Control funcional y control cualitativo de los algoritmos en la administración pública:

a case study from European road transport regulations

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II Seminario Internacional DAIA de Derecho público.
*Datos e inteligencia artificial en el sector público: la
importancia de las garantías jurídicas*
Valencia, Spain

Control funcional

industry	fault density Error for Kloc
Automotive	3
Aviation	1
Shuttle	0.1
Traditional	200
Agile	22

http://leanagilepartners.com/publications.html

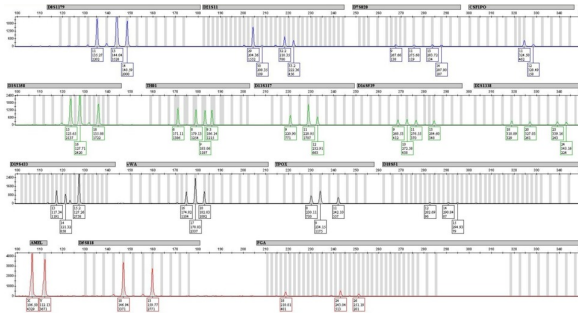May legal software be proprietary?

Is the *agile error rate* acceptable for legal software?

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  - ▶ In three cases, judges from USA have petitioned to **make the software open to the public** from proprietary DNA comparing software, due to some unreliable results:

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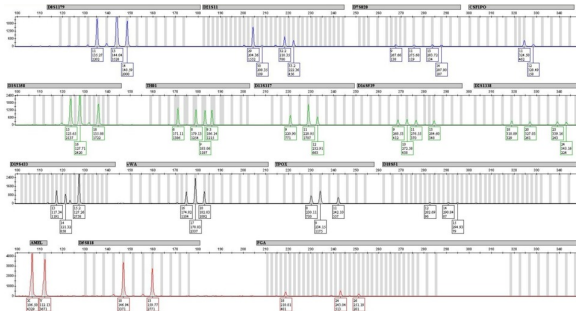
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    - ▶ TrueAllele (still proprietary)
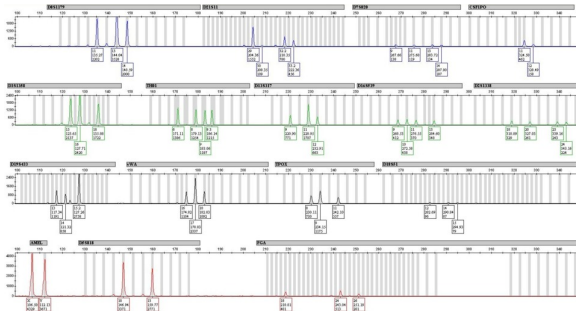
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- *New York Times*: Software Designer Reports Error in Anthony Trial. Lizette Alvarez. July 18, 2011.
    - In this case, in Miami, the fact that a mother had searched the word "chloroform" online **84 times** was used conclusively as evidence in an infanticide case.
    - The software had counted 84 times **instead of 1**, due to an error. **The programmer apologized**.

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- N. Sentence: 30/2019, CONTENCIOSO/ADMTVO court. N. 4 of Valladolid (Spain)

infracción imputada y sancionada en cuanto que no se han incumplido los tiempos de descanso semanales.

En segundo lugar considera que los hechos denunciados no están suficientemente probados a efectos de poderlos considerar constitutivos de la infracción sancionada. En este apartado señala que el tacógrafo del que se han obtenido datos tiene una programación o configuración de fábrica que adolece de errores y que hace que sus resultados no sean fiables ni ciertos. No se trata de una avería o de un mal funcionamiento sino de errores de fabricación, configuración y/o programación llamando la atención sobre la falta de homologación del tacógrafo y, especialmente, del software utilizado dentro del mismo. A lo anterior añade que no consta, y por lo tanto falta, la homologación del software utilizado por las autoridades para obtener y procesar los datos registrados en el tacógrafo.

Se acepta lo alegado por la parte demandante en lo que se refiere a la ausencia de prueba de cargo suficiente respecto al software utilizado por la autoridad correspondiente para obtener los datos registrados en el tacógrafo por lo que, sin necesidad de analizar el resto de la fundamentación jurídica

Homologación funcional

- ¿Que quiere decir homologación?
- Tenemos una solución en nuestro proyecto.
- El software será igual de bueno como su especificación

Control cualitativo

- Requerimientos lógicos
  - Consistencia
  - Viabilidad (feasibility)
- Legal/ethical requirements
  - Indiscernibilidad/equitativo
  - In dubio pro reo
  - etc.
- Requisitos específicos de cada campo

Tachograph Labeling Regulations

Requirements (51) and (52) from Regulation (EU) 2016/799 are meant to prescribe how to label minutes according to the recorded labelling of seconds.
They read as follows:

(51) Given a calendar minute, if DRIVING is registered as the activity of both the immediately preceding and the immediately succeeding minute, the whole minute shall be regarded as DRIVING.

(52) Given a calendar minute that is not regarded as DRIVING according to requirement 051, the whole minute shall be regarded to be of the same type of activity as the longest continuous activity within the minute (or the latest of the equally long activities).

