Categorising Justifications in Legal Argument

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Abstract

In this paper I discuss the various justifications that can be given for components of a legal argument. First a number of different types of argument are described. These are used in legal reasoning, but cannot be satisfactorily reduced to deductive arguments. While deductive arguments have been fruitfully analysed in the literature, these other forms of arguments, and the ways in which they can be challenged are relatively unexplored from any kind of formal perspective. I suggest a way of describing these forms of argument in an extended version of Toulmin's well known argument schema. I conclude by arguing that progress in a computational understanding of legal reasoning requires that we address these non-deductive argument forms.

1. Introduction

Perhaps the most interesting recent development in AI and law is the focus on argument. Argument has been used for a variety of purposes: for modelling case based reasoning (e.g. Ashley 1990); as the basis of dialogue games (e.g. Gordon 1993); as the basis for presentation of reasoning and explanation (e.g. Zeleznikow and Stranieri 1995); and as the basis for analysing phenomena that arise in legal reasoning such as defeasible rules and conflicting norms (e.g. Prakken and Sartor 1996, Kowalski and Toni 1996. One line of approach is to consider how an argument can be attacked and how an argument can be defended against these attacks. We arrive at some final status of an argument according to how successful the defences are. The assessment may (as in Farley and Freeman 1995) depend on some notion of the burden of proof required.

The basis framework here (as in Prakken and Sartor 1996) is that knowledge comprises a theory containing rules. An argument is a finite sequence of ground instances of rules and will consist of a number of steps leading from facts to a conclusion by the application of rules whose antecedents are satisfied. To attack an argument we must attack one of these steps. Three attacks are possible. Either we can claim that one of the literals in the antecedent is false, (an *undercutting* attack), or we may claim that the consequent is false since its negation can be established by some other argument (a *rebutting* attack), or we can claim that the rule is not applicable. In the literature the third form of attack is typically reduced to one of the other two forms; either an undercutting attack which shows that a literal in the antecedent is false, or a rebutting attack resting on a preferred rule (a rule with a higher *priority*). Kowalski and Toni (1996) also reduces rebutting attacks to undercutting attacks by adding "~ it can be shown that r is defeated" to the antecedent of each rule r.

This framework has provided some impressive results, and offers considerable insight into the phenomena of defeasible rules and conflicting rules. The framework is, however, entirely based on the notion of argument as deduction. In this paper I want to consider other possible ways of arguing. A key question is whether these alternative styles of argument can be assimilated into a deductive framework, or whether we require a broader conception of argument.

2. Inductive Arguments

It is well known that not all arguments are deductive. Inductive arguments, for example abound in empirical disciplines. In an inductive argument we move from a set of observations to a general rule. For example, having observed that the sun has risen at regular

intervals in the past, we may conclude that it will rise at similar intervals in the future. Of course, such arguments can provide only a weak justification since the threat of a counter example is always present; typically a theory will be developed to give a more substantial justification (as did Copernicus with the rising sun). An inductive argument can be attacked in three ways. Consider the false inductive argument :

Every swan I have seen is white
Therefore, all swans are white.

This can be attacked by disputing the inductive premise, perhaps by reminding the proponent of a visit to a zoo where there were black swans, or by offering a counter example, taking the proponent to a zoo to see a black swan; or by disputing that the inductive basis is sound; if the proponents observations are limited to wild swans in England, it can be suggested that the sample is insufficiently broad to warrant the conclusion.

Whereas the first two kinds of attack are like attacks in deductive argument, undercutters and rebuttals respectively, the third is not. Here we are criticising the process of the induction, rather than the applicability of the rule. Attempts to recast it as a deduction are very artificial.

