



研究生与系列
学术著作

人工智能 商业应用手册

——人工智能在会计、银行、金融、
管理及营销中的商业应用

(英文影印版)

乔尔·G·西格尔 (Joel G. Siegel)

杰·K·希姆 (Jae K. Shim) / 著

The Artificial Intelligence Handbook

Business Applications in

Accounting, Banking, Finance,

Management, and Marketing

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A R T I F I C I A L
Intelligence
h a n d b o o k

***Business Applications in
Accounting, Banking, Finance,
Management, Marketing***

JOEL G. SIEGEL
Queens College of the City of New York

ANIQUE A. QURESHI
Queens College of the City of New York

JAE K. SHIM
California State University, Long Beach

SUSANNE O'CALLAGHAN
Pace University

JOHN P. WALKER
Queens College of the City of New York

PAUL KOKU
Florida Atlantic University

THOMSON

SOUTH-WESTERN

图书在版编目(CIP)数据

人工智能商业应用手册:人工智能在会计、银行、金融、管理及营销中的商业应用
西格尔等著—英文影印版
北京:中国人民大学出版社,2004
(研究生与学术著作系列)

ISBN 7-300-05330-0/F·1646

I. 人…

II. 西…

III. 人工智能-应用-经济-英文

IV. F-39

中国版本图书馆 CIP 数据核字(2004)第 007410 号

研究生与学术著作系列

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乔尔·G·西格尔

著

杰·K·希姆

出版发行 中国人民大学出版社

社 址 北京中关村大街 31 号

邮政编码 100080

电 话 010-62511242(总编室)

010-62511239(出版部)

010-62515351(邮购部)

010-62514148(门市部)

网 址 <http://www.crup.com.cn>

<http://www.ttrnet.com>(人大教研网)

经 销 新华书店

印 刷 唐山市润丰印务有限公司

开 本 965×1270 毫米 1/32

版 次 2004 年 3 月第 1 版

印 张 8.25 插页 2

印 次 2004 年 3 月第 1 次印刷

字 数 233 000

定 价 18.00 元

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本书能为你提供什么帮助

本书的目的是帮助企业管理人员了解并应用人工智能软件。人工智能的内容包括专家系统和神经网络,将使企业管理人员掌握最新和最重要的计算机应用软件。本书将给财务经理、会计、税务经理、市场经理、企业经理、信用管理经理、贷款员、保险经理、产品经理、律师、经济学家及在商业领域内的其他人员带来巨大的利益。

人工智能属于计算机科学领域,它主要研究如何制造智能机器或创建智能系统,在日常工作中运用软件来模拟人类智能活动的的能力。本书清晰地定义和解释了人工智能及其使用方法,讨论了人工智能在商业活动中的应用,并说明了人工智能的应用如何使得决策更科学、更快捷。

企业人员必须了解人工智能——专家系统、模糊逻辑和神经网络——的应用,只有如此,企业才能充分发挥人工智能软件的作用,最大限度挖掘企业增长的潜能。专家系统和神经网络软件能够使得企业的并购评估更加精确,从而使企业管理人员具有更大的竞争优势。人工智能所讨论的内容能使执行人员更加准确地把握未来并购的变化趋势。

本书比较难懂的部分均用简单术语来描述。实际上它是一本操作性手册——一本寻找什么、做什么以及如何运用所学知识的说明书,并利用例子按照操作步骤一步一步地进行描述。其中包括简单的工作表、进度表、核对表、图表、演示、表格、曲线图、个案研究、计算机输出等。本书给出了常见问题的解决办法,不同的问题有不同的解决办法。

