Limitations of TAF

In a TAF framework [1], arguments are not revived because attack relations between arguments are only considered when the arguments have overlapping time intervals. In fact, a TAF can be transformed into a regular argumentation network where each overlapping time interval between nodes is treated as a separate argument (see figure below). Instead, we would like revived arguments to have a different “status” than normal arguments.

Our proposal: A Model for Argument Revival

We propose a model for argument revival consisting of an annotated network and an algorithm to compute revival by considering only coherent extensions. Arguments are annotated using an algebra of contexts, which can be restricted to, for instance, time intervals (in the case of [1]) or locations.

Case study: Murderer scenario

Scenario In 1974, Mary died of an unknown cause. Initially, there was no evidence (E5) to assume she was murdered (M). Then, it turned out she had acquired a very expensive life insurance (I), which making her husband John the main suspect. Due to insufficient evidence (E7) the case against John was buried along with Mary. In early 1991 there was a scientific breakthrough in arsenic poisoning detection, showing that Mary was poisoned (P3). John was found guilty and cursed himself for not cremating his wife when she died. Another 9 years later, an alternative method for detecting arsenic poisoning was developed, which was judged to be equally credible to the previous method and came back negative on Mary (P2). Should John be freed from prison, or is he a murderer?

Analysis Let the context c = 2000 and the revival algorithm A “revive all connected arguments that occurred at most 20 years ago”, i.e., A(c,x) = {y | (y ∈ µ(x)) ∧ 0 ≤ ν(d(y)) ≤ 20} ∨ ν(x) = ν(y). The revived network instantiation N1rev contains all arguments, since argument P2 revives P1, P1 revives E5 and E1, and all arguments that occur in 1974 (M, E5, I, E7) revive each other. The two extensions of N1rev are E5 = {P2, E5, E1} and E5 = {P1, M, I}. Are these extension coherent? E5 is incoherent, because argument P1 is only revived by P2, but P2 is out of the extension. E1 is coherent, because all of the arguments in the extension have at least one argument that revives it which is in the extension as well. Thus, using our framework we can conclude that John is not a murderer.

Conclusions

We proposed a novel framework for argument revival, a topic that to our knowledge has not be formalized yet. In this framework it is possible to analyze the validity of extension using a notion of coherence. Although this seems to work well in case of our example, we would like to study this in more detail by analyzing more case study. We are currently working on tax investigation, interpretation of laws and a formalization of [1]. This should help us to define the concept of revival more clearly and perhaps lead to changes in our formalism.