Data Science - Professional Responsibility and Ethics

BCS ICT Ethics SG

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Data science – needs data scientists …

- UK government in 2017-18 spend “nearly £6 million on data scientists” (Zoldi, 2018)
- Shortage of relevant skills - business intelligence /big data
- Urgent need for ‘data workers’
- Universities - Data Science programmes
- Government Office of National Statistics (ONS) - Data Science Campus
- Target: “500 qualified data scientists for government by 2021”. (Pullinger, 2019)

The combination of Artificial Intelligence and Machine Learning (AI/ML) brings a level of complexity that requires expertise – deep knowledge and a range of skills – including an ethical approach.

Data Science

- What it is – UK Government, Department for Digital, Culture, Media and Sport

Data science describes analysis using automated methods to extract knowledge from data. It covers a range of techniques, from finding patterns in data using traditional analytics to making predictions with machine learning.

www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework

Data ethics

UK Government, Department for Digital, Culture, Media and Sport

Data Ethics Framework

www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework

Data ethics is an emerging branch of applied ethics which describes the value judgements and approaches we make when generating, analysing and disseminating data. This includes a sound knowledge of data protection law and other relevant legislation, and the appropriate use of new technologies. It requires a holistic approach incorporating good practice in computing techniques, ethics and information assurance.

www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework

Rationale …

- Combination of Artificial Intelligence and Machine Learning (AI/ML)
- Level of complexity that requires expertise –
- Deep knowledge and a range of skills –
- Including an ethical approach.

- This presentation looks at the BCS Code of Conduct and other ethical frameworks in the context of data science and meeting the needs of . ‘early career’ data scientists

Ethics and professionalism

- Ethics is at the heart of what it is to be a ‘professional’
- A professional (doctor; lawyer; technology developer …) is in a privileged position because:
  - They have expertise in their field of work – and therefore know more than their clients
  - Clients expect their professional expert to provide a good product, or advice.
  - A professional is expected to know the benefits and avoid any risks associated with the product

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- Being a professional is about the duties and responsibilities of people engaged to ensure ‘ethical’ practice by ‘ethically informed decisions’.
- It is about good practice, understanding and explaining the constraints and limitations of the product

Hippocratic Oath

- “Maths and tech specialists need Hippocratic oath, says academic” (Guardian, August 2019).

> “One of the problems maths struggles with is that it's invisible ... despite being invisible, mathematics has a dramatic impact on our lives, and at this point in history that's more pertinent than it's ever been."

Hannah Fry, Associate Professor, Mathematics of Cities, University College London.

- Note: Hannah Fry will be talking about ‘powers and perils’ of modern mathematics in the **2019 Royal Institution Christmas lectures**

Why ethics for computer professionals?

"If ethics is about how to act and designers help to shape how technologies mediate action, designing should be considered a material form of doing ethics. Every technological artefact that is used will mediate human actions, and every act of design therefore helps to constitute moral practices."

Verbeek, 2011, p.91

[Verbeek, P-P. (2011) Moralizing Technology: Understanding and Designing the Morality of Things. The University of Chicago Press.]

BCS Code of Conduct

"The BCS code of conduct serves as a unique and powerful endorsement of your professional integrity."
www.bcs.org/membership/become-a-member/bcs-code-of-conduct/

In brief … more later …

- Public Interest
- Professional Competence and Integrity
- Duty to Relevant Authority
- Duty to the Profession

Ethics and technology

- (i) James Moor (1985) – computers raise ethical issues because:
  - Logical malleability *(can be shaped to be anything, based on the logic of programming)*
  - Social impact *(they are everywhere/affect people)*
  - Invisibility factor
    - Invisible abuse
    - Invisible programming values
    - Invisible complex calculations (beyond our understanding)

The following slides give examples and highlight aspects of BCS Code of Conduct

Moor, J.H.(1985) What is Computer Ethics? Metaphilosophy, 16:266-275, 1985
doi: 10.1111j.j467-0073. 1985.tb00173.x

Example

- Invisible Abuse
  - Hacking – lots of examples … from business to home
    - In business:

      A British man who hacked TalkTalk Telecom Group Plc, blackmailed executives and offered to supply customer data has been jailed for four years.
      https://www.insurancejournal.com/news/international/2019/06/12/529022.htm

    - In the home:

      "… internet-connected baby monitor took a dark turn. She said the camera on her Wi-Fi-connected device mysteriously moved in the direction of her bed."

      www.marketwatch.com/story/woman-claims-hacker-used-baby-monitor-to-spy-on-her-in-her-bedroom-2018-06-07

Privacy / Security

due regard for the legitimate rights of third parties

Note: "third parties" = any person/organisation affected by activities –
right to privacy in the home (Article 8, EU Convention on Human Rights)

Example

- Invisible programming values

(i) Cameras – thoughtless design

Discrimination

"We have to keep in mind that default settings are not neutral. They reflect the Coded Gaze, the preferences of those who have the opportunity to develop technology. Sometimes these preferences can be exclusionary."

