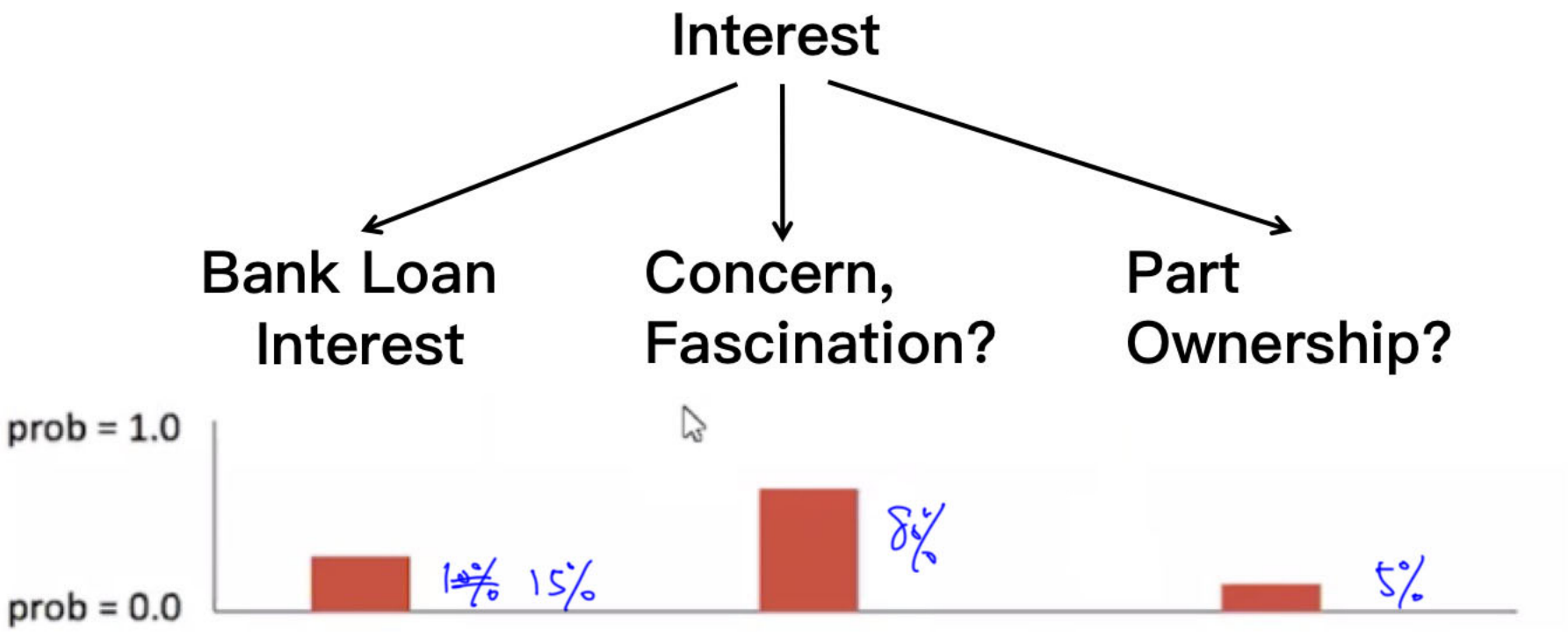
# The Challenge：Ambiguity（一词多义）

- 今天参观了苹果公司
- 现在正好是苹果季节

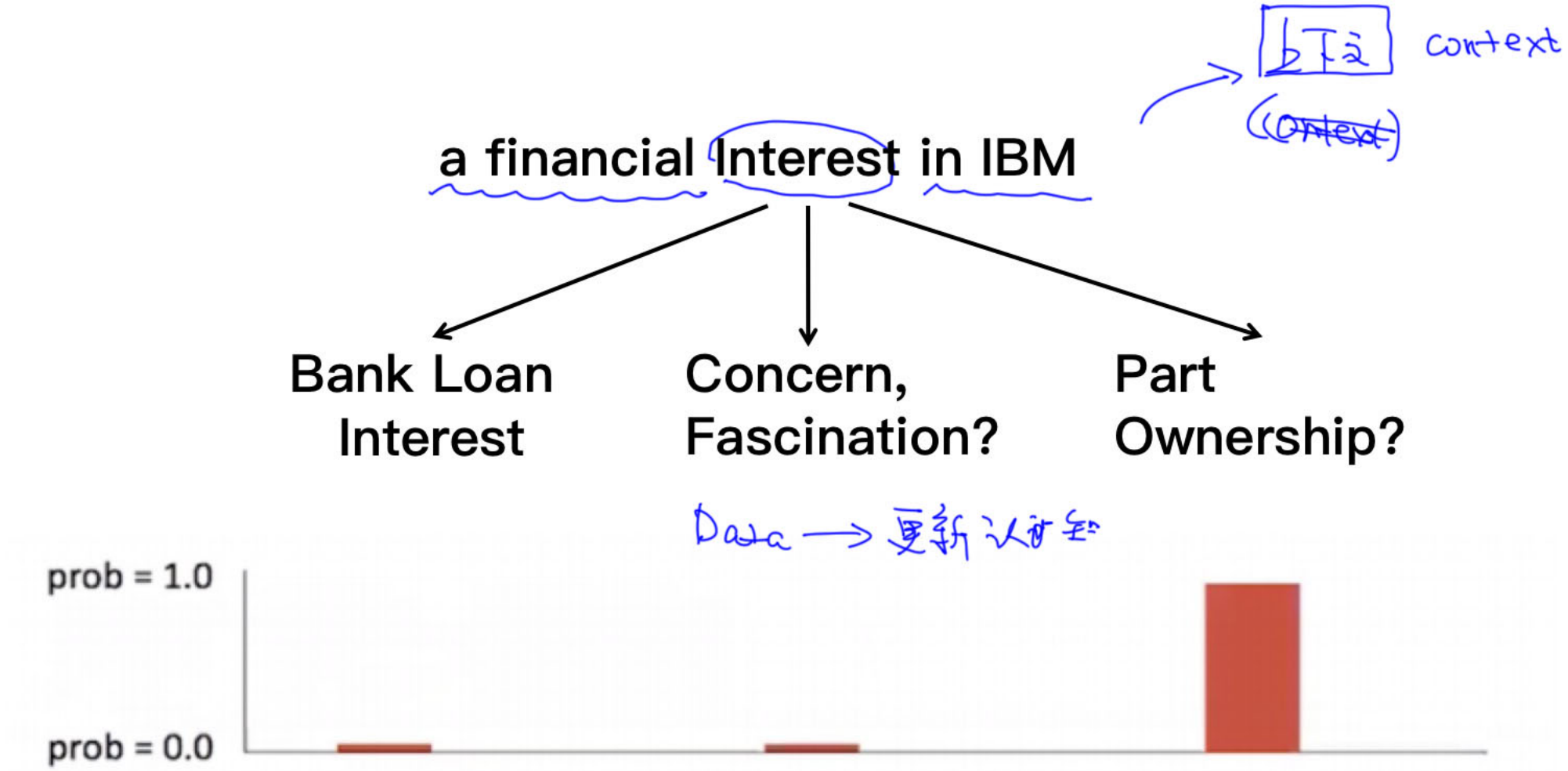
# How to Solve Ambiguity?