术语表列出了本书所定义的专业术语,便于用户根据索引非常方便地查阅自己感兴趣的章节。

在财务会计领域,人工智能软件有助于跟踪监控账户、设置风险

储备金及分析公司的财务状况。

在管理会计领域,人工智能软件有助于进行成本管理与分析、规划与控制、编制预算、预测、资金预算、资源分配、方差分析、现金流评价以及产品与服务分析。

在审计领域,人工智能软件有助于审计、内部评估控制、收集证据、舞弊调查、抽样分析及风险分析(如预测“继续经营”问题)。

在税务领域,人工智能软件有助于税务规划、资产规划、确定交易的税额、识别税种、税务研究及确定税务执行标准。

另外,注册会计师可以利用人工智能软件为客户提供个人理财规划服务——如证券管理,包括股票与债券的选择和多元化,通过分析公司、投资时间、贸易活动、套期保值策略等多重约束以建立投资组合。人工智能软件还适用于有关资产和负债管理、险种选择、政策限制以及银行安排。

当会计师为客户进行管理咨询服务时,他们就可以利用人工智能软件给出有关会计信息和会计报告的建议,这些建议也许对市场经理、信用管理经理、产品经理、保险经理、跨国企业经理及财务经理做出具有全局性的决策有很大的帮助。另外,在其他管理咨询服务领域中如何利用人工智能为客户提供增值服务目前仍在探讨和论证之中。

在实际管理过程中,人工智能软件还有助于建立客户档案、调度员工作业、服务定价及计算机辅助教学等工作。

人工智能涉及到的技术包括专家/知识系统、神经网络、推理、模式匹配、机器学习和模糊逻辑。在商业管理中人工智能软件有以下几项优点:

- 以较低成本进行商业活动;
- 提高生产力和生产效率;
- 收入最大化;
- 资源利用最优化;
- 决策制定和分析最优化。

专家/知识系统是以人类专家的知识水平执行任务的一组计算机程序。专家系统通常是一个基于特殊领域(例如财务会计、管理会计、审计、税收、个人理财规划等)的专家知识和经验的大型数据库,它能

够结合用户的问题重复查找相关数据,得出决策或结论。换句话说,根据事先设计的一系列客户所要提问的问题及附加信息,专家系统进行判断推理,从而帮助客户解决商业难题。根据专家系统得出的问题答案并非十全十美,但它是根据推理得到的最优逻辑结论。

专家系统的主要构成要素包括数据库管理系统、知识数据库、推理机、域数据库、用户界面及知识获取工具。本书对每一个要素都进行了全面的探讨,以达到最佳的成本效益结果。

如果商业应用涉及到专家知识、专家判断和专家经验,开发一个专家系统将是一个不错的选择,实际上清晰定义这样一个专家系统是比较容易的。专家系统适合非结构化的作业环境和人机交互式任务。

企业人员必须熟悉专家系统外壳,它是一组用于设计、开发、使用和维护专家系统的软件包和工具的组合。有关这些内容本书均进行了讨论。

专家系统开发工具对简化、推动、设置或扩展专家系统是有用的。开发的辅助设备包括 if - then 规则、数据库运用界面、电子数据表运用工具、编程语言及生成推理机工具等。

专家系统的应用领域有如下几个方面:

- 财务分析;
- 预算与预测;
- 会计分析;
- 资金与人事规划;
- 贷款申请评估;
- 安全与控制;
- 审计计划;
- 报告准备与分析;
- 降低风险;
- 投资与投资组合管理;
- 内部控制评估;
- 并购分析;
- 工程调度;
- 产品与服务评估;

- 税收计划；
- 舞弊辨识；
- 生产缺陷辨识。

专家系统在内部控制系统中的应用是完美的。可以针对评估现金流、应收账款、应付账款和管理控制进行专家系统的开发。知识基础包括来自美国注册会计师协会、财务会计标准委员会、证券交易委员会和美国税务局的会计、审计及税收条例。

在独立注册会计师所使用的审计系统中,专家系统在预付账款和实施审计时自始至终应用会计标准。专家系统在审计领域,如选择审计程序和检验样本、确定误差等级、实施分析审查、基于调查结果的判断描述等方面非常有用。专家系统可以帮助企业进行内部控制评估、风险评定、审计时间安排、评价审计员品行等。另外,专家系统还能提供客户报告中与公认会计准则相一致的重要证据。

