

# THE MAGIC OF DATA-DRIVEN REGULATION

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# THE MAGIC OF DATA-DRIVEN REGULATION

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# The lawyers' response to 'legal tech'

- AI in law is nonsense, not feasible, waste of time
- AI in law will democratise the provision of 'legal services'
- AI in law will solve many legal problems caused by text-driven complexity
- AI in law will solve some problems, and create new ones
- All will depend on how 'legal tech' is developed, by whom

# The lawyers' response to 'legal tech'

- AND FOR WHOM
- what are 'we' optimising for ?

# **Technology, Law and Innovation**

**Should we understand how the technology of 'legal tech' works?**

# Technology, Law and Innovation

- We can drive a car without knowing how the engine works
  - Remember Pirsig's *The Art of Motorcycle Maintenance*?
- We act on doctor's advice though we don't know how they get to their diagnosis
  - Note that doctors generally employ 'diagnosis by treatment'

# Technology, Law and Innovation

**Can we trust 'legal tech' ?**

**As we trust our car's engine and our doctor's diagnosis ?**

# What's Next?

- MAGIC
- Counting as a human being in the era of computational law
- Data-driven and code-driven legal tech
- Legal by Design and Legal Protection by Design
- MAGIC



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# Magic

## John Dewey (1939): we must not believe

that democratic conditions automatically maintain themselves, or that they can be identified with fulfillment of prescriptions laid down in a constitution. Beliefs of this sort merely divert attention from what is going on, just as the patter of the prestidigitator enables him to do things that are not noticed by those whom he is engaged in fooling. For what is actually going on may be the formation of conditions that are hostile to any kind of democratic liberties.

# Magic

- Some people claim a **trade-off between interpretability and accuracy**:
  - the **less** 'ordinary folk' understand AI, the **better** it functions
  - If a then b **does not** imply if b then a
  - if developer does not 'understand' AI, what's the basis of the accuracy?
- Some people claim that blockchain applications support **trustless transactions**
  - no need for 'ordinary folk' to trust institutions or even the state
  - so, trust incomprehensible software instead? trust protocol developers?

# Magic

- This is the **lure of magic**:
  - We don't need to understand the engine of our car to be able to drive
  - We don't need to study medical science to trust the doctor

# Magic

- **In anthropology magic is about:**
  - Mistaken attribution of causality (the rain dance)
  - Raising fear and inviting subservience (the power of the priest)
  - We are now warned of an arms race in AI and asked to submit e.g. our data
  
- **Such magic is not reserved for 'primitive society':**
  - All types of society are vulnerable to such thinking
  - All types of society found ways to fact-check and to call-to-account
  - This requires resilience, patience and a serious effort to understand
  - **And a well designed system of checks and balances (e.g. re 'car' and 'doctor')**
  - **We call it 'Rule of Law': legality, auditability and contestability**

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# COUNTING AS A HUMAN BEING IN THE ERA OF COMPUTATIONAL LAW

## (COHUBICOL)

SAY CUBICLE  
THINK WITTGENSTEIN'S CUBE

 Tweet

HOME

COMPUTATIONAL LAW

LEGAL PROTECTION

VACANCIES

EVENTS

PRESS

RESEARCH OUTCOME

## INNOVATION OF LEGAL METHOD

'It would be nice if all of the data which sociologists require could be enumerated because then we could run them through IBM machines and draw charts as the economists do. However, not everything that can be counted counts, and not everything that counts can be counted'.

William Cameron, *Informal Sociology*, 1963, p. 13

[www.cohubicol.www](http://www.cohubicol.www)

**(see final slide for further reading)**



# Counting as a human being in the era of computational law

- **To count, to calculate, to compute:**
  - Incomputability from a CS perspective
    - Godel, Wolpert, Mitchell
    - The mathematical assumptions of ML are incorrect but productive
- **To count, to qualify, to matter:**
  - Incomputability from an anthropological perspective
    - G.H. Mead, Arendt, Plessner, Ricoeur
    - The co-constitution of self, mind and society

# what descartes did not get

<https://www.aup.nl/nl/book/9789463722124/being-profiled-cogitas-ergo-sum>

## Legal protection:

- Against being **over**determined
  - By gaze of the other (Mead)
  - Soi-meme comme un autre (Ricoeur)
  - By government, seeing like a state (Scott)

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- **Data-driven legal tech:**
  - e-Discovery
  - Argumentation Mining
  - Prediction of judgements

## ■ **Code-driven legal tech:**

- Code-driven legislation, e.g. policy articulated in code
- Code-driven contracts, e.g. in fintech, transfer of assets
- Code-driven decisions ,e.g. of public administration

# Machine learning

## What is A/B Testing?

**A/B testing (sometimes called split testing) is comparing two versions of a web page to see which one performs better.** You compare two web pages by showing the two variants (let's call them A and B) to similar visitors at the same time. The one that gives a better conversion rate, wins!