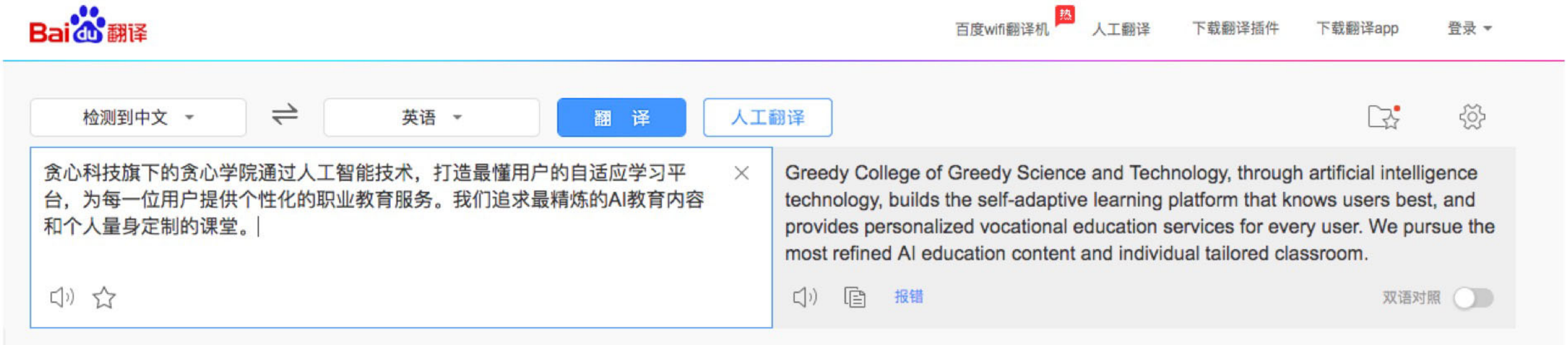
# Solving Ambiguity: Learning from Data



# Solving Ambiguity: Learning from Data



# Today's Case Study: Machine Translation




如果现在让你写一个机器翻译系统，怎么实现?

请翻译这句话: farok crrrok hihok yorok clok kantok ok-yurp

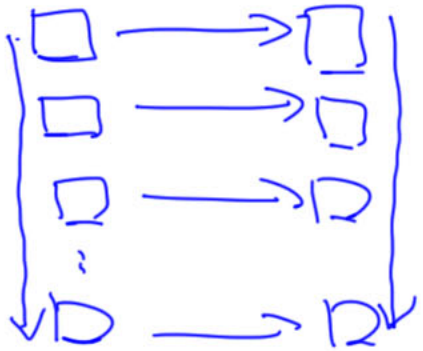
| | |
|---|---|
| 1a. ok-voon ororok sprok . | 7a. lalok farok ororok lalok sprok izok enemok . |
| 1b. at-voon bichat dat . | 7b. wat jjat bichat wat dat vat eneat . |
| 2a. ok-drubel ok-voon anok plok sprok . | 8a. lalok brok anok plok nok . |
| 2b. at-drubel at-voon pippat rrat dat . | 8b. iat lat pippat rrat nnat . |
| 3a. erok sprok izok hihok ghirok . | 9a. wiwok nok izok kantok ok-yurp . |
| 3b. totat dat arrat vat hilat . | 9b. totat nnat quat oloat at-yurp . |
| 4a. ok-voon anok drok brok jok . | 10a. lalok mok nok yorok ghirok clok . |
| 4b. at-voon krat pippat sat lat . | 10b. wat nnat gat mat bat hilat . |
| 5a. wiwok farok izok stok . | 11a. lalok nok crrrok hihok yorok zanzanok . |
| 5b. totat jjat quat cat . | 11b. wat nnat arrat mat zanzanat . |
| 6a. lalok sprok izok jok stok . | 12a. lalok rarok nok izok hihok mok . |
| 6b. wat dat krat quat cat . | 12b. wat nnat forat arrat vat gat . |