税收系统有一套适合于专家系统的复杂制度和程序。专家系统可以用于资产规划、税务研究、确定股票赎回的税收额度以及其他各种交易的综合税收问题。

贷款分析专家系统能够接受或拒绝信贷申请,它根据预先设定的标准来决定是否贷款给申请人,该系统能够根据违约风险系数识别出可疑的贷款申请。

运用神经网络技术,计算机对特征的实际观察和数据库推理的结果进行学习,从而具有了根据所提供的特征预测结果的能力。随着观察样本的增加,系统学习的精度逐渐提高,从而使神经网络能够做出更科学的决策。神经网络可以模仿人类的智能以及从经验中学习所需的知识。

神经网络使计算机变成一位具有“思维”的解决问题的专家。一个神经网络程序能够用于确认审计员的判断。本书共讨论了四种神经网络:(1)预测;(2)分类;(3)数据过滤;(4)最优化。神经网络具有持续学习的能力,随着输入—输出关系的相应变化,网络关系可以被修改。神经网络能够对环境的变化做出反应,进而产生新的知识。它具有较强的灵活性,因为它们并不受限于预先确定的环境。

神经网络可以用于评估投资组合管理。它能够扫描到表现不佳

的或定价过高的股票,并预测股票的走势图。图形识别是神经网络最常用的领域。神经网络在分析程序、内部控制评估、风险评定及严峻的“财务危机”中进行客户识别是有用的。

人工智能系统能够用于进行串行处理或并行处理。在同一时间,串行处理系统只能做出一项决策,而并行处理系统能够对多项任务做出决策。专家系统运用串行处理可以很好地按照程序步骤执行任务。神经网络运用并行处理系统能够对多个非串行输入较好地进行操作。

专家系统有一系列“if-then”执行规则,每一个“if”,都有一个“then”与之相对应,直到实现最终结果。这种对应关系是确定的。另一方面,神经网络运用并行处理能够同时对多个输入进行评价。

相比较而言,专家系统运用演绎推理,而神经网络则依赖归纳推理。前者的知识以事先定义规则的形式输入系统,具体的行为和条件来源于这些规则;后者的知识则以实例的形式存储在系统中,一般结论来源于这些特定的实例。

神经网络的优点多于专家系统。例如,神经网络具有自适应能力,能够对隐藏在图形和关系中的信息进行学习。

模糊逻辑可以看做一门用数学公式代替自然语言来对比较复杂的状态进行描述的语言。模糊逻辑建立了输出与输入之间的联系,传感器代替人类提供输入,应用时人们不需要理解中间的步骤。模糊逻辑比专家系统要求的规则少,比神经网络运用的数据少。它是一种语言,而不是数值和变量,它简化了知识的获取和表述方法,具有更大的灵活性和选择权。当客户提出的问题具有较大范围和较高不确定性时,运用模糊逻辑寻求解决方案比较有利。

