ROBOT LAWYERS?

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"Biotechnology will soon make it possible to engineer bodies and brains and to upgrade our physical and cognitive abilities" - Yuval Noah Harari 2017

Over the last decade increasing emphasis has been placed on the role that artificial intelligence (AI) will play in disrupting the practice of law. Arguably law is no different from all other professions where technology has become increasingly central to the work being conducted; yet the likely impact of technology on the legal profession is tempered by a number of factors that distinguish legal services from other service professions. This paper advocates for a more balanced view of

Symbolic v Sub-Symbolic

"The truth is no online database will replace your daily newspaper, no CD-ROM can take the place of a competent teacher and no computer network will change the way government works," - Clifford Stoll 1995

The Debate...

- Formalism v Realism
- Normative v Positivist

The Burning Question...

- What does this mean for the 'new' generation of AI?
- Sub-symbolic machine learning methods

Sub-Symbolic

What is it?

Machine Learning
...an algorithm that can learn from data without relying on rules-based programming.

Statistical Modelling
... formalisation of relationships between variables in the form of mathematical equations.

- Linear Regression
- Logistic Regression
- Decision Trees
- SVM
- Naïve Bayes
- KNN (K Nearest Neighbours)
- K Means
- Random Forest
- Dimension Reduction
- Gradient Boosting

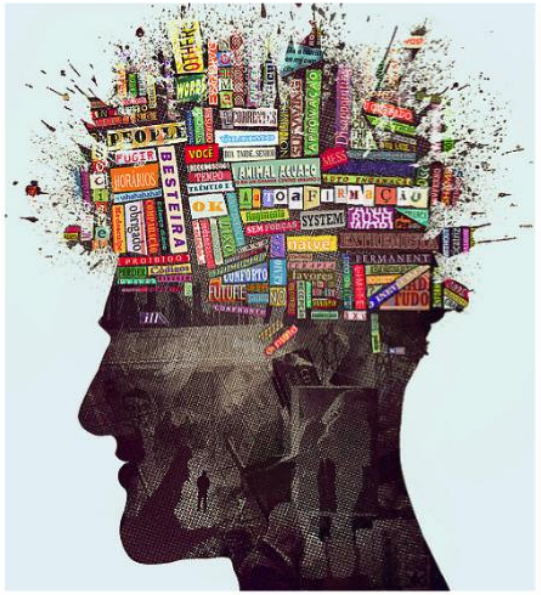
Symbolic v. Sub-Symbolic

The Chinese Library

Symbolic Approaches

Logic Programming & Expert Systems

- Hard-coded systems replicate the problem-solving task performed by a lawyer
- Capture lawyer's heuristic knowledge and apply logical inference rules to the task at hand.
- Symbolic approaches focus on logic programming and use symbol manipulation to represent the steps of problem solving, decision-making and inference through formal rules.



Identifying the Differences

Symbolic v Sub-Symbolic

- The system has no innate knowledge of the subject, but can follow steps to achieve a particular goal (in this case, translating from English to Chinese)
- Simulate understanding
- Simulation fails if the letter contains a symbol for which there is no reference in the books.

- The person in the room learns how to speak Chinese, using the reference books as study aids and inferring the rules from this material themselves.
- This requires that the person (i.e. system) has the ability to learn from information.
- Hence - *machine learning*

Statute	**Sub-Rules**		**Logic**
"(1) A person born in the United Kingdom after commencement shall be a British citizen if at the time of the birth his father or mother is –	[A] X acquires British Citizenship by section 1.1	*if*	A is true if [B *and* C *and* B *and* [E *or* F]] are true.[15]
	[B] X is born in the uk at T	*and*	
	[C[T is after commencement	*and*	
(a) a British citizen; or	[D] Y is parent of X	*and*	
(b) settled in the United Kingdom. "	[E] Y is a british citizen at T		
	[F] Y is settled in the uk at T	*or*	

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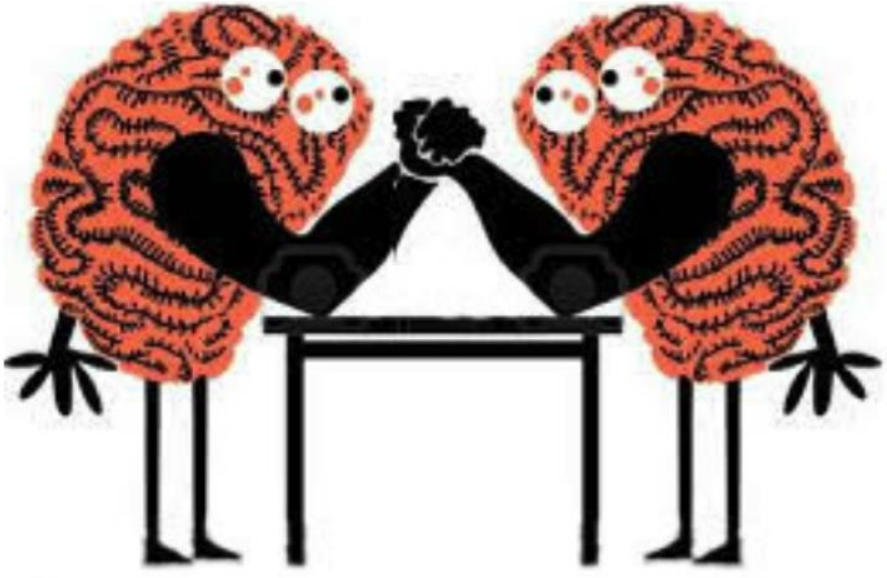