Do inductive arguments occur in law? Perhaps we could see case law as such. Certainly there have been efforts made to inductively learn from cases (e.g. Zeleznikow et al 1993). Suppose we present a set of cases with particular features also present in the case under discussion, all of which were found for the plaintiff. We now characterise the case based argument as:

1) Every case in the set with these features has been decided for the plaintiff
2) So, all cases with these features should be decided for the plaintiff [Inductive step]
3) The current case has these features
4) So, the current case should be decided for the plaintiff [Deductive step]

Such an argument would be attacked by pointing to a case in the set with these features but decided for the defendant; finding a case outside the set with the features but decided for the defendant; or finding reasons to suppose that the set of cases is not representative, perhaps by finding some other feature which is common to them but which cannot be expected to be true of all cases. Note that here it is unnecessary to argue that the absence of this common feature implies that we should find for the defendant (although we perhaps need to ensure that it is sufficiently relevant that it might lead to such a decision), nor that this feature is absent in the current case (although we would then be vulnerable to a reformulated induced rule including this feature); it is enough to cast doubt on the inductive basis to refute the argument.

3. Abductive Arguments

Another form of argument, common in AI and in common sense is abductive argument. Here we have a rule, say P => Q, and know that the *consequent* is true. We then infer the antecedent by abduction. This form of argument looks odd in that it is a well known logical fallacy, the fallacy of affirming the antecedent. It is, however, justified by the notion of an appeal to the *best explanation:* since P would explain why Q is the case, if we have no better explanation we may conclude that P. We can attack an abduction by denying that P is an explanation of Q, by denying that Q, (undercutters) by producing an independent argument against P, (rebuttal) or by providing a different explanation of Q (an attack peculiar to abduction). How good this other explanation needs to be depends on the burden of proof on our proponent: any explanation casts some doubt on P, but the proponent may in some contexts need to do no more than show that P is possible. Unless we have a complete set of explanations, and even then unless we are able to exclude alternative explanations, abduction is a very weak form of argument. It is of use in generating hypotheses, and focussing an inquiry, but its power to justify is very limited.

In law it is probably most often used in assessing evidence, in some such argument as "*Why did he lie unless he was guilty*?". Such arguments are typically best met by offering alternative explanations of the behaviour. Unless the burden of proof is low, such arguments are often indicative of a weak case.

4. Arguments from Analogy

Another way of arguing is from analogy. In this form of argument we argue from some similarities between certain situations to other similarities. For example, renting a house is in some respects similar to owning a house, and so we might argue analogically that a renter should be subject to certain restrictions that an owner is subject to.

To attack an argument from analogy we can suggest that the similarities are not present, (undercutting attack), that there is an independent argument against the conclusion (rebuttal), or that the similarities are not relevant, or that the differences between the two situations are sufficiently relevant to suggest that the analogy does not hold. Since differences will be present in any analogy, this fourth attack is always possible, and its success will depend on the relative importance given

to the differences as against the similarities. These last two forms of attack are peculiar to this form of argument.

Like induction such arguments tend to be pre-theoretical. Here to we should like to come up with a model which explains which features of the situation are relevant, and how they determine the conclusion. If we use analogy we are trying to move from a situation which is governed by a theory to which is not, or at least not yet. The development of theories of electricity which began as analogies with water flow provide a good example of this process. If we have a theory we can rely on this rather than on the analogy. Thus while analogies are very useful in suggesting theories, without an underpinning theory they are vulnerable to attack.

Such arguments are widely used in law, often in connection with case based reasoning. In a sense, that like cases should be treated in like manner, is a reasonable way of regarding both analogy and case based reasoning.

6. Model Based Arguments

As I have suggested above induction, abduction and analogy are all argument forms which are intended to be eventually supplanted by a theory which will explain their force. When such a theory has been arrived at, there is a possibility of a model based argument. Depending on the nature of the theory, such arguments may be based on *logical, qualitative or quantitative* models.

6.1 Logical Models

A logical theory is supposed to provide necessary and sufficient conditions, In such a model deduction is an appropriate method of reasoning, and can be appropriately addressed by the techniques discussed in the first section of this paper.

