Academic English - assignment 1 – Nienke Reints

When a group decision needs to be made, there are various strategies to choose from. Classically, a voting rule is chosen to aggregate the individual preferences of the agents into a collective one. Each voting rule satisfies different normative principles (so-called axioms) constraining the outcomes that can be selected under different situations (so-called profiles of preferences). The Pareto Principle, for example, states that if in a given profile all the agents prefer alternative A over alternative B, then the latter cannot possibly be part of the outcome. The axioms characterising a rule can then be seen as justifying the outcomes it gives.

Despite the fact that such justifications could be helpful when an important decision needs to be made, just a couple of studies have addressed how to generate justifications of election outcomes given the preferences. Cailloux and Endriss, for example, have used tools from AI to let people reason about the different voting rules. Cailloux and Endriss also provided a model which generated a justification for an outcome if that outcome was the winner according to the Borda rule.

Instead of relying on a specific voting rule, Boixel and Endriss sought to generate a justification for why a target outcome would represent a reasonable compromise in a concrete situation directly in terms of appealing normative principles. The notion they develop of justification has both a normative and an explanatory component. The explanation shows how the selection of the target outcome follows from concrete instances of the normative principles considered.

Finally, in terms of methodology, Belahcene et al. and Geist and Peters (chapter 13) employed the same tools as Boixel and Endriss, namely SAT solvers. These types solvers are capable of deciding whether a logic formula is satisfiable. Moreover, both papers use the minimal unsatisfiable set (MUS) to determine which set causes the formula to be unsatisfiable.

However, producing the justification for why a target outcome would represent a reasonable compromise is computationally hard. This project will be restricted to axioms that only refer to at most two profiles. Under such a restriction, the difficulty of the problem and efficient algorithms to solve it will be studied. Furthermore, these algorithms will be implemented and finally evaluated in terms of efficiency through a small experimental study.

The research question is: How challenging is the task of computationally generating justifications for collective decision making when solely considering axioms that refer to at most two profiles?

Excellent, Nienke. Formality and style are highly appropriate in this authoritative piece, particularly in terms of impersonal tone, vocabulary and sentence density. If anything, complexity and density border on the unclear, partly as a result of the extremely technical subject matter – in some places I can't tell if expression is unclear or the field-specific phrasing is simply difficult to understand for outsiders. Some sentences may be worth slightly rephrasing to maximise clarity; hopefully our second class on cohesion may remind you of some ways of reordering information in sentences to improve this. Otherwise, there is very little to improve here, and comments above indicate minor points of expression and formatting. Keep up the good work!