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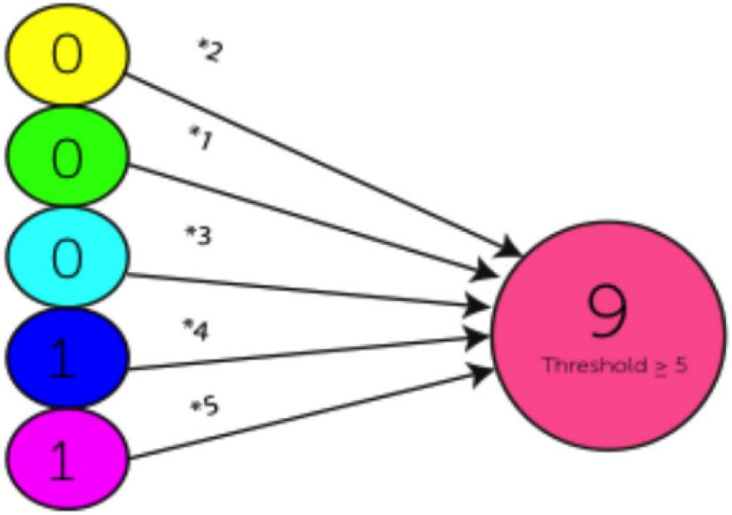
Neural Networks

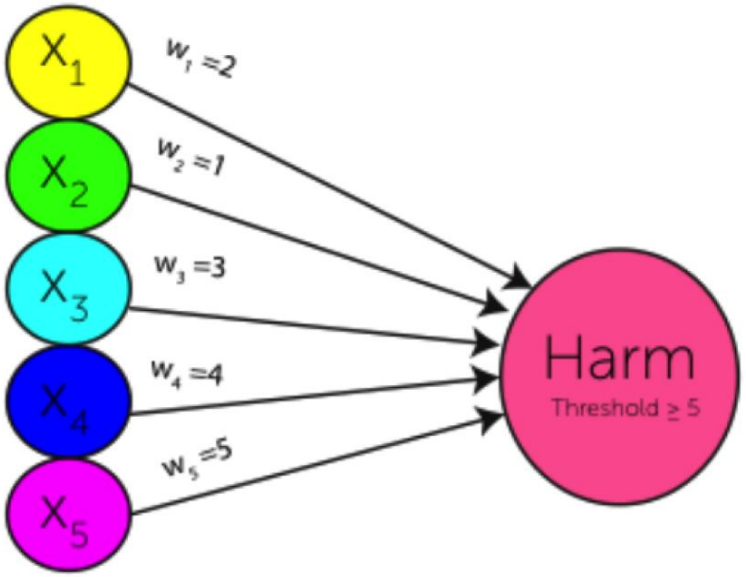
Label	Factor	Weight
X_1	Theft causing significant degree of loss	$w_1 = 2$
X_2	Soiling, ransacking or vandalism of property	$w_2 = 1$
X_3	Victim at home, on premise, or returned whilst offender present	$w_3 = 3$
X_4	Significant physical or psychological injury or other trauma	$w_4 = 4$
X_5	Violence used or threated against victim, particularly involving a weapon	$w_5 = 5$



$\Sigma_j = 9$

Output = [1]

