计算机专业英语

邢敏捷　编著

Program Structure

Database

Software Engineering

Operating System

Multimedia

Computer Components

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前　言

计算机英语在日新月异、瞬息万变的计算机科学技术发展中越来越受到专家、学者的重视。计算机科学技术的刷新和开发使专业术语和专业内容与英语密不可分。阅读英语文献，使用各种信息网络，了解最新科研进展都需要计算机英语。为了满足高等院校计算机专业的学习需要、科研需要和国际交流需要，我们计算机专业和英语专业教师齐心协力、优势互补，将最新计算机英语编写成书，奉献给计算机专业的同学们。

本书内容广泛，基本覆盖了计算机学科基础的各个领域，其中包括机器学习、知识表达、程序设计方法(C^{++})、图论、软件工程、操作系统、多媒体以及计算机体系结构等，共计十章。本书主要取材于美国 93 年以来出版的资料。限于篇幅，作者对所选题材做了裁剪。本书以章分类，以节为模块，每节后面配有练习，以进一步掌握文章中出现的英语语言点，并在掌握英语语言的基础上，提高专业英语阅读能力。使用本书的教师、读者可根据教学时数及教学实践的需要，适当调节章次。

本书附有每章参考译文。这些译文虽经作者与有关专家几经切磋，但全书译文恐还难成典范。专业英语中有些术语，用句还无统一标准。译文观点仁者见仁、智者见智。为此，本书提供的译文仅供读者借鉴。

最后，我要对为本书做了全部专业审定工作的上海交通大学计算机系左孝凌教授表示深深的感谢。同时，我也要感谢复旦大学计算机系招兆鉴教授、武汉大学计算机科学系何焱祥教授、哈尔滨工业大学计算机科学系王开铸教授，以及上海工程技术大学阮家栋副教授，他们为参考译文的部分章节提出了很有价值的建议。本书的出版如能对读者学习计算机专业英语起到积极引导的作用，

应归功于上述专家学者的积极支持和鼓励。

本书是一本计算机专业英语教材，全书内容兼跨两类学科，领域繁多，作者管中窥豹，难及全貌。书中疏漏之处在所难免，敬请读者不吝赐教，作者将不胜感谢。

编　者

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Chapter 1 Learning

1.1 What is Learning

One of the most often heard criticisms of AI is that machines cannot be called intelligent until they are able to learn to do new things and to adapt to new situations, rather than simply doing as they are told to do.[1] There can be little question that the ability to adapt to new surroundings and to solve new problems is an important characteristic of intelligent entities.

Rather than asking in advance whether it is possible for computers to "learn", it is much more enlightening to try to describe exactly what activities we mean when we say "learning" and what mechanisms could be used to enable us to perform those activities.[2]

Learning covers a wide range of phenomena. At one end of the spectrum is *skill refinement*. People get better at many tasks simply by practicing. The more you ride a bicycle or play tennis, the better you get.[3] At the other end of the spectrum lies *knowledge acquisition*. As we have seen, many AI programs draw heavily on knowledge as their source of power. Knowledge is generally acquired through experience.

Knowledge acquisition itself includes many different activities. Simple storing of computed information, or *rote learning*, is the most basic learning activity. Many computer programs, e. g., database systems, can be said to "learn" in this sense, although most people would not call such simple storage learning.

However, many AI programs are able to improve their performance substantially through rote-learning techniques.

Another way we learn is through taking advice from others. Advice taking is similar to rote learning, but high-level advice may not be in a form simple enough for a program to use directly in problem solving. The advice may need to be first *operationalized*.

People also learn through their own problem-solving experience. After solving a complex problem, we remember the structure of the problem and the methods we used to solve it. [4] The next time we see the problem, we can solve it more efficiently. [5] Moreover, we can generalize from our experience to solve related problems more easily. In contrast to advice taking, learning from problem-solving experience does not usually involve gathering new knowledge that was previously unavailable to the learning program. That is, the program remembers its experiences and generalizes from them, but does not add to the transitive closure of its knowledge, in the sense that an advice-taking program would, i. e., by receiving stimuli from the outside world. [6] In large problem spaces, however, efficiency gains are critical. Practically speaking, learning can mean the difference between solving a problem rapidly and not solving it at all. In addition, programs that learn through problem-solving experience may be able to come up with qualitatively better solutions in the future.

Another form of learning that does involve stimuli from the outside is *learning from examples*. We often learn to classify things in the world without being given explicit rules. For example, adults can differentiate between cats and dogs, but small children often cannot. Somewhere along the line, we induce a method for telling cats from dogs based on seeing numerous ex-

amples of each.

AI researchers have proposed many mechanisms for doing the kinds of learning described above. In this chapter, we discuss several of them. But keep in mind throughout this discussion that learning is itself a problem-solving process. In fact, it is very difficult to formulate a precise definition of learning that distinguishes it from other problem-solving tasks.[7] Thus throughout this chapter, we will make extensive use of both the problem-solving mechanisms and the knowledge representation techniques.