合约分析和决策是模糊逻辑的特殊运用。另外企业人员可以利用模糊控制对投资风险进行安全等级评估。

人工智能软件具有自治、交流、协作、推理和自适应等主要特性。

总之,本书详细地介绍了人工智能软件如何帮助企业人员提高生产力和工作效率,并提供了成功使用专家系统和神经网络软件的全部信息。

作者简介

乔尔·G·西格尔, 博士, 注册会计师, 现任纽约州立大学皇后学院的会计学 and 金融学教授, 并成立了一家会计事务所。作为一名注册会计师, 他曾经受雇于永道咨询公司 (Coopers and Lybrand) 及安达信国际会计公司 (Arthur Andersen); 作为会计学 and 金融学领域里的著名专家, 他被花旗公司、美国国际电话电信公司、联合技术公司以及美国注册会计师协会等世界著名的机构聘为顾问。西格尔博士共撰写了 65 本专著和 200 多篇有关会计学 and 金融学的论文, 他的著作分别被 Glenlake 出版公司、西南出版公司、Prentice-Hall 出版公司、欧文公司 (Richard Irwin)、Probus 出版公司、Macmillan 出版公司、麦格劳 - 希尔出版公司 (McGraw-Hill)、HarperCollins 出版公司、John Wiley 出版公司、国际出版公司、Barrons 公司、美国管理协会及美国注册会计师协会等单位出版。他的论文分别在《财务主管》、《财务分析家杂志》、《注册会计师杂志》、《会计师实践》及《国家会计师》等会计学 and 金融学刊物上公开发表。1972 年他获得了美国杰出教育家奖。为此, 他的名字被《作家名人录》和《世界名人录》所收录。他现在是国家监管委员会的主席。

杰·K·希姆, 博士, 毕业于加州大学伯克利分校, 现为好几家公司的会计顾问及加利福尼亚大学长滩分校的会计学教授, 希姆博士共撰写了 40 部著作和 50 多篇论文, 他的论文分别在《注册会计师杂志》、《高级会计》、《国际会计师》及《财务管理》等会计学 and 金融学刊物上公开发表。

约翰·P·沃克, 博士, 注册会计师, 现任皇后学院会计信息系统教授和计算机顾问, 曾任纽约市经济发展合作委员会主要财务和行政官员、Data Spectrum 公司的执行副总裁。沃克博士还在银行系统中担任过分析家和程序师, 在毕马威国际会计公司的注册会计师协会担任管

理顾问。他的论文主要发表在《会计杂志》、《国家会计师》、《俄亥俄州会计师期刊》、《管理会计》、《维吉尼亚会计季刊》和《内部审计师》等学术刊物上。

阿尼奎·阿迈德·奎瑞士, 博士, 注册会计师, 国际注册内部审计师, 坦帕大学会计学和计算机科学的顾问教授。他的著作由Glenlake出版有限公司、Prentice-hall出版公司、美国管理协会等机构出版。他还是麦格劳-希尔出版公司一些书的主编。他的论文分别发表于《会计技术》、《注册会计师杂志》、《国家会计师》、《管理会计》和《内部审计师》等学术刊物。

苏珊妮·奥卡拉汉, 博士, 注册会计师, 国际注册内部审计师, 现任贝斯大学会计信息系统的副教授。她还是一名精算师和计算机专家。奥卡拉汉是Hubbard and O'Callaghan公司以前的合伙人, 内布拉斯加州州立大学审计主管。她的论文主要发表在包括《会计杂志》和《内部审计师》等许多刊物上。

保罗·科库, 博士, 现任佛罗里达州大西洋大学会计信息系统副教授和计算机顾问。他的论文主要发表在《商业研究杂志》、《技术管理国际期刊》、《市场集中管理》、《市场营销杂志》等学术刊物上。

About the Authors

JOEL G. SIEGEL, Ph.D., CPA, is a self-employed certified public accountant and professor of accounting and finance at Queens College of the City University of New York. He was previously employed by Coopers and Lybrand, CPAs, and Arthur Andersen, CPAs. Dr. Siegel has been a consultant in accounting and finance to many organizations, including Citicorp, International Telephone and Telegraph, United Technologies, and the American Institute of CPAs. Dr. Siegel has written 65 books and more than 200 articles on accounting and financial topics. His books have been published by Glenlake Publishing Company, Ltd., South-Western, Prentice-Hall, Richard Irwin, Probus, Macmillan, McGraw-Hill, HarperCollins, John Wiley, International Publishing, Barrons, American Management Association, and the American Institute of CPAs. His articles have been published in many accounting and financial journals including *Financial Executive*, *The Financial Analysts Journal*, *The CPA Journal*, *Practical Accountant*, and *The National Public Accountant*. In 1972, he was the recipient of the Outstanding Educator of America Award. Dr. Siegel is listed in *Who's Where among Writers* and *Who's Who in the World*. He served as Chairperson of the National Oversight Board.