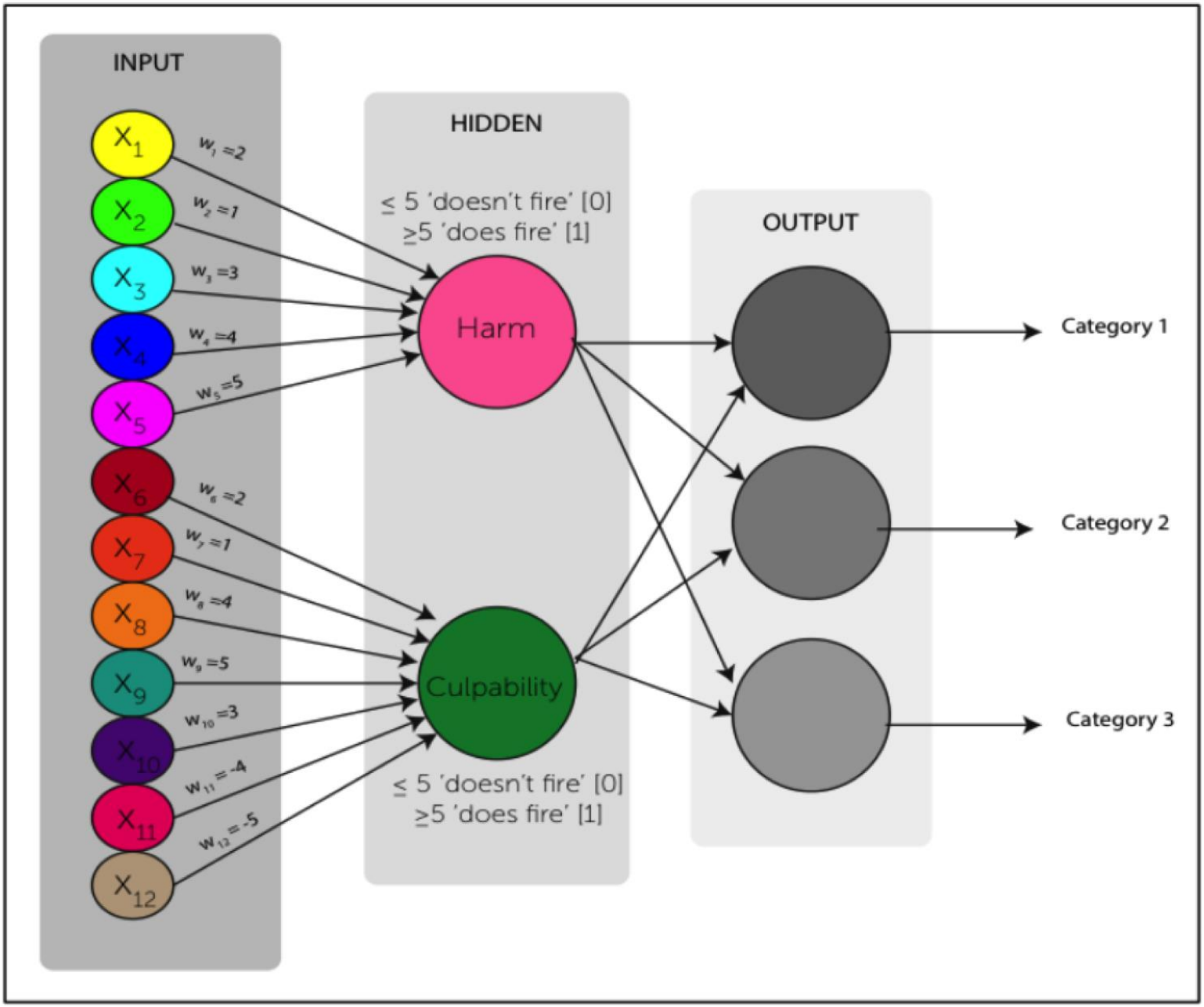
Offender meets criteria of 'greater harm'



If $\Sigma_j\ X_1W_1 \ldots X_5W_5$

≤ 5 'doesn't fire' [0]
≥5 'does fire' [1]

Label	Factor	Weight
Higher Culpability		
X_6	Victim or premises deliberately targeted	$W_6 = 2$
X_7	A significant degree of organization or planning	$W_7 = 1$
X_8	Offender was equipped for burglary	$W_8 = 4$
X_9	Weapon present on entry	$W_9 = 5$
X_{10}	Member of a group or gang	$W_{10} = 3$
Lower Culpability		
X_{11}	Offender exploited by others	$W_{11} = -4$
X_{12}	Mental disorder or learning disability, where linked to the commission of the offence	$W_{12} = -5$


INPUT
HIDDEN
≤ 5 'doesn't fire' [0]
≥5 'does fire' [1]
OUTPUT
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
w1 =2
w2 =1
w3 =3
w4 =4
w5 =5
w6 =2
w7 =1
w8 =4
w9 =5
w10 =3
w11 = -4
w12 = -5
Harm
Culpability
Category 1
Category 2
Category 3
≤ 5 'doesn't fire' [0]
≥5 'does fire' [1]

The Verdict?

For Legal Reasoning.....

provides a positivist & realist insight into the factors that contribute to decision making

Reasoning by analogy is possible

using sub-symbolic methods to develop e.g. decision-trees that you later use to develop symbolic systems is still a formalising of the law

For other 'legal tasks'.....

Predicting settlement amounts

Flag up unusual terms/conditions

Classification/Triage Documents

Compare differences between documents

Challenges....

Data can be a real problem

Law = natural language & unstructured documents

You have to capture those factors

Hard to explain reasoning

- Greater move towards risk forecasting, analysis - role of lawyers will change.

- Data based society requires people who understand data & data processes to capitalise on the new areas of 'legal' work that will emerge.

- AI in law = theoretical and empirical understanding that is almost wholly neglected in academic and vocational training in the UK .

- We cannot predict the likelihood of robot lawyers based on the work lawyers currently do.

- The nature of legal work will change - technology will offer new avenues for profitability.

- In leveraging these opportunities,
- those tasks become exposed to the risk of automation.