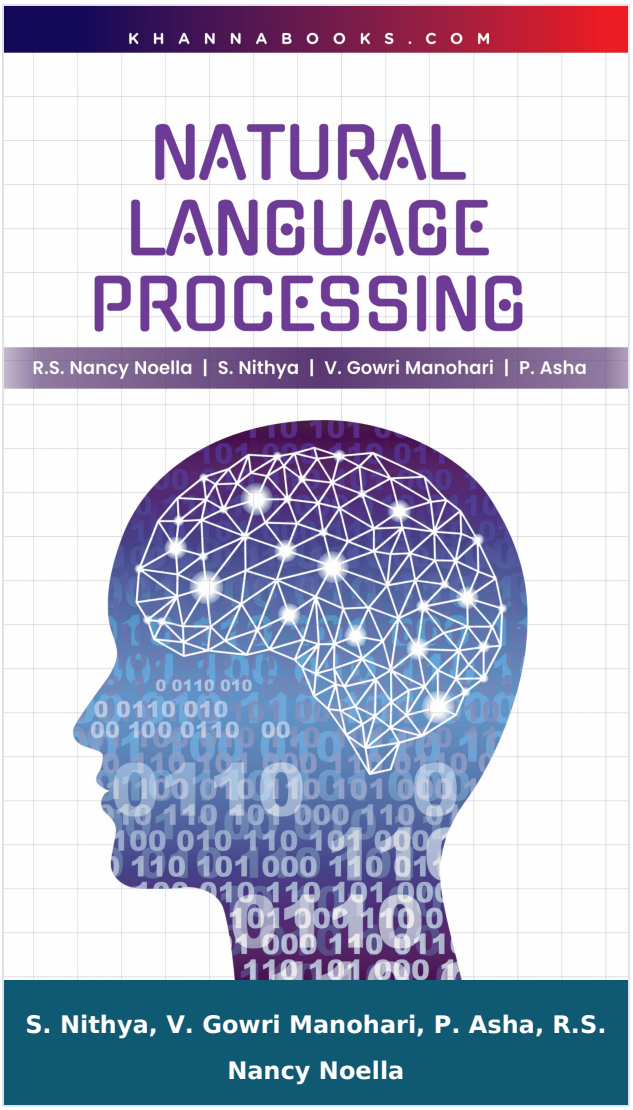

Natural Language Processing

Author :	S. Nithya, V. Gowri Manohari, P. Asha, R.S. Nancy Noella
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Product Description

This comprehensive text is an essential guide to the rapidly evolving field of Natural Language Processing (NLP), which sits at the dynamic intersection of linguistics, computer science, and artificial intelligence. The core theme is mastering the ability for computers to understand, interpret, and generate human language, a capability that powers modern AI applications from virtual assistants and machine translation to sentiment analysis and chatbots.

Designed to be a balanced and holistic resource, the book successfully bridges the critical gap between theoretical foundations and practical implementation. It systematically covers fundamental concepts like text preprocessing, tokenization, and language modeling, ensuring readers build a strong conceptual base. The practical value lies in its commitment to demystifying complex concepts, providing readers with the necessary tools to build, optimize, and deploy robust NLP systems effectively.

The text offers in-depth coverage of state-of-the-art architectures like transformers, BERT, and GPT, complemented by practical, hands-on examples using industry-standard frameworks such as PyTorch, TensorFlow, and Hugging Face. Furthermore, it extensively covers the entire phases of NLP—from lexical and syntactic processing to semantic interpretation and discourse analysis—ensuring a thorough understanding of the whole pipeline. The primary audience for this text is students seeking foundational knowledge, researchers looking to refine their expertise, and practitioners aiming to implement real-world NLP solutions. It is an indispensable resource for anyone dedicated to exploring and innovating in this exciting and interdisciplinary domain.

Salient Features:

• Foundational Concepts: Provides clear explanations of core NLP techniques, including tokenization, embedding, and language modeling, covering the phases of NLP from

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lexical to pragmatic analysis.

• State-of-the-Art Models: Includes in-depth coverage of current advancements, exploring transformer architectures, BERT, GPT, and other cutting-edge, highly efficient models for language tasks.

• Hands-on Implementation: Offers practical, hands-on examples using popular industry frameworks such as PyTorch, TensorFlow, and the Hugging Face library for real-world development.

• Syntactic-Semantic Pipeline: Explores the key NLP phases of syntactic parsing and semantic interpretation, including grammar, ambiguity resolution, and the use of Logical Forms.

• Context and Discourse: Dedicated coverage of World Knowledge and Discourse Structure, including knowledge representation techniques and the analysis of coherence and reference resolution.

• Real-World Applications: Features case studies and projects demonstrating the practical deployment of NLP in industry, covering applications like machine translation and sentiment analysis.

• Parsing & Grammar: Delves into advanced parsing techniques, including Probabilistic Parsing, Feature Structures, Augmented Grammars, and the Symbolic Approach to computation.