6.2 Quantitative Models

In a quantitative model, we are able to use some kind of formula to derive an output from a set of inputs. A simple example would be conversion of temperature from Fahrenheit to Centigrade. Here we can justify a claim that it is 68^0F on the grounds that it is 20^0C. To criticise such an argument we would need to dispute the claimed centigrade temperature (undercut the argument), dispute the application of the model (discover an arithmetical error), suggest an independent argument for a different Fahrenheit temperature (rebuttal), or claim the model was incorrect (dispute the formula). In this case the last attack is not very realistic, but in other cases, such as economic models in which this sort of reasoning is very common, disputing both the factors included as input to the model and the coefficients applied to these factors to produce the formula is quite common. We may therefore wish to subdivide an attack on the model into attacks on the input factors, and attacks on the coefficients which weight these factors. Such quantitative models can be found in law; tax law provides some examples. Another interesting (although disputable) example is that of Dutch "smart money" (Groendijk and Tragter (1995)). Such models also relate to statistical models, which will be discussed in section 7.

6.3 Qualitative Models

In a qualitative model, we identify the factors which influence an outcome, but see them as trading off against one another in a rather loose, non-arithmetical way, rather than either determining the outcome, as in the logical models, or capable of resolution through the application of some kind of numerical formula, as in the quantitative models.

A good example of a model of this sort is found in the CATO system (Aleven 1997). In the factor hierarchy of this system we find an extension of the categorisation of factors found in HYPO (Ashley 1990), so that we can see a mechanism to determine not only the relevance of factors, but also get insight into how they are relevant to the case in terms of their contribution to more abstract factors. The model is applied by considering the input factors for and against a particular contention, and then weighing these factors. Weights are *not* quantified; it is a matter of judgement, guided and informed by past weighings, as to which are held to win. Attacks on such an argument can either dispute the input factors claimed (undercutters, not found in CATO, where the applicable factors are taken as given), provide an independent argument for the opposite conclusion (a rebuttal, termed *counter example* in CATO); cast doubt on the existence of a good guide in the past cases by pointing out that there is no relevantly similar case (*distinguishing* in CATO), or dispute the weights of factors (*playing up* or *playing down* a distinction in CATO).

There has been an interesting attempt to render this style of argument within a deductive framework (Prakken and Sartor 1996). This is reasonably effective provided we have a precedent case which can determine relevant priorities between competing factors, but it is less effective when the degree to which factors are satisfied is needed to justify the reasoning. The latter aspect was

important in HYPO, and although less explicit in CATO is still present through the use of factor hierarchies.

This kind of reasoning appears to occupy a stage in the evolution of a theory of the domain between the pre-theoretic inductive and analogical treatment of cases, and the established theory represented by a sound quantitative model. This is not to say that we can progress from a qualitative theory to a quantitative one; it may be that the qualitative theory is the best that can be done in the domain. None the less the existence of a theory, even a qualitative one enables questions as to the soundness of the inductive basis, or the relevance of similarities and differences between cases to be posed in a more explicit manner.

7. Arguments Based on Statistical Techniques

The next class of arguments I shall look at is those based on statistical techniques. First I shall consider arguments based on probability.

7.1 Arguments Based on Probability

Probability is used when we want to argue that there is a particular chance of an event, or combination of events happening. For example it is possible to justify that the chance of throwing two sixes is 1/36 by saying that the chance of throwing a single six is 1/6, since probability theory tells us that the probability of the co-occurrence of two independent events is the product of their individual probabilities. As usual we can attempt to undercut the argument by denying that the premise is true (perhaps it is an eight sided die), or rebut it by providing an independent argument against the conclusion (perhaps I have performed an experiment with a different result because the dice are loaded). Again, however, there are also attacks that centre on the appropriateness of probability; for example claiming that the events are not independent, for example. The probability that it is both snowing and cold is *not* the product of the individual probabilities, because the events are not independent. Such arguments are relatively uncommon in law. Even though "*balance of probabilities*" is sometimes used to express a particular burden of proof, the term is not, I think, used to indicate that mathematical probability theory as the appropriate method to determine this.

7.2 Other Statistical Techniques

There are other statistical techniques available. For example distributions are often used to express the degree of confidence in forensic evidence. In cases which turn on matching DNA samples, it is statistics that allow the expert witness to claim a very high degree of confidence. Again, apart from the usual undercutting and rebutting techniques, there are statistical attacks that can be made. For example the sampling method might be criticised.

