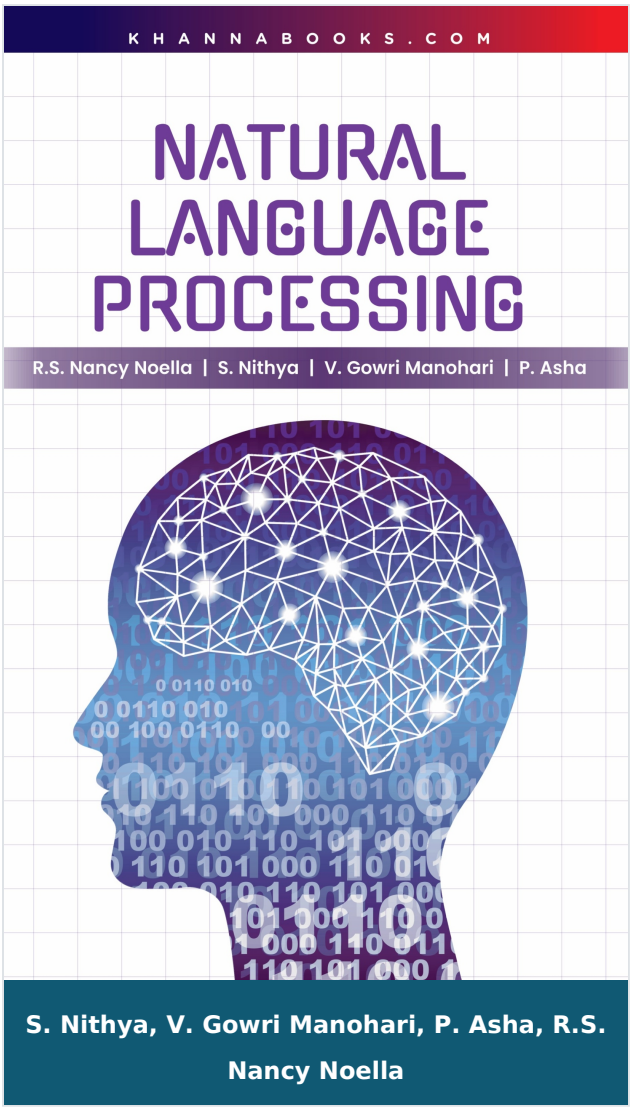

Natural Language Processing

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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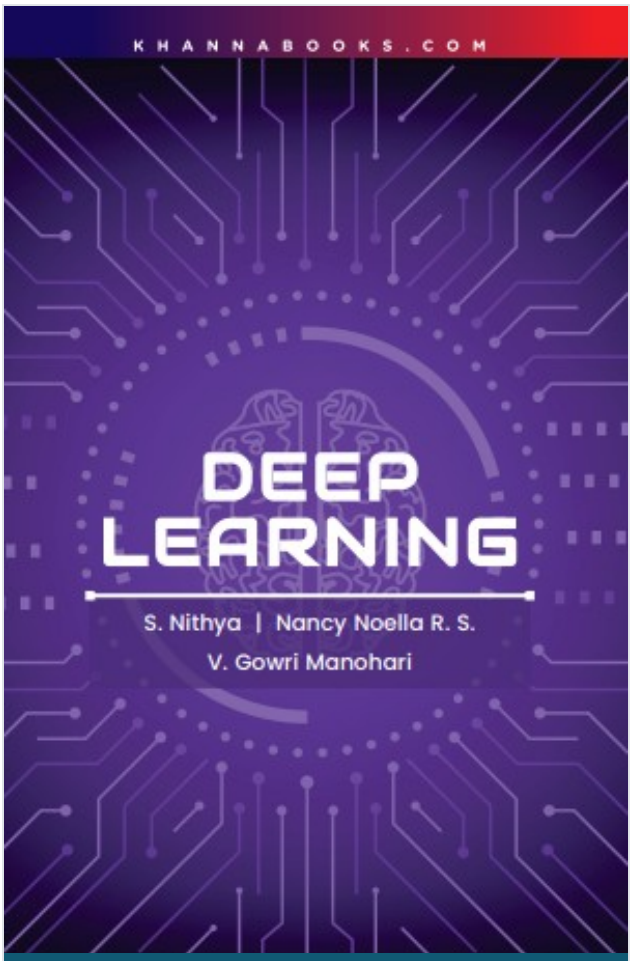

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Deep Learning

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Product Description

Deep Learning

This textbook, Deep Learning, serves as a comprehensive and structured introduction to the transformative field of Artificial Intelligence, focusing specifically on modern Deep Learning (DL) methodologies. It is explicitly designed to meet the academic needs of students enrolled in computer science programs, covering the Sathyabama University Syllabus, while simultaneously acting as an invaluable resource for researchers and practitioners seeking to deepen their technical knowledge.

The book's core theme revolves around mastering the application of Artificial Neural Networks (ANNs) to extract complex patterns from massive datasets. Its primary objective is to effectively bridge the crucial gap between fundamental theoretical concepts and their practical utility in real-world scenarios. The content guides the reader progressively, starting from foundational Machine Learning concepts—including linear models like SVM and Perceptrons—to the intricate architectures of modern deep networks.

Key topics covered include the inner mechanics of neural networks, advanced training processes like backpropagation, various optimization techniques (e.g., SGD, Adam), and advanced models such as Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and Generative Adversarial Networks (GANs). To ensure practical mastery, each chapter is reinforced with hands-on exercises, code implementations, and case studies. By emphasizing both theoretical rigor and practical implementation, this text equips readers with the skills needed to apply DL to revolutionary areas such as natural language processing, image recognition, and healthcare.

Salient Features:

- **Foundational Concepts**: Structured coverage of Machine Learning fundamentals, including Linear Models, Support Vector Machines (SVM), and Perceptron, before diving into deep network architectures.
- **Core Network Mechanics**: Detailed explanations of Neural Network training processes, focusing on Loss Functions, Backpropagation, and Stochastic Gradient Descent principles.
- **Advanced Architectures**: Dedicated analysis of state-of-the-art models like Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and the latest Transformers and Generative Adversarial Networks (GANs).
- **Practical Optimization**: Thorough discussion on Hyperparameter Optimization, Batch Normalization, and various Stochastic Optimization algorithms (e.g., AdaGrad, Adam) to maximize model performance and training efficiency.
- **Dimensionality Reduction**: Explores essential techniques like Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), Manifold Learning, and Autoencoders for effective data preprocessing.
- **Sequence Modeling**: In-depth coverage of sequential data processing using Recurrent Neural Networks and advanced long-term dependency handling via Long Short-Term Memory (LSTM) units.
- **Real-World Case Studies**: Dedicated unit featuring practical applications and industry benchmarks like ImageNet, Audio Wavenet, Word2Vec for NLP, and Deep Reinforcement Learning (DRL).
- **Modern Applications**: Focus on emerging fields such as Bioinformatics, Face Recognition, and Scene Understanding to demonstrate the revolutionary scope of deep learning in critical real-world systems.

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- Optimization and Generalization
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