Normative Reasoning

Overview and Challenges

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Basic Notions

What is normative reasoning?

Normative reasoning is to reason about evaluation or value judgement.
A norm in this context is a standard for evaluating and judging behaviour or outcomes as good (desirable, permissable etc.) or bad (undesirable, impermissable etc.).

Basic Notions

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Disclaimer:

- We will choose this particular definition for our presentation. There are other definitions of normative.
- We make a distinction between beliefs and intentions.

Basic Notions

Practical reasoning versus normative reasoning

Practical reasoning is to reason so that the conclusion is an intention. In pure normative reasoning we only reason about normative beliefs. We can of course mix both.

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Example: ϕ some verb, P some person

P ought to ϕ

so P shall ϕ

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The application of normative and practical reasoning is one reason that motivates the study of those systems in machine ethics.

Normative Reasoning

Approaches to normative reasoning

Normative theories cannot tell which beliefs are right but rather what beliefs are *consistent*.

consistent: does not entail a contradiction/ has a model where

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Approaches to normative reasoning

It is convenient to differentiate three different approaches to formalize normative reasoning:

- Logic - consequence of belief
- Probability theory - degrees of belief
- Rational choice theory - valuing choices

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Motivations:

- A.I.
- Standard of comparison for actual behaviour
- Descriptive theories on reasoning
- Philosophy

Normative Reasoning

Approaches to normative reasoning

absolutism vs. pluralism:
Normative systems can often be embedded into each other but differ in expressiveness as in utility for a predefined purpose.

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Approaches to normative reasoning

absolutism vs. pluralism:
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Examples:

- Logic: proof verification
- Probability theory: recurring events
- Rational choice theory: optimization, microeconomy

Normative Reasoning

Logic

Extremely good to model beliefs on a local level but problems arise when background knowledge is required.

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Example:

All general statements are false.
P is a general statement.

P is false.

What happens if we assume the opposite of the conclusion to be true?

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Example:

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P is false.

What happens if we assume the opposite of the conclusion to be true?

Logic detects the inconsistency but does not tell us what went wrong.

Normative Reasoning

Probability

How can we model different degrees of belief?

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Rational Choice

Setting: An individual has a set of choices which is *complete* and *transitive*. We furthermore assume our *rational agent* always makes a cost-benefit-analysis and will always choose the optimum.

Advantage: compact & tractable

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Challenges

- How to effectively model the entaglement of knowledge? (Frame Problem)

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- How to deal with inconsistency?

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Challenges

- How to effectively model the entaglement of knowledge? (Frame Problem)
- How to deal with inconsistency?
- How to effectively model and compute normative reasoning?

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