APRENDIZADO TRANSDUTIVO - CONCEITOS E APLICAÇÕES

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Aprendizado indutivo – o que é?

Método de aprendizado focado em prever apenas para os exemplos de teste disponíveis, em contraste com o aprendizado indutivo

Principais características:

Uso direto da distribuição de dados do conjunto de teste.

Redução da generalização ampla

Exemplo simples:

Problema com conjuntos de dados limitados ou específicos

Diferenças entre Aprendizado Transdutivo e Indutivo

	Generalização	Dados de teste conhecidos	Cenários típicos de uso
Transdutivo	Generaliza apenas para dados conhecidos	exige os dados de teste	ideal para contextos com um conjunto de previsão fixo.
Indutivo	Generaliza amplamente	não depende de dados de teste conhecidos	usado para prever futuros dados

Principais algoritmos transdutivos

Algoritmos comuns:

- Support Vector Machines (Transductive SVM)
- Graph-Based Learning (ex.: Graph Neural Networks)
- Semi-Supervised Learning com modelos transdutivos

Como eles funcionam?

- Uso de informações relacionais entre dados rotulados e não rotulados

Benefícios e limitações

Benefícios:

- Melhor desempenho em cenários específicos
- Redução de erros em conjuntos limitados

Limitações:

- Menor aplicabilidade em cenários de generalização ampla
- Dependência de informações sobre o conjunto de teste

Referências

Transductive Learning via Spectral Graph Partitioning

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Abstract

We present a new method for transductive learning, which can be seen as a transductive version of the k nearest-neighbor classifier. Unlike for many other transductive learning methods, the training problem has a meaningful relaxation that can be solved globally optimally using spectral methods. We propose an algorithm that robustly achieves good generalization performance and that can be trained efficiently. A key advantage of the algorithm is that it does not require additional heuristics to avoid unbalanced splits. Furthermore, we show a connection to trans-

exploits structure resulting from two redundant representations. We will study what these approaches have in common and where they have problems. In particular, we will focus on s-t Mincuts, Co-Training, and TSVMs and show that they have undesirable biases that require additional, difficult to control heuristics.

To overcome this problem, we first propose and motivate a set of design principles for transductive learners. Following these principles, we introduce a new transductive learning method that can be viewed as a transductive version of the k nearest-neighbor (kNN) rule. One key advantage is that it does not require greedy search, but leads to an optimization problem that can be solved efficiently and globally optimally via spectral methods. We evaluate the algorithm em-

Referências

On Inductive–Transductive Learning with Graph Neural Networks

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Abstract—**Many real–world domains involve information naturally represented by graphs, where nodes denote basic patterns while edges stand for relationships among them. The Graph Neural Network (GNN) is a machine learning model capable of directly managing graph–structured data. In the original framework, GNNs are inductively trained, adapting their parameters based on a supervised learning environment. However, GNNs can also take advantage of transductive learning, thanks to the natural way they make information flow and spread across the graph, using relationships among patterns. In this paper, we propose a mixed inductive–transductive GNN model, study its properties and introduce an experimental strategy that allows us to understand and distinguish the role of inductive and**

been proposed, based on support vector machines [4]–[9], random fields [10], statistical relational learning [11], transductive and semi–supervised learning [12], [13], and artificial neural networks. In particular, neural network models for graphs have been devised both in the supervised [14], [15] and in the unsupervised framework [16], [17] since the late '90s. Recursive Neural Networks (RNNs) [14], [15] are the forefather of supervised approaches. RNNs process directed positional acyclic graphs, taking into account both symbolic and subsymbolic information — collected into the node labels and defined by the graph topology, respectively — to calculate

Referências

Aprendizado Transdutivo Baseado em Teoria da Informação e Teoria do Aprendizado Estatístico

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