# Today's Case Study: Machine Translation

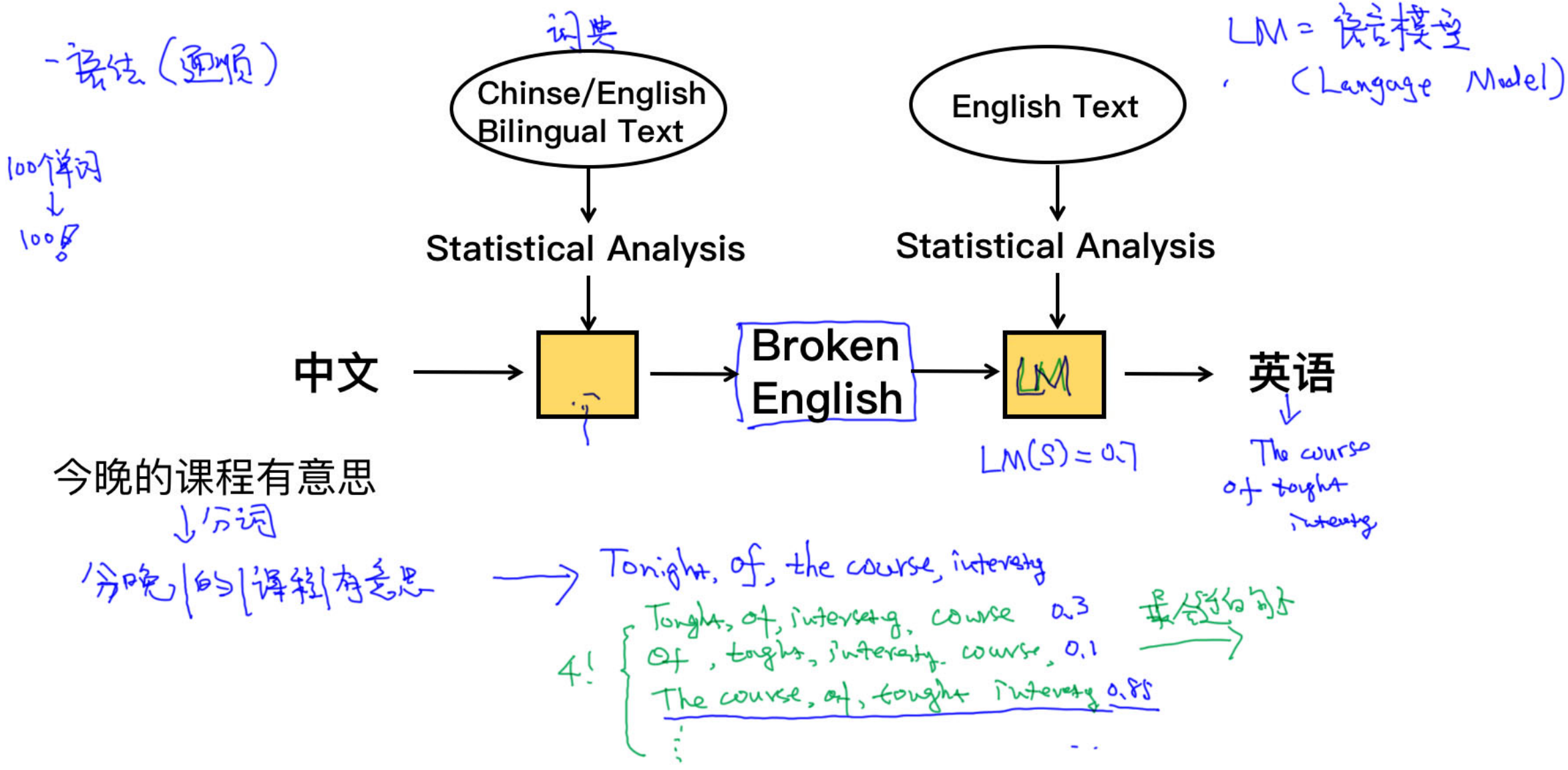
问题：

- 慢（AI/算法）
- 语义
- 上下文
- 语法不对
- 规则统计

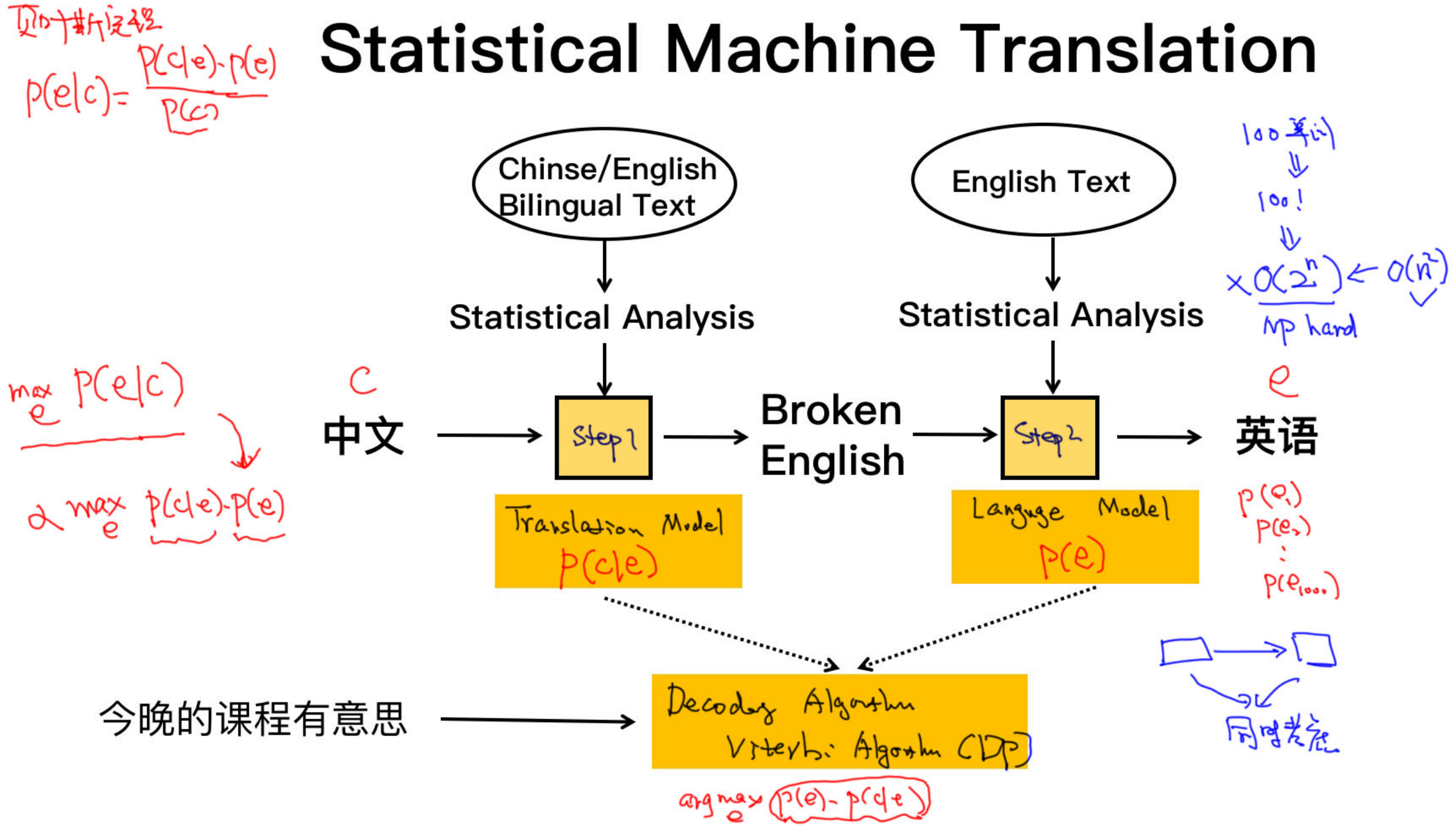
在前一张PPT里所实现的方法有什么缺点?



