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FIGI FINANCIAL INCLUSION GLOBAL INITIATIVE

FIGI Symposium

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#financialinclusion

Big data, machine learning, consumer protection and data privacy

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- Big data and machine learning
- Consumer protection
- Data privacy

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- Notice and consent requirements

Engagement: operations
- Accuracy
- Bias and discriminatory treatment
- Breach and re-identification
- Data intermediaries

Post-engagement: accountability
- Rights of access, rectification and erasure
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Big data: computer processing involving high Volumes and Varieties of types of linked up data processed at high Velocity (3 Vs sometimes + Veracity)

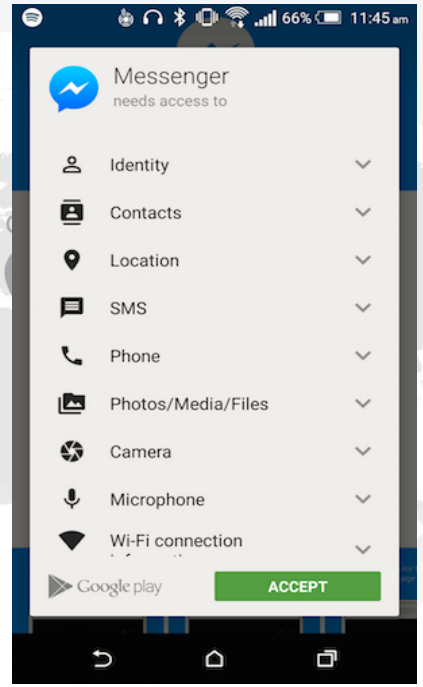
Relies on **alternative data** collected from a wide range of non-traditional digital sources (i.e., beyond application documents and credit reference reports):

- Data from financial aggregators
- Credit card data
- Geospatial and location data
- Web scraping datasets
- App engagement data
- Shipping data from customs
- Ad spend data
- Data made available through APIs
- Location/foot traffic data from sensors and routers
- Social media data
- B2B data acquired from parties in the supply chain
- Agriculture data (e.g., feeds on corn production)
- Point of sale data
- Pharmaceutical prescription data

1993 New Yorker

"On the Internet, nobody knows you're a dog"

2018 – 90% of apps on Android smartphones transfer data to Google



Artificial intelligence: techniques that seek to approximate aspects of human or animal cognition using computers

Machine learning: ability of a system to improve its performance, often by recognising patterns in large datasets, doing so at multiple layers of analysis

Profiling: automated processing of personal data to evaluate, analyse or predict likely aspects of a person's interests, personal preferences, behaviour, performance at work, economic situation, health, reliability, location or movements (inferences)

Automated decisions: decisions made by computer processing systems without any human involvement (beyond the coding), typically based on inferences produced by profiling using machine learning models applied to big data

Big data and machine learning are used throughout financial services:

- risk assessment for credit and insurance
- fraud detection (e.g., insurance, credit card)
- customer sales and recommendations
- customer service
- security and digital identification
- high-frequency trading (HFT)
- asset management, liquidity and foreign currency risk and stress testing
- news analysis

Consumer benefits:

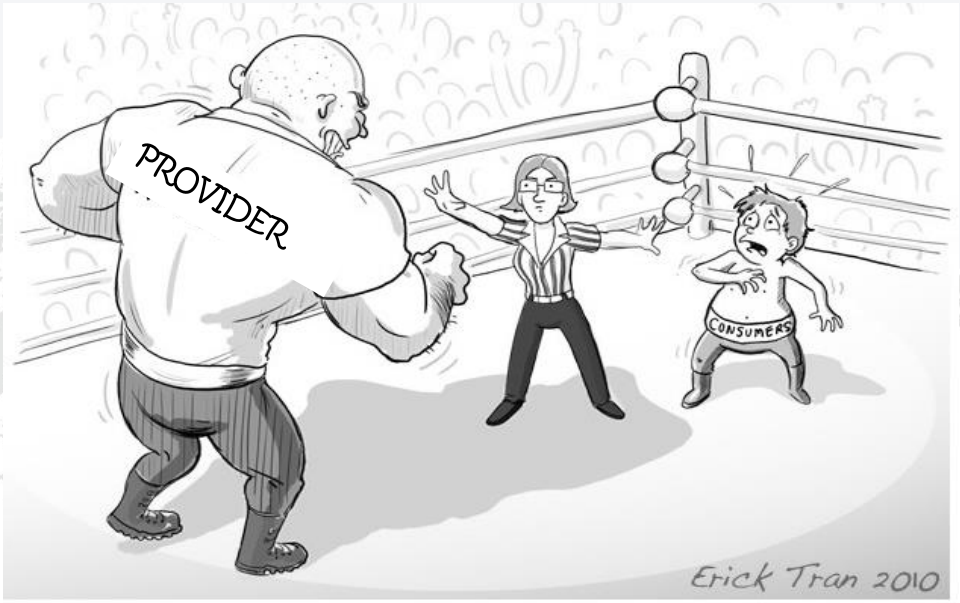
- Inferences and predictions improve firms' ability to discriminate among consumers
- Firms can offer consumers' products and services suited to their preferences, needs and risk profile
- Prices can be set at levels they are willing and able to pay