There are also curve fitting techniques which have been applied to law, such as Multiple Linear Regression (Groendijk and Tragter 1995), or Distance of Least Squares (Greenleaf et al 1987). The aim here is to apply these methods to produce a quantitative model from an analysis of data, which can then be applied to new cases. As well as undercutting and rebutting attacks these arguments can be attacked on the basis of the inclusion of irrelevant factors. Relevance is an issue here because the inclusion of irrelevant factors may distort the prediction. Also, because such techniques rely on a good set of initial data we can also criticise the sample used to produce the curve on the basis that it does not accurately reflect the population as a whole. This kind of attack is very similar to challenges to the inductive basis in inductive arguments.
With these techniques we should also include neural network based systems, (e.g. Zeleznikow and Stranieri 1995), which are best seen as sophisticated line fitting techniques, and which are open to exactly the same kinds of challenge.

8. Argument From Proper Process

A final class of arguments is those which rely on the outcome of a proper process. The importance of such arguments is stressed in Gordon (1993). The kind of argument here is where one justifies saying that a person is guilty by stating that he was found guilty in a properly conducted trial. Here we may undercut the argument by disputing the premise (someone else was tried, the verdict was acquittal), or rebut it (someone else is provably guilty), but here we may also attack the argument by pointing to flaws in the process. This is, indeed a common reason for appealing a decision (the judge misdirected the jury, certain evidence was inadmissable etc). Such attacks need to relate to the particular process used, and the features of the process which have been established as making it proper.

9. A Framework for Representing Heterogeneous Arguments

The point of distinguishing the different argument types is because they can be attacked in different ways, and different attacks are characteristic of different types of argument. All arguments can be attacked by being

undercut (challenging the premises) or rebutted (producing an independent argument for the falsity of the conclusion). In addition *non-deductive* arguments can be attacked by casting doubt on the way that the particular inference procedure has been carried out, and these attacks will rely on the particular inference procedure used. Also some arguments, like the statistical arguments, exhibit a second kind of undercutting, wherein we cast doubt not on the *truth* of a premise, but on its *relevance*.

I shall now point to some work which provides a means of describing arguments in a uniform framework. Such a framework is vital for the expression of arguments in a form in which they can be subjected to analysis, and subsequently as the basis for building tools for the support of the analysis and construction of arguments. This work extends the well known argument schema of Toulmin (1958). Several extensions to this basic framework have been proposed in the literature. Zeleznikow and Stranieri (1999) propose three further extensions to Toulmin's schema to accommodate different argument types. They introduce extra components which explicitly indicate

- The inference procedure used to link the data to the claim
- The reason why this inference procedure is appropriate
- Reasons why the data is relevant

The first of these is important so that we know the type of argument that is intended. The second allows us to criticise the appropriateness of the argument type, and the third is important in some argument types (e.g. neural network based inferences), as was shown above. These extensions go a considerable way to allowing the explicit representation of information necessary to fully describe the argument. Other extensions, however, might be suggested.

- We might wish to indicate the strength of a data item. In arguments based on qualitative models, where we have a trade off between factors it is essential that we consider the degree of satisfaction of a predicate, as well its truth and its relevance.
- We could re-introduce the qualifier to indicate the burden of proof that the argument is intended to satisfy.

Other extensions could, I suspect be proposed. What we should strive towards is, a standard way of describing arguments which allows us to represent all the information we need, and which can accommodate all types of argument.

11. Conclusion

In this paper I have identified and discussed a number of arguments types which are not well served by representation as deductive arguments, but which often play a vital role in a chain of legal reasoning. Because they are not well seen as deductive the insights into argument provided by work on deductive argument cannot be applied to them. I have argued that we will gain similar insights if we identify these arguments, and in particular focus on how such arguments can be challenged. In order to do this we need a good representation of argument which can handle a chain of arguments comprising a variety of types. Current work on extensions to Toulmin's argument schema is heading in this direction, but there is still a fair way to go. Once this representation has been fully developed, I believe we will have a powerful tool for the analysis, support and possibly even mechanisation of a richer model of legal reasoning than deduction alone can provide.

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