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- Syntactic Processing
- Semantic Interpretation
- Context and World Knowledge
- Natural Language Discourse Structure

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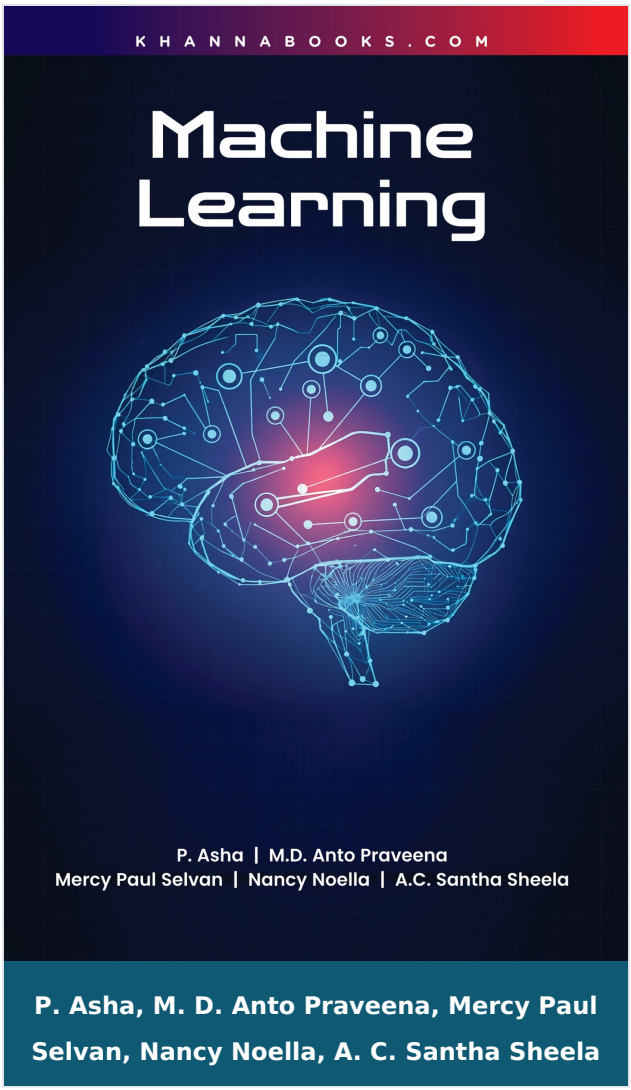

P. Asha, M. D. Anto Praveena, Mercy Paul Selvan, Nancy Noella, A. C. Santha Sheela

Machine Learning

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Product Description

MACHINE LEARNING: A Theoretical and Practical Guide is an essential introductory textbook meticulously designed to equip students and researchers with a robust theoretical foundation and critical practical insights into the rapidly evolving field of data analytics. Addressing the core principles of machine learning (ML), the book systematically explores the diverse ML types—Supervised, Unsupervised, Semi-Supervised, and Reinforcement Learning—while meticulously detailing their mathematical underpinnings and theoretical frameworks.

The book begins with an exploration of fundamental learning concepts, including the Bias-Variance Tradeoff and VC Dimension, before delving into core algorithms. It provides comprehensive coverage of key techniques for real-world problem-solving, such as Association Analysis for recommendation systems, and foundational Classification algorithms like Decision Trees and Naïve Bayesian Classifiers. Complex topics are simplified through a thorough analysis of parametric estimation, multivariate techniques, and crucial dimensionality reduction methods like PCA and LDA. Furthermore, the text offers practical solutions for Clustering and Outlier Detection, which are vital for achieving effective generalization. A dedicated section introduces Neural Networks, from single-layer perceptrons to Multi-layer Perceptrons and Backpropagation, culminating in a discussion of advanced local models and ensemble techniques like Bagging and Boosting. Finally, the book highlights emerging research in Reinforcement Learning, positioning it as a valuable resource for tackling complex engineering and open research challenges. This volume serves as an invaluable roadmap for aspiring data scientists and established academics seeking to master modern ML principles.

Salient Features:

• Foundational Learning Paradigms: Details the four main types of learning: Supervised, Unsupervised, Semi-Supervised, and Reinforcement Learning, providing context for

various algorithms.

• Core Algorithms Analyzed: Provides in-depth coverage of crucial models such as Decision Trees, Naïve Bayes Classifiers, K-Means clustering, and Linear Regression.

• Mathematical Underpinnings: Explains the theoretical frameworks of ML, including Bayesian Decision Theory, PAC Learning, and the Bias-Variance Tradeoff in model building.

• Data Reduction Techniques: Features practical chapters on essential dimensionality reduction methods like Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) for data preprocessing.

• Neural Network Deep Dive: Introduces the architecture and training of neural networks, covering perceptrons, Multi-Layer Perceptrons, and the Backpropagation algorithm.

• Advanced Local Models: Includes detailed explanations of competitive learning, Self-Organizing Maps (SOM), and Radial Basis Function (RBF) networks for advanced data grouping.

• Model Optimization Strategies: Explores ensemble methods, specifically Bagging and Boosting (including AdaBoost and Gradient Boosting), for improving model accuracy and stability.

• Future Learning Paradigms: Highlights emerging research in Reinforcement Learning, explaining its workflow, terminologies, and key models like Markov Decision Processes (MDPs) and Q-Learning.

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