Theoretical shift-sensitivity of labelling

minute labelling
no shift

second labelling

minute labelling
shift d

d

0   1   2   3

0   1   2   3

■ Rest
■ Driving
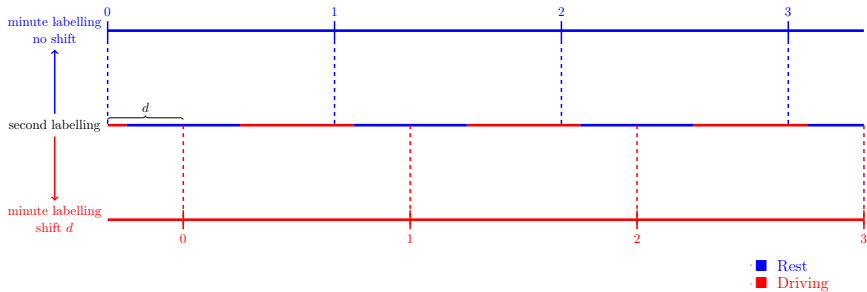
Real impact

Guretruck S.L. has conducted experimental tests and deduce from them that commercial tachographs:

- ▶ apply Requirement (52) followed by Requirement (51), which is a dubious interpretation of the law,
- ▶ disregard leap seconds, which are part of the UTC time standard prescribed by Regulation (EU) 2016/799.

Guretruck S.L. has conducted experimental tests with real-world driver data as well, finding that the minute labellings computed with proper UTC calendar vary up to an 8% of driving time with respect to the minute labellings computed disregarding leap seconds, even using a small sample of driver files.

Some regulations regarding weekly rest periods

Regulation (EC) No 561/2006

§8.6. In any two consecutive weeks, a driver shall take at least:

▶ two regular weekly rest periods [of at least 45 hours], or

▶ one regular weekly rest period and one reduced weekly rest period of at least 24 hours. However, the reduction shall be compensated by an equivalent period of rest taken en bloc before the end of the third week following the week in question.

A weekly rest period shall start no later than at the end of six 24-hour periods from the end of the previous weekly rest period.

§8.9. A weekly rest period that falls in two weeks may be counted in either week, but not in both.

Let's break it down…

- Regular weekly rest: ≥ 45 hours

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- ▶ Every other week must have a full weekly rest

- ▶ Any reduced rest must be compensated by a continuous block
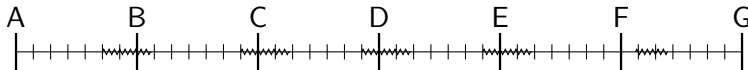 in the following three weeks

Combinatorics of rest assignments

Can we assign a week to each rest period so that each week is assigned to at least one rest period?
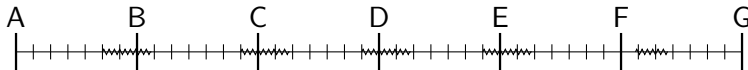
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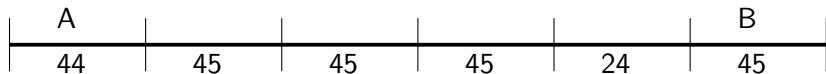

In principle this is an NP problem (assign 0 or 1 to each rest period according to whether it should belong to the earlier week or the later week).
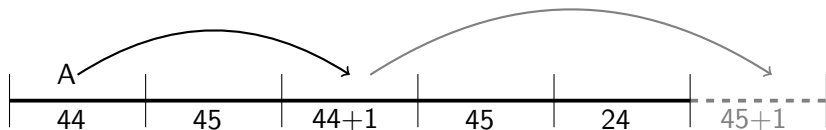
Non-locality of compensations

A					B
44	45	45	45	24	45

Illegal

Non-locality of compensations

A
| 44 | 45 | 45 | 45 | 24 | 45 | B |

Illegal

A
| 44 | 45 | 44+1 | 45 | 24 | 45+1 |

Legal

Non-locality of compensations

A					B
44	45	45	45	24	45

Illegal

A					
44	45	44+1	45	24	45+1

Legal

A					B
44	45	45	24	45	
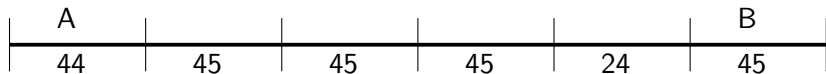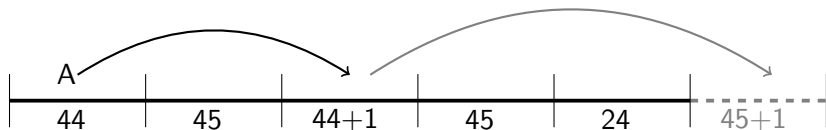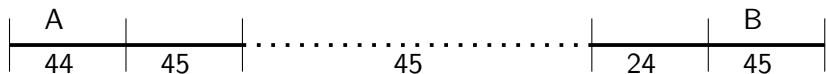
This can be iterated indefinitely

Propiedades computacionales

- Is compliance with §8.6 polynomially decidable?
  Work in progress: Yes!

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- We must work with legislators to ensure that future laws take **logical** and **computational** considerations into account.

Hacia una legislación

Rating agencies para

Control funcional

Control cualitativo

Registro central de algoritmos críticos

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Thank you for your attention!