JAE K. SHIM, Ph.D., is an accounting consultant to several companies and professor of accounting at California State University, Long Beach. He received his Ph.D. degree from the University of California at Berkeley. Dr. Shim has 40 books to his credit and has published over 50 articles in accounting and financial journals including *The CPA Journal*, *Advances in Accounting*, *International Accountant*, and *Financial Management*.

JOHN P. WALKER, Ph.D., CPA, is Professor of Accounting and Information Systems at Queens College and a computer consultant. He served as Chief Financial and Administrative Officer at the New York City Economic Development Corporation, was Executive Vice President at Data Spectrum, Inc., and served as assistant corporate controller at UNC, Inc. Dr. Walker also acted as a systems analyst and programmer at banks and was a management consultant to KPMG Peat Marwick, CPAs. His articles have appeared in such journals as the *Journal of Accountancy*, *National Public Accountant*, *Ohio CPA*, *Management Accounting*, *Virginia Accountant Quarterly*, and *Internal Auditor*.

ANIQUE AHMED QURESHI, Ph.D., CPA, CIA, is a consultant in accounting and computer sciences and professor of accounting and computer science at the University of Tampa. Dr. Qureshi has authored books for The Glenlake Publishing Company, Ltd., Prentice-Hall, American Management Association, and has contributed chapters to books for McGraw-Hill. His articles have appeared in *Accounting Technology*, *The CPA Journal*, *National Public Accountant*, *Management Accounting*, and *Internal Auditing*. He has made presentations at the American Accounting Association, American Association of Accounting and Finance, and INFORMS.

SUSANNE O'CALLAGHAN, Ph.D., CPA, CIA, is an Associate Professor of Accounting and Information Systems at Pace University. She

is also an actuary and computer consultant. Dr. O'Callaghan was formerly a partner in Hubbard and O'Callaghan, CPAs and Director of Internal Auditing at the University of Nebraska. Her articles have appeared in many journals including the *Journal of Accountancy* and *Internal Auditor*.

PAUL KOKU, Ph.D., is Associate Professor of Accounting and Information Systems at Florida Atlantic University and a computer consultant. His articles have appeared in the *Journal of Business Research*, *International Journal of Technology Management*, *Journal of Market Focus Management*, and *Journal of Marketing*.

What This Book Will Do For You

The purpose of this book is to assist business people to understand artificial intelligence software and to make practical use of it. The topic of artificial intelligence (AI), including expert systems and neural networks, will keep business people up-to-date on the latest and most significant computer software applications. The book will be of immeasurable benefit to financial managers, accountants, tax managers, marketing managers, business managers, credit managers, loan officers, insurance executives, production managers, attorneys, economists, and others in the business world.

Artificial intelligence is the field of computer science that studies how machines can be made to act intelligently. It is the use of software to simulate the functions of a decision-maker's mind in carrying out his or her daily job responsibilities. The *Handbook* clearly defines and explains artificial intelligence and how it is used. It discusses the use of artificial intelligence by those directly or indirectly involved in business activities and shows how the use of AI can aid in making better and faster business decisions.

The business person must have an understanding of AI applications—expert systems, fuzzy logic, and neural networks—to properly conduct functions and maximize the company's growth potential. Artificial intelligence is the latest cutting edge technology. This knowledge will give

business managers a competitive edge— potential mergers and acquisitions may be evaluated with expert systems and neural network software. Emerging trends in AI are discussed so the executive can properly plan for the future.

Difficult topic areas have been written in simple terms. The book is a practical “how to” guide—a what to look for, what to do, and how to apply what has been learned. Examples to illustrate practical applications as well as step-by-step instructions are provided. These include sample worksheets, schedules, checklists, charts, exhibits, tables, graphs, diagrams, forms, case studies, and computer printouts. Answers to commonly asked questions are given. The uses of this *Handbook* are as varied as the topic areas presented.