"Suggesting people with dark skin keep extra lights around to better illuminate themselves misses the point."

Joy Buolamwini, **Algorithms aren't racist. Your skin is just too dark.** May 2017
https://hackernoon.com/algorithms-arent-racist-your-skin-is-just-too-dark-4ed31a7304b8

(ii) Software – intentional design

NOT misrepresent or withhold information

"In September, the Environmental Protection Agency (EPA) found that many VW cars being sold in America had a "defeat device" - or software - in diesel engines that could detect when they were being tested, changing the performance accordingly to improve results. The German car giant has since admitted cheating emissions tests in the US."

Volkswagen: The scandal explained, BBC News, 10 December 2015
www.bbc.co.uk/news/business-34324772

Example

- Invisible complex calculations beyond our understanding

due regard for the legitimate rights of third parties

"What distinguishes machine learning is its use of arbitrary black-box functions to make decisions. These black-box functions may be extremely complex and have an internal state composed of millions of interdependent values. As such, the functions used to make decisions may well be too complex for humans to comprehend; and it may not be possible to completely understand the full decision-making criteria or rationale" (p.1)

[Mittelstadt, B., Russell, C, Wachter, S.. 2019. *Explaining Explanations in AI.* ACM ISBN 978-1-4503-6125-5/19/01]

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duty to uphold the reputation of the profession

EXAMPLE: "Back in 2016, a Microsoft chatbot named Tay became a racist, sexist, generally-rather-unsavoury character after internet users took advantage of its machine learning capabilities. The chatbot was covered in media around the world and itself was bound to have caused Microsoft some reputational damage.
[Ryan Daws, AI News. Ethics: Microsoft warns its AI offerings 'may result in reputational harm']

Note: "third parties" = any person/organisation affected by activities – conflict 'right' of the data subject and possible IPR on software

Guidance on ethics …

- Principles for data ethics (UK Government)
- Algorithmic Transparency/accountability (ACM)
- Guidelines for Trustworthy AI (European Commission)
- Internet Governance Forum 2019: Best Practices Forum on Internet of Things; Big Data; Artificial Intelligence.

- Matching with … BCS Code of Conduct?

Guidance for ethics and AI

UK Government - Data Ethics Framework

1. clear user need and public benefit
2. be aware of relevant legislation and codes of practice
3. use data that is proportionate to the user need
4. understand the limitations of the data
5. ensure robust practices and work within your skillset
6. make your work transparent and be accountable
7. embed data use responsibly

follow the data protection safeguards laid out in Article 22 of the GDPR and section 14 of the DPA 2018

Provenance; errors in the data; bias (from historical decision making, or unrepresentative surveys or social media)
if metadata and field names are ambiguous

be transparent about the tools, data, algorithms and the user need (unless there are reasons not to such as fraud or counter-terrorism).

…the role of algorithms in decision making … not only a final decision but any potential automated decisions which played an important role in forming the final decision-making process.

Note on Legislation …

Right to explanation of automated decision-making [… does not exist …]

- In all of the GDPR, a right to explanation is only explicitly mentioned in Recital 71, which states that a person who has been subject to automated decision-making:
- should be subject to suitable safeguards, which should include specific information to the data subject and the right to obtain human intervention, to express his or her point of view, to obtain an explanation of the decision reached after such assessment and to challenge the decision. (emphasis added)

Wachter, S., Mittelstadt, B., Floridi, L. Why a Right to Explanation of Automated Decision-Making Does Not Exist in the General Data Protection Regulation, International Data Privacy Law, Volume 7, Issue 2, May 2017, Pages 76-99 https://doi.org/10.1093/idpl/ipx005

Note on accountable algorithms

Not always possible …

"when the decision being regulated is a commercial one, such as a decision to offer credit, a business's legitimate interest in protecting proprietary information or guarding trade secrets like the underwriting formula may be incompatible with full transparency. And in many contexts, an automated decision may use as inputs, or will create as an output, sensitive or private data that should not be broadly shared to protect business interests, privacy, or the integrity of law enforcement or investigative methods."