All websites on the web have a goal - a reason for them to exist

# Machine learning

## p-Hacking and False Discovery in A/B Testing

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Leonid Pekelis†

Aisling Scott‡

Christophe Van den Bulte§

June 28, 2018

### Abstract

We investigate whether online A/B experimenters “p-hack” by stopping their experiments based on the p-value of the treatment effect. Our data contains 2,101 commercial experiments in which experimenters can track the magnitude and significance level of the effect every day of the experiment. We use a regression discontinuity design to detect p-hacking, i.e., the causal effect of reaching a particular p-value on stopping behavior. Experimenters indeed p-hack, especially for positive effects. Specifically, about 57% of experimenters p-hack when the experiment reaches 90% confidence. Furthermore, approximately 70% of the effects are truly null, and p-hacking increases the false

# Machine learning

**Tom Mitchell:**

**“A computer program is said to learn**

- **from experience  $E$**  (legal text)
- **with respect to some class of tasks  $T$**  (e.g. prediction of judgement)
- **performance measure  $P$**  (e.g. getting it right)
- if*
- **its performance at tasks in  $T$ ,**
- **as measured by  $P$ ,**
- **improves with experience  $E$ .”**



# Machine learning

**ML often 'parasites on' human domain expertise**

**on what cs calls: 'ground truth'**

**e.g. a lawyer's estimate, or an actual court decision**

# Machine learning

- The politics are in **who** get to determine **E, T** and **P**
  - The ethics are in **how** they are determined
    - Law concerns the **contestability**

# AI program able to predict human rights trials with 79 percent accuracy

by James Vincent · @jjvincent · Oct 24, 2016, 8:05a



Amazon Mode

## JOURS MODE

JUSQU'À **-30%**

Vêtements - Chaussures - Sacs  
Montres - Bijoux - Beauté



- Assumption: text extracted from published judgments are a proxy for applications lodged with the Court
  - why? published judgments = low hanging fruit
  - *problem: as authors state, facts may be articulated by court to fit the conclusion*

- Cases held inadmissible or struck out beforehand are not reported, which entails that a text-based predictive analysis of these cases is not possible.
  - why? admissible cases = low hanging fruit
  - *problem: these cases would probably make a difference which now remains invisible*

- Data on cases related to art. 3, 6, 8 ECHR
  - why? provided the most data to be scraped, and sufficient cases for each
  - *problem: impact of framing of the case remains invisible (think e.g. art. 5, 7, 9, 10, 14)*

- Dataset = publicly available
  - for each article: all cases [apart from non-English judgments]
  - equal amount of violation/non-violation cases
  - text extraction by using regular expressions, excluding operative provisions

- Prediction is defined as a binary classification task: yes/no violation:
  - using each set of textual features to train SVM classifiers
  - linear kernel to check the weight learned for each feature
  - violation cases labelled +1, non-violation labelled -1
  - features with positive weights indicative of violation, with negative indicative of non-violation
- trained and tested by 10-fold cross validation, a held-out of 10% for testing
- performance computed as **mean accuracy** after 10-fold cross-validation



**Table 2** Accuracy of the different feature types across articles. Accuracy of predicting violation/non-violation of cases across articles on 10-fold cross-validation using an SVM with linear kernel. Parentheses contain the standard deviation from the mean. Accuracy of random guess is .50. **Bold** font denotes best accuracy in a particular Article or on Average across Articles.

Feature Type		Article 3	Article 6	Article 8	Average
N-grams	Full	.70 (.10)	.82 (.11)	.72 (.05)	.75
	Procedure	.67 (.09)	.81 (.13)	.71 (.06)	.73
	Circumstances	.68 (.07)	.82 (.14)	.77 (.08)	.76
	Relevant law	.68 (.13)	.78 (.08)	.72 (.11)	.73
	Facts	.70 (.09)	.80 (.14)	.68 (.10)	.73
	Law	.56 (.09)	.68 (.15)	.62 (.05)	.62
Topics		<b>.78 (.09)</b>	.81 (.12)	.76 (.09)	.78
Topics and circumstances		.75 (.10)	<b>.84 (0.11)</b>	<b>.78 (0.06)</b>	<b>.79</b>

- **Circumstances and topics are best predictors, combined works best**
  - law has lowest performance
    - discussion: facts more important than law
    - legal formalism and realism: evidence that legal realism is realistic
  - this is nonsense for 2 reasons:
    1. as indicated by the authors the facts, formulated by the court, may be tuned to the outcome
    2. in many cases there is no law section due to an inadmissibility judgment

