Adversarial Expert Judgement Modelling

Applications in counterterrorism, corporate competition, cybersecurity and auctions, among others, have raised renewed interest for what we could call adversarial problems. In them, we need to provide decision support or risk assessments when a major source of uncertainty stems from the intentional actions of intelligent, adaptive adversaries. A review of approaches for dealing with such problems may be seen in the NAS report by Parnell et al (2008), focusing on counterterrorism.

Almost inevitably in this type of problems, one needs to build a forecast of what the adversaries are going to make. The literature remains relatively sparse about this problem. For example, O'Hagan et al's (2006) review mentions only a reference by Nau (1992). Wang and Bier (2013) recently used probabilistic inversion for expert elicitation of adversary preferences.

One might be tempted to treat the problem as a standard expert judgement one. However, in doing this we tend to forget about the intentionality of the adversary. Alternatively, one can draw upon the recent machinery of adversarial risk analysis, but frequently we end up in nested hierarchies of decision problems.

Here are some fundamental questions that could be addressed:

- What is the gain of moving from a standard formulation to an adversarial one? This reminds questions related with the value of a decision analysis.
- When performing an adversarial approach, one ends up frequently with a hierarchy of problems? What ways are available to close the hierarchy? Moving from one step in the hierarchy to the one above entails a lot of work. Does the information gained pay off the effort? This reminds questions of value of information.
- The adversarial approach has been performed for relatively simple interactions between the adversaries. What if such interactions are complex as in MAIDs? Relevance concepts become then important.
- What if there are several adversaries and they may (or not) coordinate their actions?
- Probabilistic inversion has been timidly used in this area. Are there more substantial uses of such technique?

Since these are natural questions in applied contexts, motivating examples in auctions, security and cybersecurity could be explored, as well as its impact in insurance.

Should you be interested in pursuing these or related questions please contact

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