Kroll, J. A., Huey, J., Barocas, S., Felten, E.W., Reidenberg, J.R., Robinson, D.G., Yu, H. Accountable Algorithms. University of Pennsylvania Law Review, Gol. 165: 633. p.658

Freedom of Information Act (subject request)

Extract from a letter sent by Department of Work and Pensions (UK) in response to a Freedom of Information request by a data subject regarding the UK Universal Credit IT system (2013):

> "One of the major advantages of Universal Credit over the present benefits system is that it replaces the need for several different benefit systems in different places, involving various organisations holding the same or similar data. So the incidence of the scenarios that you are concerned about should not arise, or should occur less frequently.
>
> Having said that, the Department does use data-matching in order to detect and prevent benefit fraud, and has processes and procedures that staff follow to conduct this data matching.
>
> The Department is withholding this information under one of the exemptions in the Freedom of Information Act. Information that you have requested is exempt under section 31(1) (a) of the Freedom of Information Act which exempts information from disclosure, if to do so would be likely to prejudice the prevention or detection of crime. This is because if the Department published details of how it undertakes data-matching, this could potentially facilitate individuals in making false benefit claims, or failing to report changes of circumstances that affect benefit entitlement.
>
> There is a general public interest in openness, and also in understanding the level of fraud against the Department, and, in turn how the Department responds to, and detects and prevents such frauds. These concerns have to be weighed against a stronger public interest in ensuring that benefit fraud is detected, and prevented, and that this can be best achieved by ensuring that the Department's approaches, techniques and methodologies for countering fraud are not made public. Taking account of all the circumstances of your request, and the relevant factors above, I have concluded that the balance of the public interest favours withholding this information."

Statement on Algorithmic Transparency and Accountability - US ACM Public Policy Council, 2017

Principles for Algorithmic Transparency and Accountability

1. Awareness: (of possible biases in design, implementation, and use, and potential harm to individuals and society
2. Access and redress: (adoption of mechanisms that enable questioning and redress for individuals and groups adversely affected)
3. Accountability: (Institutions held responsible for decisions made by the algorithms they use)
4. Explanation: (Systems/institutions are encouraged to produce explanations of procedures and decisions)
5. Data Provenance: (the way in which training data was collected and potential bias) concerns over privacy, protecting trade secrets, or revelation of analytics that might allow malicious actors to game the system can justify restricting access to qualified and authorized individuals.
6. Auditability: (models, algorithms, data and decisions should be recorded in cases where harm is suspected)
7. Validation and Testing: (institutions should use rigorous methods to validate models, routinely perform tests, make results public).

European Commission – guidelines for Trustworthy AI

- Develop, deploy and use AI systems in a way that adheres to the ethical principles of: respect for human autonomy, prevention of harm, fairness and explicability. Acknowledge and address the potential tensions between these principles.
- Pay particular attention to situations involving more vulnerable groups such as children, persons with disabilities and others that have historically been disadvantaged or are at risk of exclusion, and to situations which are characterised by asymmetries of power or information, such as between employers and workers, or between businesses and consumers.
- Acknowledge that, while bringing substantial benefits to individuals and society, AI systems also pose certain risks and may have a negative impact, including impacts which may be difficult to anticipate, identify or measure (e.g. on democracy, the rule of law and distributive justice, or on the human mind itself.) Adopt adequate measures to mitigate these risks when appropriate, and proportionately to the magnitude of the risk.

Ethics Guidelines for Trustworthy AI: High-Level Expert Group on Artificial Intelligence European Commission B-1049 Brussels. Document made public on 8 April 2019.

Internet Governance Forum (IGF) 2019 IoT, Big Data, AI to address societal challenges

1. Define terms narrowly (avoid sweeping generalisations)
2. ... focus on what an application DOES not on how the technology DOES IT.
3. Collaborate to ensure that these technologies are deployed in ways that protect user privacy and security, and network resiliency
4. Consider ethics and human rights when applying IoT, Big Data, and AI from the outset
5. Watch out for bias and incomplete data sets ... in ALL cases, the limits of the data and Big Data analysis should be recognized.
6. Make privacy and transparency a policy goal and a business practice
7. Ensure that systems are adequately secured before they get to the market.
8. Foster technologies and business practices that empower SMEs

Guidance for ethical behaviour?
(yours and your IT system …)