# Statistical Machine Translation



# Statistical Machine Translation



# Statistical MT: Three Problems

- **语言模型（Language Model）**
  - 给定一句英文e, 计算概率（e)
  - 如果是符合英文语法的，p(e)会高
  - 如果是随机语句，p(e)会低
- **翻译模型**
  - 给定一对<c,e>，计算p(f|e)
  - 语义相似度高, 则p(f|e)高
  - 语义相似度低，则p(f|e)低
- **Decoding Algorithm**
  - 给定语言模型，翻译模型和f, 找出最优的使得p(e)p(f|e)最大

# Language Model (语言模型)

- 对于一个好的语言模型：
  - p(He is studying AI) > p(He studying AI is)
  - p(nlp is an interesting course) > p(interesting course nlp is an)

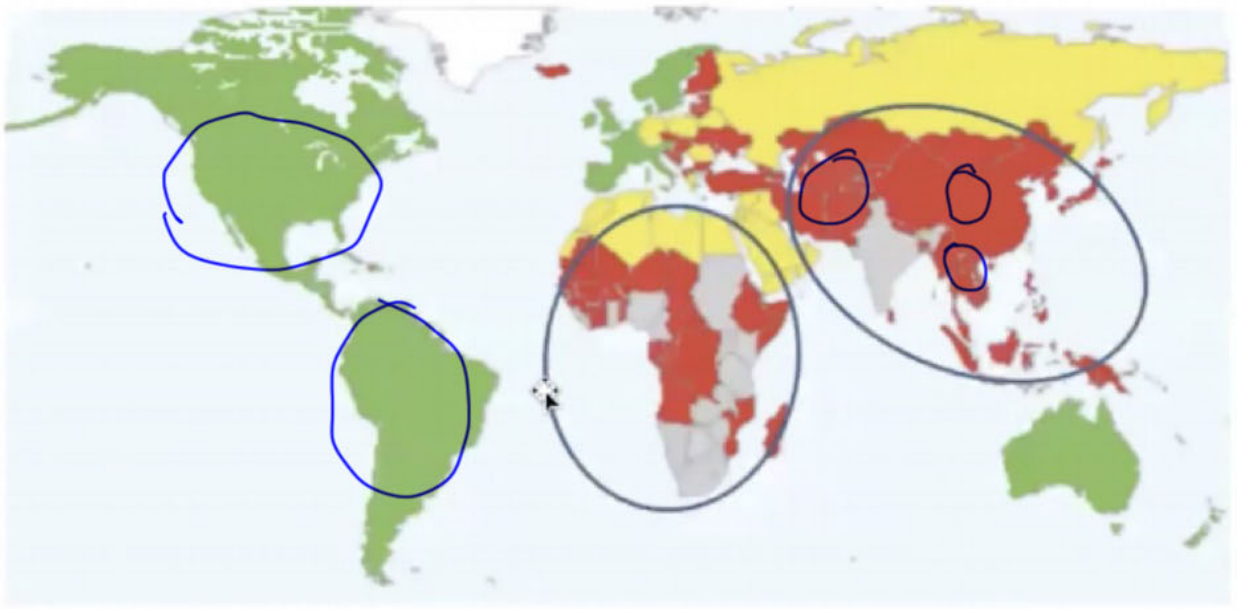
- 怎么计算p(.)
  - Uni-gram: p(He is studying AI) = p(He)p(is)p(studying)p(AI)
  - Bi-gram: P(He is studying AI) = p(He)p(is | He)p(studying | is)p(AI | studying)
  - Tri-gram: P(He is studying AI) = p(He)p(is | He)p(studying | he is)
    p(AI | is studying)
  - ⋮
  - N-gram

