

THE SECOND ORDER TRAFFIC FINE

Temporal reasoning in European Transport Regulations

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SUMMARY

We argue that European transport regulations can be formalized within the purely existential fragment of monadic second-order logic and possibly weaker fragments including linear temporal logic. We consider several articles in the regulation to verify these claims.

FORMALIZATION OF LEGAL ONTOLOGIES

Law

Modelling of the EU Regulation: Regulation (EC) No 561/2006

Time

Modelling the regulation's articles via Linear Temporal Logic

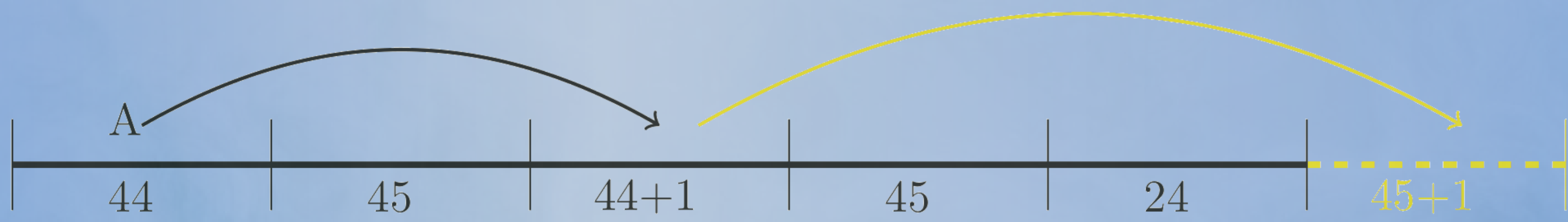
Complexity

Expressibility of the legal articles within Monadic second-order Logic

EXAMPLES



Illegal interval of six consecutive weeks performed by a hypothetical driver. (Fig. 2, p. 4)



First five weeks of the example represented in Figure 2, together with a possible sixth week that would make the whole interval legal. (Fig. 3, p.4)



General example of arbitrary length of an illegal interval that is legal when week A or week B is erased. (Fig. 6, p. 5)

CONCLUSIONS

Articles §8.6 or §8.9 cannot be expressed in the next-henceforth fragment (U-free fragment of LTL). §8.6 can only be expressed, if at all possible, in the full language of LTL (\square -free fragment of LTL) with a large until-depth.

Both §8.6 and §8.9 can be expressed in a purely existential fragment of MSO (or monadic temporal logic). Evaluating whether a given truck driver's record complies with regulations can then be transformed into a model-checking problem over this fragment, and model-checking formulas in this fragment can be reduced to satisfiability of first-order formulas.

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