- Code of Conduct/Code of ethics

  "The BCS code of conduct serves as a unique and powerful endorsement of your professional integrity."
  www.bcs.org/membership/become-a-member/bcs-code-of-conduct/

  PUBLIC INTEREST
  You shall:
  - have due regard for public health, privacy, security and wellbeing of others and the environment;
  - have due regard for the legitimate rights of third parties;
  - conduct your professional activities without discrimination on the grounds of sex, sexual orientation, marital status, nationality, colour, race, ethnic origin, religion, age or disability, or of any other condition or requirement;
  - promote equal access to the benefits of IT and seek to promote the inclusion of all sectors in society wherever opportunities arise.

BCS Code of Conduct

- “You have integrity and show competence, but you know you don’t know everything, that’s why you continuously learn and grow and never take on tasks that you don’t have the skills and resources to complete.”

www.bcs.org/membership/become-a-member/bcs-code-of-conduct/

PROFESSIONAL COMPETENCE AND INTEGRITY (a selection, see full version online)

You shall:

- only undertake to do work or provide a service that is within your professional competence;
- NOT claim any level of competence that you do not possess;
- develop your professional knowledge, skills and competence on a continuing basis, (see full piece online)
- avoid injuring others, their property, reputation, or employment by false or malicious or negligent action or inaction
- ensure that you have the knowledge and understanding of legislation and that you comply with such legislation, in carrying out your professional responsibilities;

BCS Code of Conduct

- “You work with due care and diligence, acting in your client or company’s best interests at all times. You take personal and collective responsibility for your actions while maintaining discretion and ethical standards.”

DUTY TO RELEVANT AUTHORITY (a selection, see full version online)

You shall:

- accept professional responsibility for your work and for the work of colleagues who are defined in a given context as working under your supervision;
- NOT disclose or authorise to be disclosed, or use for personal gain or to benefit a third party, confidential information except with the permission of your relevant authority, or as required by legislation;
- NOT misrepresent or withhold information on the performance of products, systems or services (unless lawfully bound by a duty of confidentiality not to disclose such information), or take advantage of the lack of relevant knowledge or inexperience of others.

BCS Code of Conduct

- As a BCS member, you're an ambassador for the IT industry and use your voice to help promote it positively to the world. You support your IT colleagues and other members in their growth both personally and professionally.

DUTY TO THE PROFESSION (a selection, see full version online).

You shall:

- accept your personal duty to uphold the reputation of the profession and not take any action which could bring the profession into disrepute;
- seek to improve professional standards through participation in their development, use and enforcement;

Relevance of BCS Code of Conduct?

- Many of the principles in the previous guidance on AI can be seen in the BCS Code of Conduct (you can check which ones …)

Read the next slide and see how many ‘breaches’ of BCS Code of Conduct you can find …

- Note: the text highlighted in red is simply my key points about the case, and not necessarily the ‘breaches’ of BCS Code of Conduct.

UK Government – Home Office – Windrush case

Handling of the Windrush situation (Home Office), Report by the Comptroller and Auditor General, National Audit Office. HC 1622 SESSION 2017–2019 5 DECEMBER 2018

Whether the quality of information shared with agencies was a factor in people being wrongfully denied access to public and private services, and accommodation

Issues with the Department's data management increased the risk of action being taken against people who had a legal right to be in the UK.

When the Department identifies someone it believes should not be in the UK, for example because it refuses that person's visa application, it places them automatically in a 'migration refusal pool'. Immigration Enforcement uses these data to target its work on removals and detention. The Department also shares these data with other public bodies, which may then apply other sanctions. Both we and the Inspectorate have raised concerns several times since 2014 about the quality of the data and controls underpinning this system. The Department declined to cleanse its database as recommended by the Inspectorate in its review of compliant environment measures on driving licences and bank accounts in 2016. The Department has now paused some of this data-sharing with other departments. It has also paused the automatic 'pull' of selected visa refusal cases into the migration refusal pool. It has not decided when, or if, it will resume these activities (paragraphs 3.14 to 3.16, 3.19, 3.21 and Figure 8).

"We do not believe that the Department is doing enough to address the appalling defects in its systems, processes and data quality, which contributed to the scandal."

In 2016, the Independent Chief Inspector of Borders and Immigration found the Department had wrongly identified some people as being 'disqualified' from having a driving license or a bank account, but the Department rejected the recommendation to cleanse its disqualified persons list of people who should not be on it.

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