$p(x,y) = p(x)\cdot p(y)$ 若 x,y 独立

$p(x,y) = p(x)\cdot p(y|x)$

$= p(y)\cdot p(x|y)$

# Machine Translation: Difficulty Level by Language

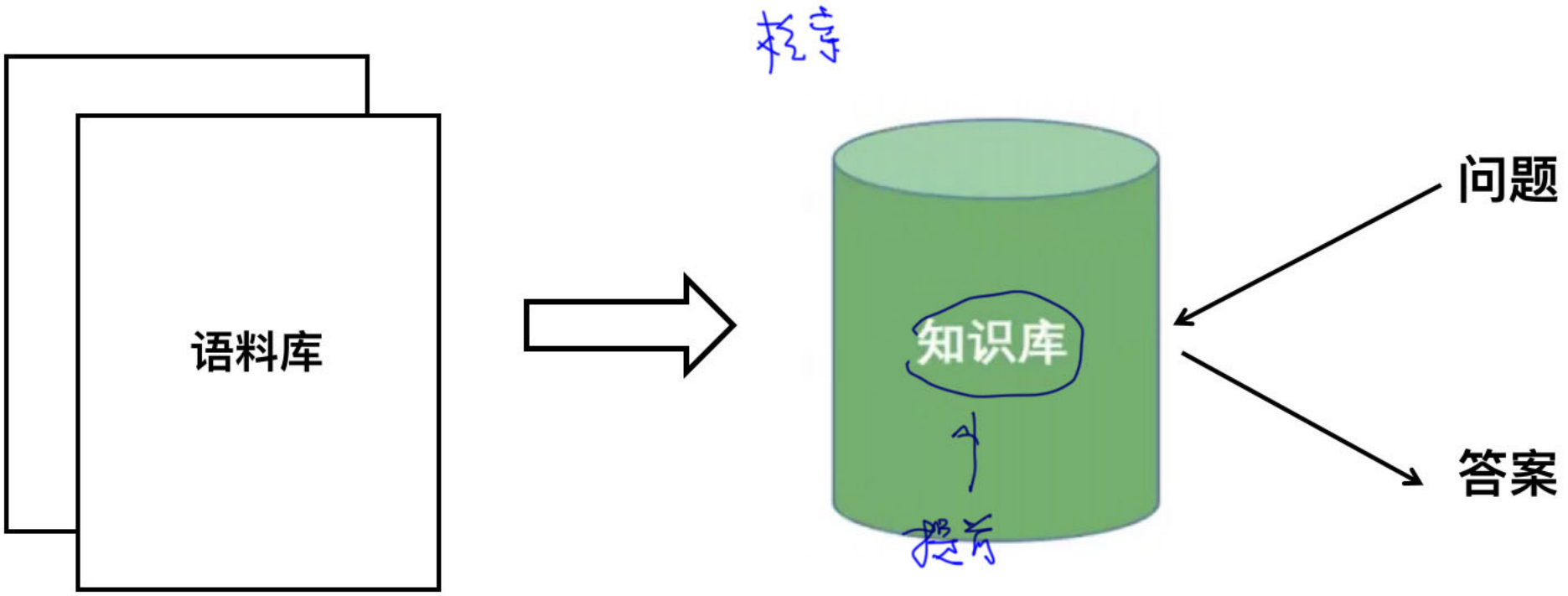


# NLP的经典应用场景

# Question Answering(问答系统)

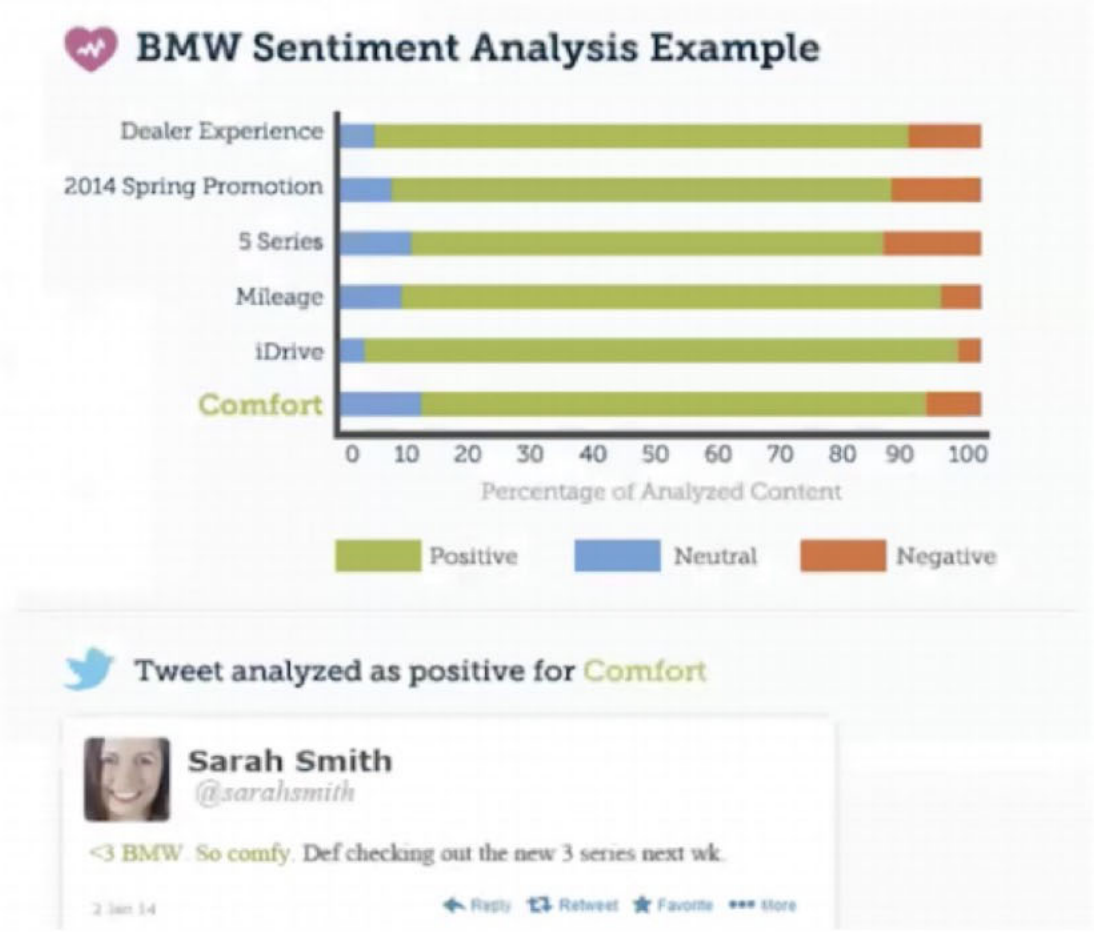
IBM Watson.

# Question Answering(问答系统)



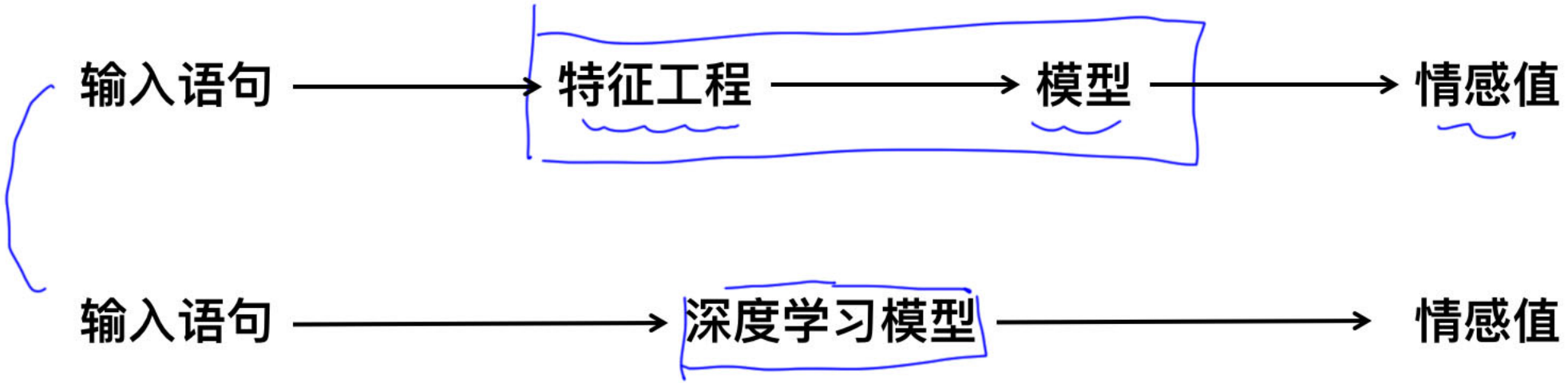
# Sentiment Analysis(情感分析)