# Data-driven and code-driven 'legal tech'

## ■ Text-driven interpretation:

- Close reading and bounded rationality
- Integrity of law and logical coherence
- Legal certainty as contestability

## ■ Data- and code-driven interpretation:

- Remote reading based on natural language processing
- Coherence based on the approximation of a mathematical target function
- Legal certainty based on predictive or self-executing 'legal tech'

# Data-driven and code-driven 'legal tech'

- **Text-driven normativity and legal protection:**
  - Ambiguity & flexibility, but armed against arbitrariness
  - Suspension of judgement, constraints upon personal opinion
  - Practical and effective legal remedies, based on institutional checks and balances
- **Data- and code-driven normativity and legal protection:**
  - Freezing the future by way of predictions based on historical data
  - Freezing the future by way of deterministic self-executing code
  - Contesting statistics and contesting execution of irreversible code

# The role of algorithms: **learners** and decisional algorithms

## ■ The 'learner':

- The algorithm that tries out various potential mathematical functions to connect input data with output data
- It is meant to achieve an approximation of an assumed target function
- It is limited to the finite hypothesis space designed by the developer
- It is limited by the training and the validation data
- Training data can be wrong, irrelevant, incomplete
- A learner cannot train on future data

# The role of algorithms: learners and **decisional algorithms**

## ■ The decisional algorithm:

- ITTT
- Based on whatever the learner has learnt or,
- Based on rules developed by experts, e.g. lawyers
- Deterministic decision tree (simple or complex)
- May be a smart contract or smart regulation

# **Text-driven law, algorithmic law, and the Rule of Law**

- **Text-driven law:**
  - externalisation
  - deliberate/deliberation
  - reflection
  - suspension of judgement
  - Interpretation
  - contestation

# **Text-driven law, algorithmic law, and the Rule of Law**

## ■ **Algorithmic law:**

- Text-driven law is algorithmic:  
legal conditions determine legal effect
- Ambiguity of human language drives 'legal certainty':
  - Consolidation of legitimate expectations
  - Opening the floor for contestation



# Text-driven law, **algorithmic law**, and the Rule of Law

## ■ **Algorithmic law:**

- Data-driven regulation:
  - Real time ML-driven decisions about e.g. tax-fraud
  - Decisional algorithms based on output of learners
  - Decisional algorithms based on translating law into code

# Text-driven law, algorithmic law, and the **Rule of Law**

## ■ Rule of law:

### – Legality (government)

- Foreseeability
- Transparency
- Equal respect and concern for each individual citizen

# Text-driven law, algorithmic law, and the **Rule of Law**

- Rule of law:
  - **Democratic legitimacy**
    - Equal respect and concern  
(also of majoritarian government)
    - Representative, deliberative, participatory democracy
    - Agonism when developing law

# Text-driven law, algorithmic law, and the **Rule of Law**

- Rule of law:
  - **Contestability in a court of law**
    - 'the I did not do it' contestation
    - 'the what I did does not qualify as a violation' contestation
    - 'the the law you applied violates higher law' contestation

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# Legal by Design

- What if you can **predict judgements** (and outperform the lawyers at that)?
  - Give people a fair idea of their chances?
  - Increase legal certainty?
  - Introduce 'triage' into the provision of legal service?
  
- What if you can translate regulation or contracts into code that **self-executes**?
  - Compliance by design
  - Increase legal certainty
  - Only write laws that lend themselves to such enforcement

# Legal by Design

- What if you cannot **predict the court**, but you can simulate probable outcome?
  - Give people a *wrong* idea of the objectivity of their chances
  - Increase the *illusion* of legal certainty
  - Introduce 'triage' into the provision of legal service: *violation of access to justice*
- What if you cannot translate regulation or contracts into code that **self-executes**?
  - Compliance by design
  - Decrease argumentative nature of legal certainty
  - Reduce law to administration

# Legal Protection by Design

To provide **practical and effective legal protection**, legal norms that constitute such protection:

1. Must be **embedded** in data-driven and code-driven 'law'
2. Based on **democratic legitimisation** (representation, deliberation, participation)
3. Enabling the **contestation** of predictions and self-execution



