Chapter 6
Insights from Jurisprudence for Machine Learning in Law

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ABSTRACT

The central theme of this chapter is that the application of machine learning to data in the legal domain involves considerations that derive from jurisprudential assumptions about the nature of legal reasoning. Jurisprudence provides a unique resource for machine learning in that, for over one hundred years, significant thinkers have advanced concepts including open texture and discretion. These concepts inform and guide applications of machine learning to law.

1 INTRODUCTION

Many applications of machine learning in the legal domain have sought to predict Court outcomes. In these approaches, key elements of past cases are represented in a database for presentation to a machine learning algorithm so that, once patterns are learnt, the algorithm can predict the outcome of other cases. The main algorithms used include case based reasoning exemplified by Ashley (1992), neural networks (Stranieri and Zeleznikow 2005) and rule induction (Bench-Capon et al 1993). Jurisprudential assumptions described below inform machine learning by determining the kinds of cases that are suitable, appropriate mechanisms for dealing with contradictory cases and approaches to evaluate the accuracy of predictions. Many of the issues that arise will be discussed in the context of a sample application: the Split Up project reported by Stranieri et al (1999).

In the Split Up project, Stranieri et al (1999) collected data from cases heard in the Family Court of Australia dealing with property distribution following divorce. The objective was to predict the percentage split of assets that a judge in the Family Court of Australia would be likely to award both...
parties of a failed marriage. Australian Family Law is generally regarded as highly discretionary. The statute presents a ‘shopping list’ of factors to be taken into account in arriving at a property order. The relative importance of each factor remains unspecified in the legislation and many crucial terms are not precisely defined. For example, the age, state of health and financial resources of the litigants are explicitly mentioned in the statute as relevant factors yet their relative weightings are unspecified. The Act clearly allows the decision-maker a great deal of discretion in interpreting and weighing factors.

The next section of this chapter provides an overview of diverse applications of machine learning in law. Following that, jurisprudence concepts of open texture and stare decisis are described in order to illustrate the role these concepts play in machine learning exercises. Points raised in that section are illustrated in practice in the Split Up system before a discussion on the limitations of machine learning in law.

2 OVERVIEW OF MACHINE LEARNING IN LAW

Philipps (1989) was among the first to demonstrate the application of neural networks in law with a hypothetical example from Roman Law. The will of a hypothetical citizen whose wife was pregnant read thus: “If a son is born to me let him be heir in respect of two thirds of my estate, let my wife be heir in respect of the remaining part; but if a daughter is born to me, let her be heir to the extent of a third; let my wife be heir to the remaining part”

Philipps trained a feed forward neural network with backpropagation of errors to deliver the correct output when exposed to scenarios that involved the birth of a boy and of a girl but not both. He then put forward a case that necessarily defeats these rules; one in which twins, a boy and a girl are born. In this case, the network that had not been exposed to this scenario during training, produced an outcome that indicated the mother receives two shares, the son receives three and the daughter receives four. Philipps argued this outcome is reasonable in that it represents an equilibrium based on past cases. However, Hunter (1994) pointed out that the notion of equilibrium with past cases is jurisprudentially flawed. There is neither a notion of moral correctness nor any appeal to rationales that reflect higher principles.

Another instance of the application of connectionism for modeling defeasible rules in law can be seen in the work of Thagard (1989). He advanced a theory of explanatory coherence that modelled the way in which competing hypotheses are supported, to a greater or lesser extent, by available evidence. Some nodes in the network represent propositions that represent each hypothesis. Other nodes represent available evidence. Links exist between evidential nodes and hypothesis nodes, which have an associated weight. These weights may be excitatory or inhibitory. To determine which hypothesis has more support, the network is activated. Nodes feed activation (or inhibition) to other nodes that feed back to each other until equilibrium is reached. The network is then said to be settled.

FeuRosa (2000) advanced a unique application of machine learning in the State Supreme Court Judge in Brazil. His ‘Judges on Wheels’ program involves the transportation of a judge, police officer, insurance assessor, mechanic and support staff to the scene of minor motor vehicle accidents. The team collects evidence, the mechanic assess the damage, and the judge makes a decision and drafts a judgement with the help of a program called the Electronic Judge before leaving the scene of the accident. The Electronic Judge software uses a KDD approach that involves neural networks. Although the judge is not obliged to follow the suggestion offered by the Electronic Judge, the software is used in 68% of traffic accidents by judges in the state of Espirito Santo. The system
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