第二个项目

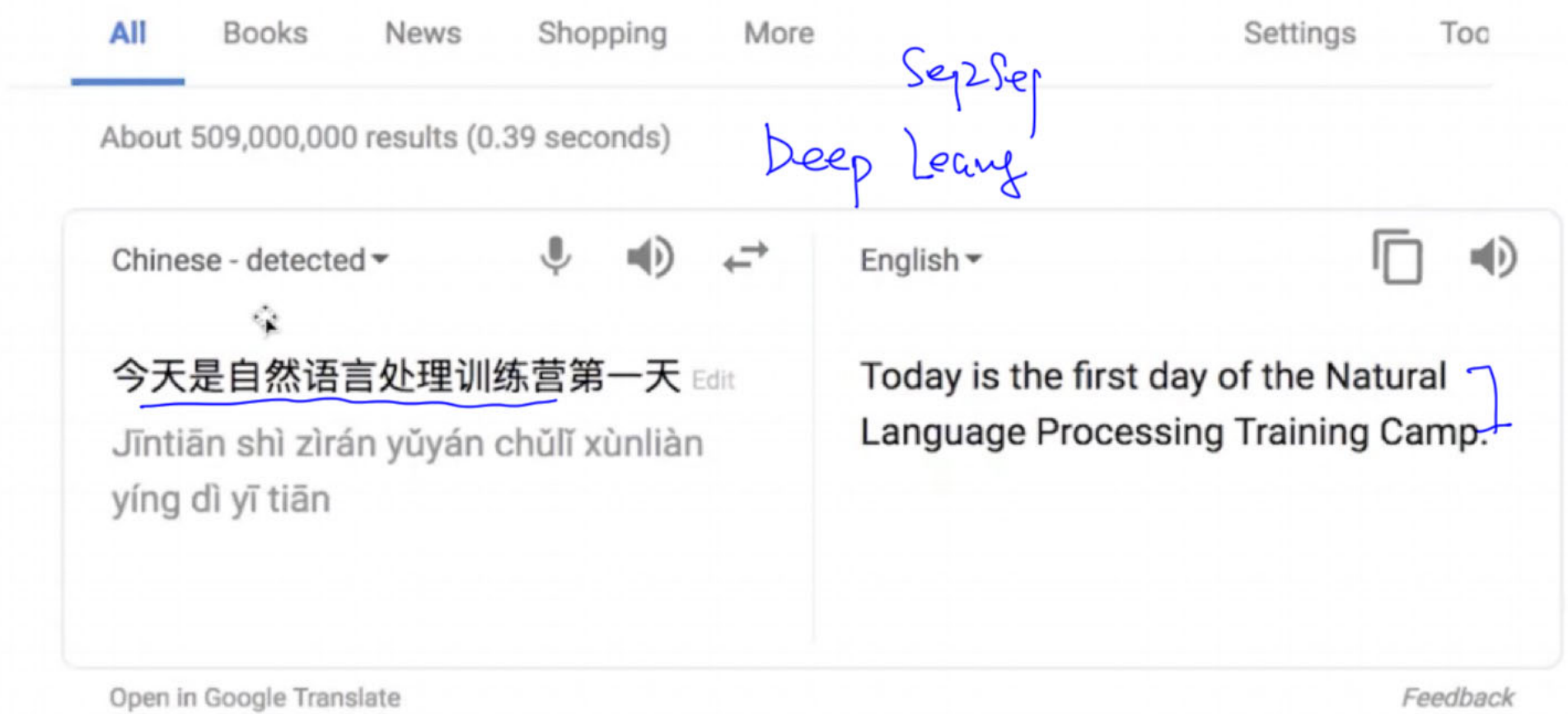



- 股票价格预测
- 舆情监控
- 产品评论
- 事件监测

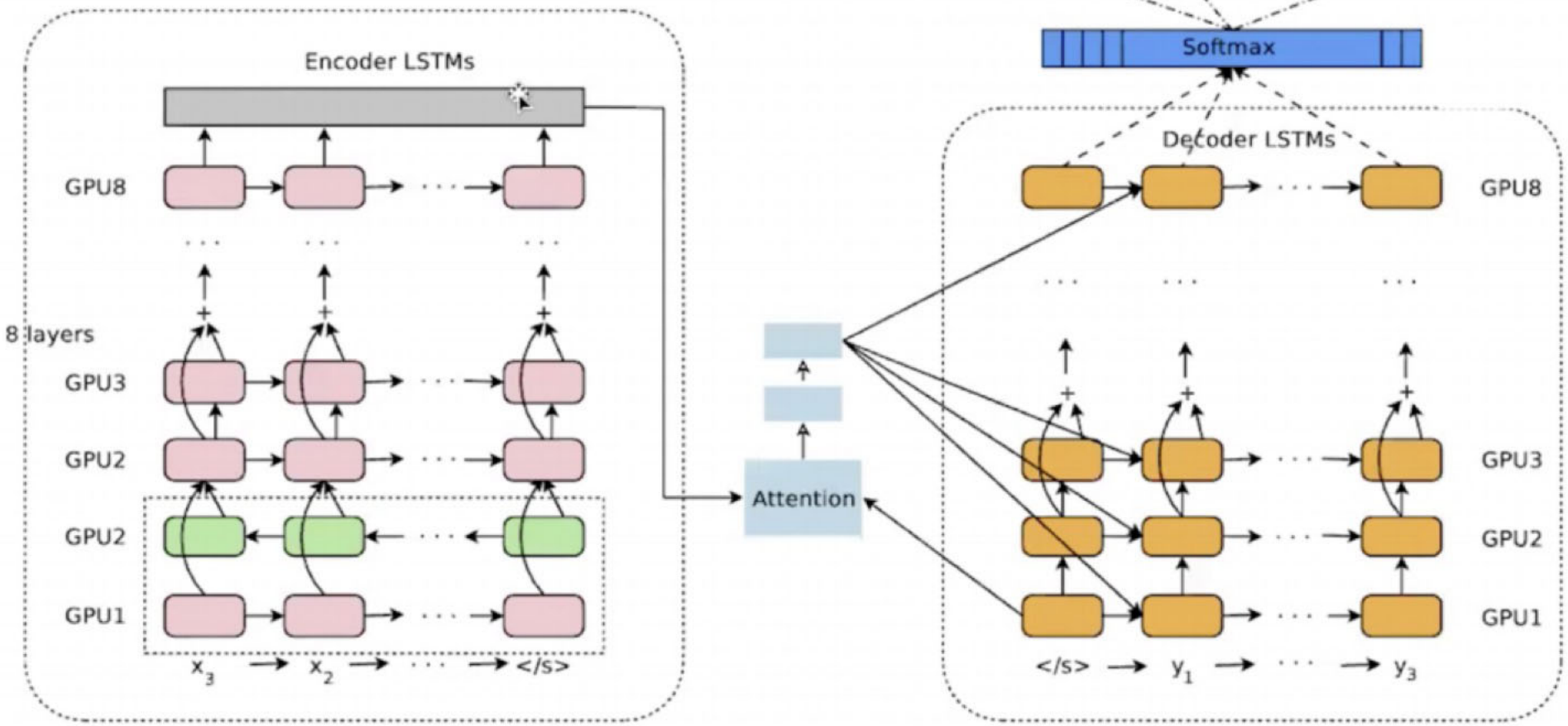
# Sentiment Analysis(情感分析)