The glossary defines terminology used in AI. A particular area of interest may easily be found by referring to the index.

In financial accounting, artificial intelligence software assists in tracking and monitoring accounts, establishing reserves, and preparing and analyzing financial statements.

In managerial accounting, AI assists in cost management and analysis, planning and control, budgeting, forecasting, capital budgeting, resource allocation, variance analysis, cash flow appraisal, and analysis of products and services.

In audits, AI aids in performing audits, internal control evaluation, obtaining evidence, fraud investigation, sampling, and risk analysis (e.g., predicting a “going concern” problem).

In taxation, AI software aids in tax planning, estate planning, determining the tax consequences of proposed transactions, identifying tax problems, tax research, and ascertaining tax compliance to tax law and rules.

Artificial intelligence aids CPAs in performing personal financial planning services for clients— portfolio management, including stock and bond selection, diversification, establishing different portfolio designs under multiple constraints, thorough analysis of companies, investment timing, trading activities, and hedge and arbitrage strategies. AI software is also applicable to financial planning with regard to asset and debt management, insurance selection and policy limits, and banking arrangements.

Accountants may use artificial intelligence software when conducting management advisory services for clients—giving advice of how

accounting information and reports may be of interest to and used by marketing managers, credit managers, production managers, insurance managers, and international business and finance managers making global trading decisions. In addition, how to incorporate artificial intelligence in other management advisory services to provide real “value added” services is discussed and demonstrated.

In practice management, AI assists in establishing client profiles, scheduling staff assignments, pricing of services, and computer-aided instruction.

The technologies used in AI include expert/knowledge systems, neural networks, case-based reasoning, pattern matching, machine learning, and fuzzy logic. Artificial intelligence software can be used to achieve voluminous business results, including:

- Lower costs to perform business activities.
- Increase in productivity and efficiency.
- Maximization of revenue.
- Maximization of resources.
- Optimal decision making and analysis.

An expert/knowledge system is a group of computer programs conducting a task at the level of a human expert. Expert systems usually have a huge database based on knowledge and experience gathered from experts in a particular area (e.g., financial accounting, managerial accounting, auditing, tax, personal financial planning). The expert system interacts with the user by repeatedly asking for relevant data until it is ready to derive a decision or conclusion. In other words, a sequential series of questions are asked designed to procure additional information in a reasoning process to help solve a business problem. Later questions are based on the answers to prior questions. The answers are not necessarily perfectly correct, but are logical conclusions. Besides reaching a decision, the expert system provides its underlying logic.

The major elements of an expert system are the database management system, the knowledge database, the inference engine, the domain database, the user interface, and the knowledge acquisition facility. Each of these components is fully discussed to achieve cost-effective optimal results.

A business application is a good candidate for developing an expert system if it involves expert knowledge, judgment, and experience. The business problem must be heuristic in nature as well as easily and clearly defined. Expert systems are appropriate for unstructured situations and tasks that are interactive.

The businessperson must be familiar with expert system shells that are a collection of software packages and tools used to design, develop, implement, and maintain expert systems. These are all discussed here.

Expert system development tools are available to simplify, facilitate, and establish, or enhance an expert system. The development aids include if-then rules, interfaces with databases, tools to better use spreadsheets and programming languages, and tools to generate the inference engine.

Areas of expert system usage include:

- Financial analysis.
- Preparing budgets and forecasts.
- Analysis of accounts.
- Planning capital and staff.
- Appraising loan applications.
- Security and control.
- Audit planning.
- Preparation and analysis of reports.
- Reduction of risk.
- Investment and portfolio management.
- Appraisal of internal control.
- Merger and acquisition analysis.
- Project scheduling.
- Product and service evaluation.
- Tax planning.
- Identify areas of fraud.
- Identify manufacturing deficiencies.