Words

criticism *n.* 评论
intelligent *a.* 具有智能的
situation *n.* 形势,情况
surroundings *n.* 环境
characteristic *n.* 特征
entity *n.* 实体
enlighten *v.* 启发,使人领悟的
describe *v.* 描述
mechanism *n.* 机制
perform *v.* 执行,运行
phenomena *n.*(*pl*) 现象
spectrum *n.* 系列,范围
refinement *n.* 精炼,精确
task *n.* 任务
tennis *n.* 网球
acquisition *n.* 获得,获取
source *n.* 根源
performance *n.* 工作,性能
substantially *adv.* 大量地,有重大价值地
technique *n.* 技术,技巧
advice *n.* 建议
directly *adv.* 直接地
experience *n.* 经验
complex *a.* 复杂的
structure *n.* 结构
generalize *v.* 归纳
involve *v.* 卷入,包括
gather *v.* 收集
previously *adv.* 以前
unavailable *a.* 无法得到的
transitive *a.* 有转移力的,过渡的

closure *n.* 关闭
stimuli *n.*(*pl*) 刺激
efficiency *n.* 效率
critical *a.* 至关重要的
qualitative *a.* 质量的，定性的
solution *n.* 解决问题的答案，办法
classify *v.* 分类
explicit *a.* 明显的
adult *n.* 成人
differentiate *v.* 区别
numerous *a.* 众多的
discover *v.* 发现
aid *n.* 帮助
researcher *n.* 研究人员
propose *v.* 提出建议
process *n.* 过程
formulate *v.* 给出公式
precise *a.* 精确的
definition *n.* 定义
distinguish *v.* 使…区分开来
extensive *a.* 扩大的
representation *n.* 表达，代表

Phrases

AI (artificial intelligence) 人工智能
adapt to 适应
in advance 事先，提前
a wide range of 大范围的
skill refinement 技术精炼
knowledge acquisition 知识获取
draw on 依靠，凭借，利用
rote learning 机械式学习
be similar to 类似
in a form 以…形式
in contrast to 相比之下，与…形成对照
in addition 此外
come up with 提供
tell from 辨别，分辨
base on 基于
keep in mind 记住
in fact 事实上
distinguish from 区分

Notes:

[1] one of the most often heard criticisms of AI 作主语，译为：人们常常听到对人工智能的评论之一；is 后面的 that

引导的表语从句中 to learn to do 和 to adapt to 是平行结构，二者都是 be able to 发出的动作；machines cannot be called intelligent until they are able to learn to do new things and to adapt to new situations，译为：除非机器能够学习做新的工作，并适应新的环境，否则，就不能称之为智能机器；rather than 意为而不是.

[2] 在主句 it is much more enlightening to…中，it 是逻辑主语，to try to describe…是句子的真正主语；what activities…和 what mechanisms…是两个平行的宾语从句；在第一个宾语从句中 we mean 是 activities 的定语从句；when we say "learning"是时间状语从句.

[3] the more…the better 句型，意为越…越…，本句 The more you ride a bicycle or play tennis, the better you get. 译为：骑自行车或打网球操练得愈多，技术愈高.

[4] 在 we remember…主句中，structure 和 methods 平行，作 remember的宾语；we used to solve it 是 methods 的定语从句；"it"指的是 complex problem.

[5] The next time we see the problem，是名词引导的时间状语从句，译为：下一次我们看到这个问题。

[6] 主语 program 发出两个动作，一个是 remembers，另一个是 does not add to…；in the sense that advice taking program would 后面省略了 add to traistive closure of its knowledge.

[7] it 是逻辑主语，在句子的真正主语 to formulate a precise definition of learning；that 引导的宾语从句修饰 a precise definition of learning.

Exercises

I. Translate the following sentences from English into Chinese:

1. Another way we learn is through taking advice from others.
2. People also learn through their own problem-solving experience.
3. There can be little question that diligence and creativeness are the important elements of success for college students.
4. Please inform me in advance whether it is possible for you to come for the conference.
5. A writer has to draw on his imagination and experience.
6. Many young people, e.g. college students, can be said to be clever in a sense, although most of them are not mature.
7. Many college students can enhance their ability through practice.
8. One of the often heard criticisms of bull-fight is that it should not be adopted as a sport because it is too crude.
9. Freshmen should adapt to the new surroundings of the campus by themselves, rather than simply doing as they are told to do.
10. After seeing the film, we remember the cinema and the way to the cinema.

Ⅱ. Translate the following sentences from Chinese into English:

1. 下次见到你的时候,你一定会更擅长计算机。
2. 与看电视相比较,阅读见不到真实图象,信息不够丰富。
3. 善于解决问题并积累经验的人将来能够迎接更具竞争性的挑战。
4. 看看实际的学习程序,我们会发现,程序开始时所用的知识越多,它所能学习的东西也就越多。
5. 学习程序需要获取新知识和新的解决问题的能力。

1.2 Rote Learning

When a computer stores a piece of data, it is performing a rudimentary form of learning. After all, this act of storage presumably allows the program to perform better in the future(otherwise, why bother?). In the case of data caching, we store computed values so that we do not have to recompute them later. When computation is more expensive than recall, this strategy can save a significant amount of time. Caching has been used in AI programs to produce some surprising performance improvements. Such caching is known as *rote learning*.

Samuel's checkers program learned to play checkers well enough to beat its creator. It exploited two kinds of learning: rote learning, and parameter (or coefficient) adjustment. Samuel's program used the minimax search procedure to explore checkers game trees. As is the case with all such programs, time constraints permitted it to search only a few levels in the tree.[1] (The exact number varied depending on the situation.) When it could search no deeper, it applied its static evaluation function to the board position and used that score to continue its search of the game tree.[2] When it finished searching the tree and propagating the values backward, it had a score for the position represented by the root of the tree.[3] It could then choose the best move and make it.[4] But it also recorded the board position at the root of the tree and the backed up score that had just been computed for it.[5]

Rote learning of this sort is very simple. It does not appear