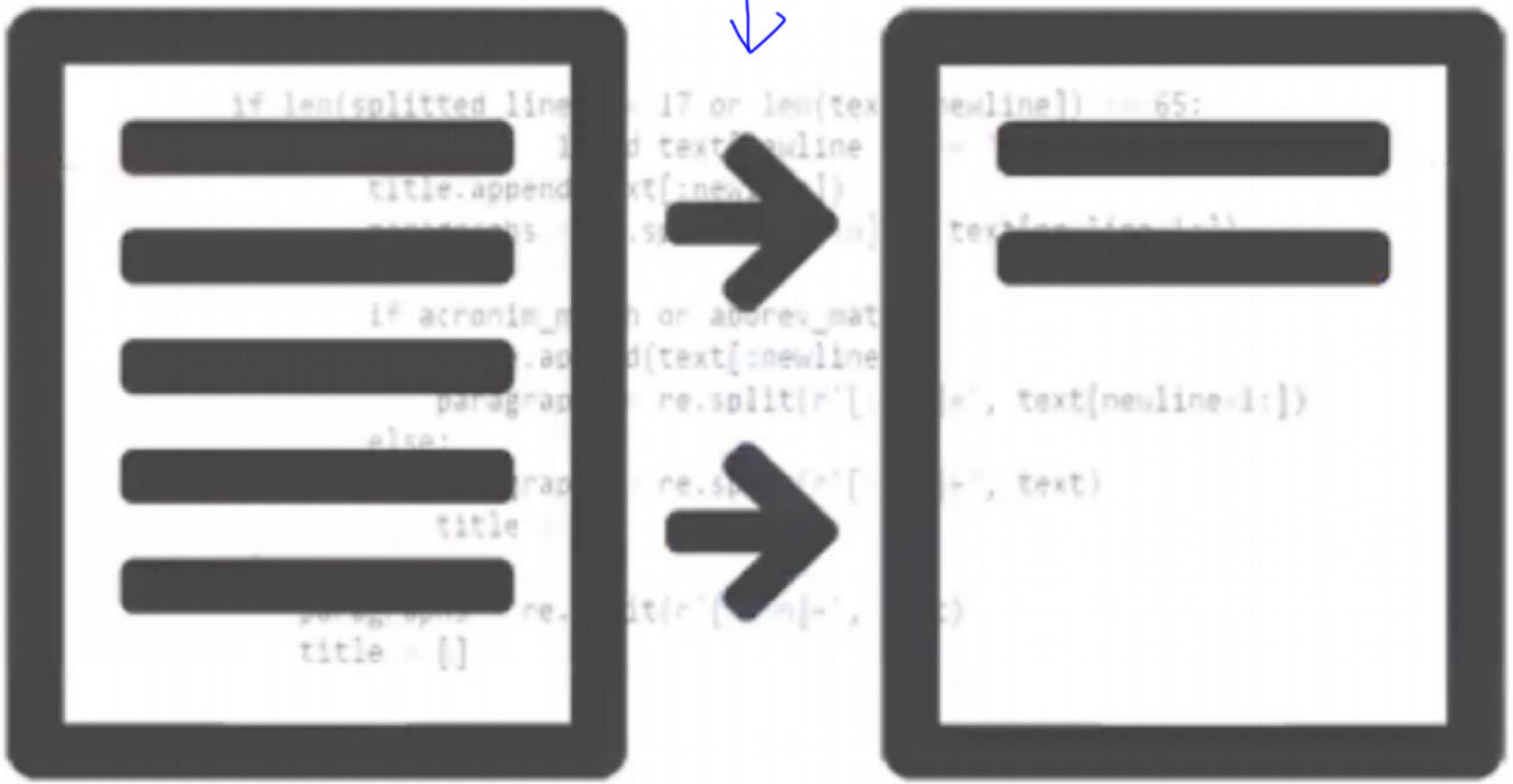
# Machine Translation(机器翻译)



# Google 机器翻译


Encoder LSTMs
GPU8
8 layers
GPU3
GPU2
GPU2
GPU1
x3
x2
</s>
Attention
y1
y2
</s>
Softmax
Decoder LSTMs
GPU8
GPU3
GPU2
GPU1
</s>
y1
y3

# Text Summarization(自动摘要)



# Chatbot（聊天机器人）


无聊了，随便聊一聊


想定一个机票


不知道自己要做啥

# Information Extraction(信息抽取)

NER ←

Relation Extraction ←

NLP ↑

Dan Jurafsky


## Information Extraction

Subject: **curriculum meeting**

Date: January 15, 2012

To: Dan Jura

Event: Curriculum
Date: Jan-16-2012
Start: 10:00am
End: 11:30am
Where: Gates 159

Hi Dan, we've now scheduled the curriculum meeting.