# EU General Data Protection Regulation

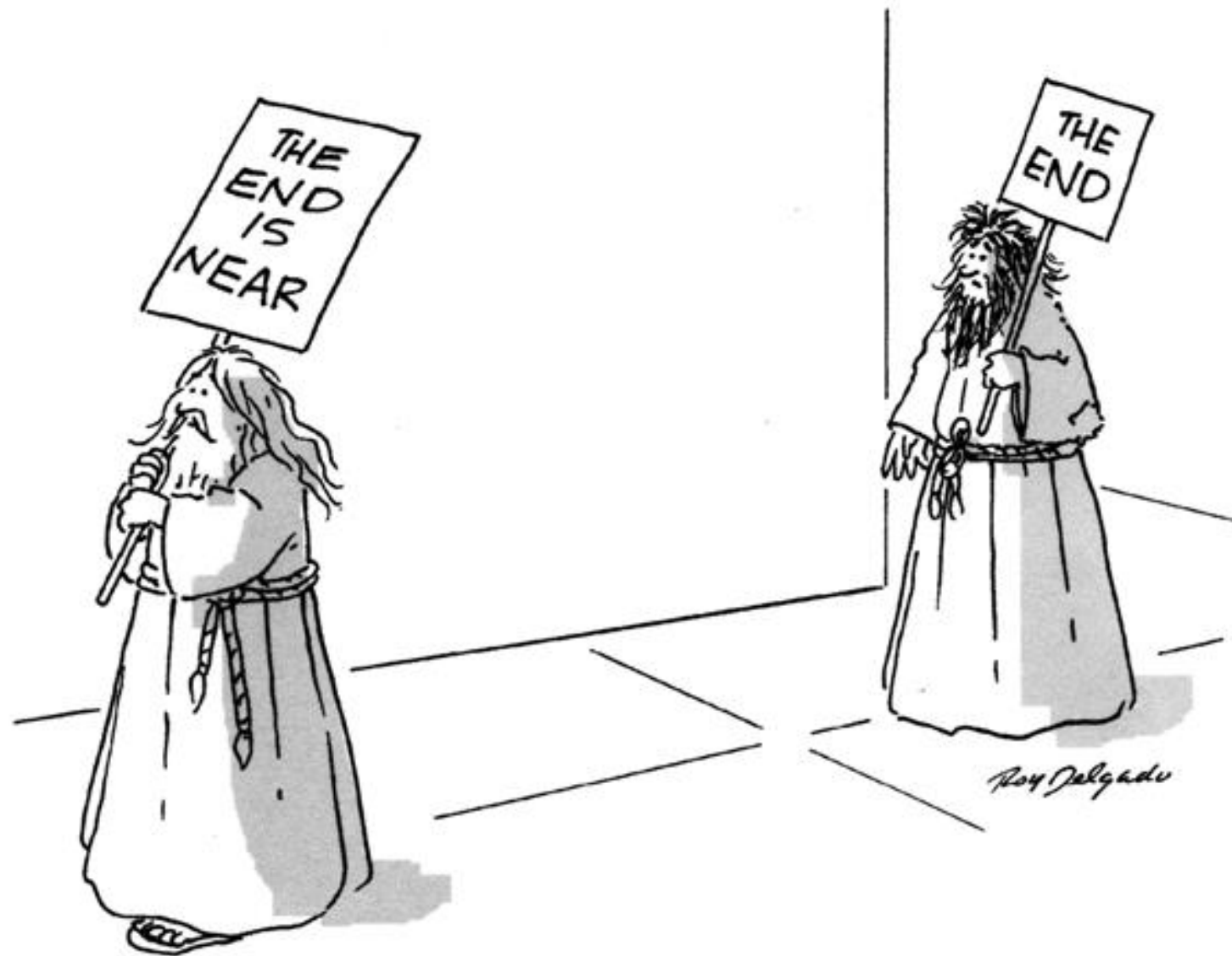
- Data protection impact assessment (DPIA)
- Data protection by design and default (DPbD)
- Prohibition of fully automated decisions

# **‘legal tech’ in the GDPR?**

- Legal protection impact assessment (LPIA): precautionary principle
- Legal protection by design and default (LPbD): not equivalent with LbD
- Prohibition of fully automated decisions (data-driven regulation), unless:
  - Underlying technology is tested and contestable
  - In case of replacement this is not qualified as law but as administration

# Magic

- Legal tech is not magic
- It does not deserve blind trust
- It is not like a car engine and not like medical science
- Law shapes the checks and balances that enable trust in engines and medicine
- Lawyers must develop a new hermeneutics, to 'read' the output of 'legal tech'



- Hildebrandt, Mireille. 2018. 'Law as Computation in the Era of Artificial Legal Intelligence: Speaking Law to the Power of Statistics'. *University of Toronto Law Journal*, March. <https://doi.org/10.3138/utlj.2017-0044>. See previous version on SSRN: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2983045](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2983045)
- Website of the ERC Advanced Grant project on the foundational implications of introducing 'legal tech': [www.cohubicol.com](http://www.cohubicol.com)
- Here you will find a host of relevant references, notably at <https://www.cohubicol.com/bibliography>