# Algorithmic Learning Theory

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## Contents

## Introduction

These notes summarize the course about the theoretical foundations of machine learning. It will be concerned with the following key topics and questions:

- **Statistical Learning theory**, concerned for example with expressing how much data is needed in order to learn, how (statistical) guarantees can be given, etc.

- **Expressiveness**, telling which functions can be expressed with our learning algorithms (e.g., multilayer perceptron, NN, ...), whether those suffice to describe reality and also what happens if the models are made richer.

- **Algorithms and complexity**, involved with finding good models efficiently, telling what algorithms are good, and which theoretic limitations their complexity has.

## 1 Statistical learning framework

Let's start with the basic formal framework describing statistical learning theory.