It will be in Gates 159 tomorrow from 10:00-11:30.

-Chris

Create new Calendar entry

3

# NLP关键技术

# 自然语言处理技术四个维度

# Word Segmentation(分词)

今天是自然语言处理训练营第一次课

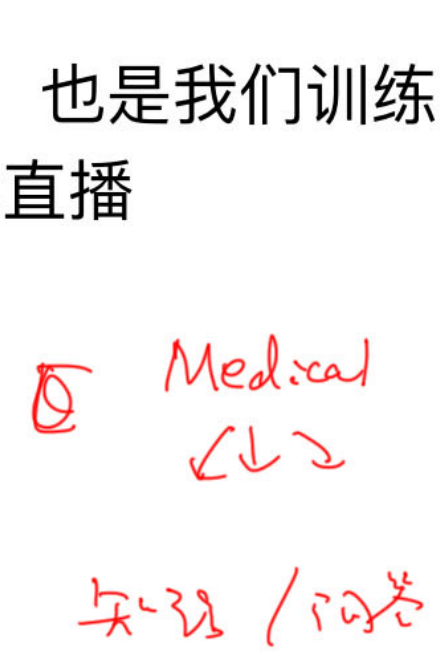
今天 是 自然语言处理 训练营 第一次 课

# Part-of-Speech（词性）

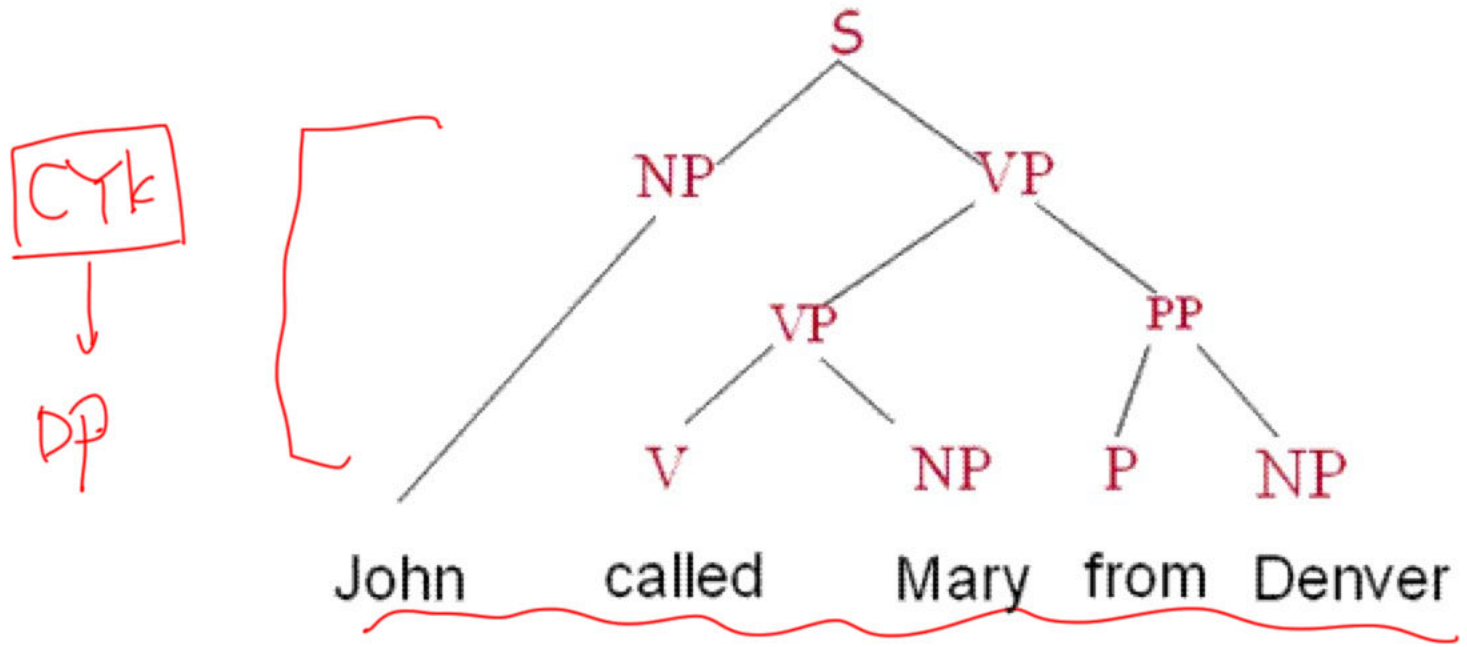
今天是1月22日，也是我们训练营的第一天，暂时课程以ZOOM的方式直播

# Named Entity Recognition
# (命名实体识别)

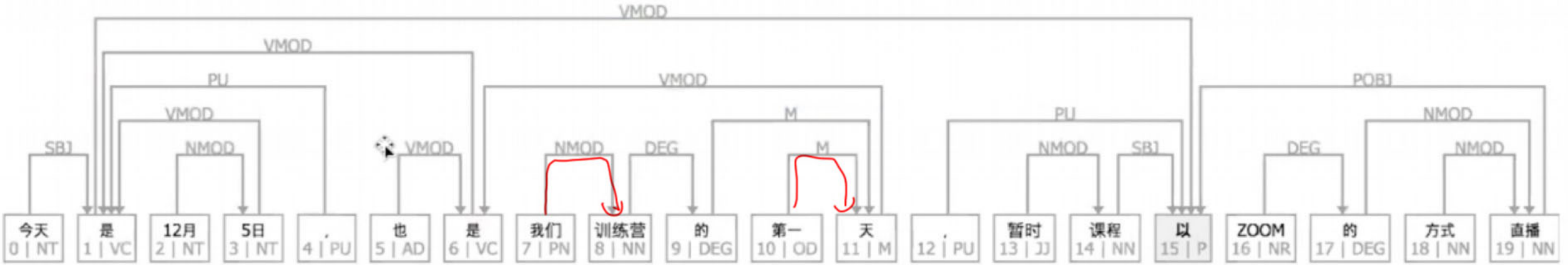
今天是1月22日，也是我们训练营的第一天，暂时课程以ZOOM的方式直播



# Parsing (句法分析)



# Dependency Parsing (依存分析)



# Relation Extraction(关系抽取)