Consumer protection

- **Issue of asymmetries**
  - Information
  - Bargaining power

- **Values**
  - Fairness, accountability, transparency (FAT) and similar formulations

- **Phases of the customer journey**
  - Prior to purchase, e.g., information about the product or service someone is agreeing to buy **(pre-engagement)**
  - The provision, quality and functioning of the product or service itself being provided **(engagement)**
  - Post-purchase means of holding providers accountable for things that went wrong with the product or service **(post-engagement)**



"LET'S GET READY TO REGULATE!"

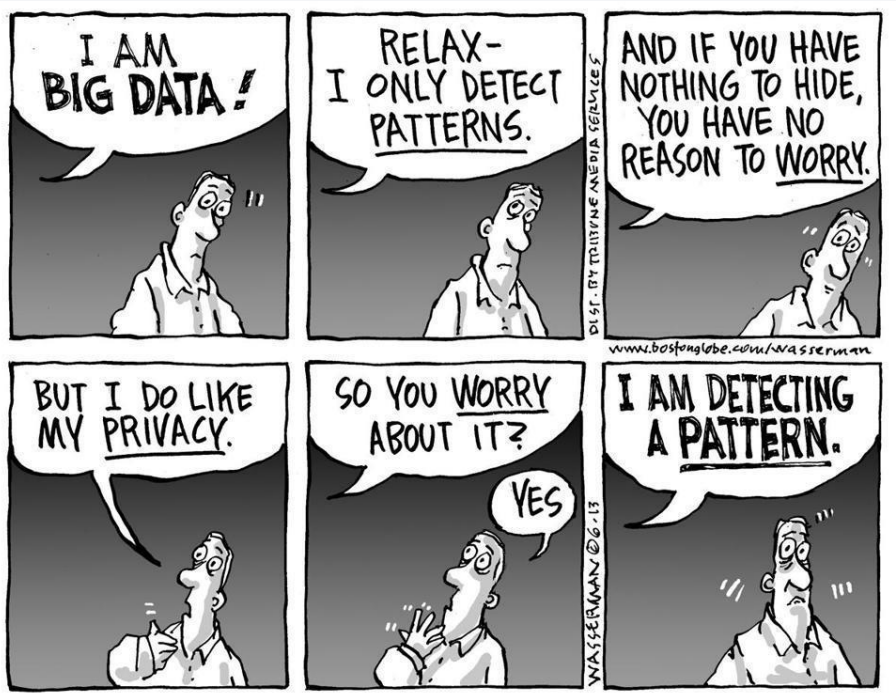
Privacy

- **Values, rights, protections**
  - “Individuality, autonomy, integrity and dignity”
  - Freedom in personal and family life

- **Digital context**
  - Controls on the collection, use and sharing of personal data
  - Data privacy ≠ data security

- **Risks**
  - Fraud and identity theft
  - Invasive advertising
  - Surveillance (government and commercial)

- **Legal approaches**
  - Constitutional: e.g., India’s “fundamental right”
  - Legislation: 107 countries (66 developing/transition economies), e.g., Mexico’s recent data protection law
  - Standards, e.g., China’s National Standards on Information Security Technology – Personal Information Security Specification GB/T 35273-2017



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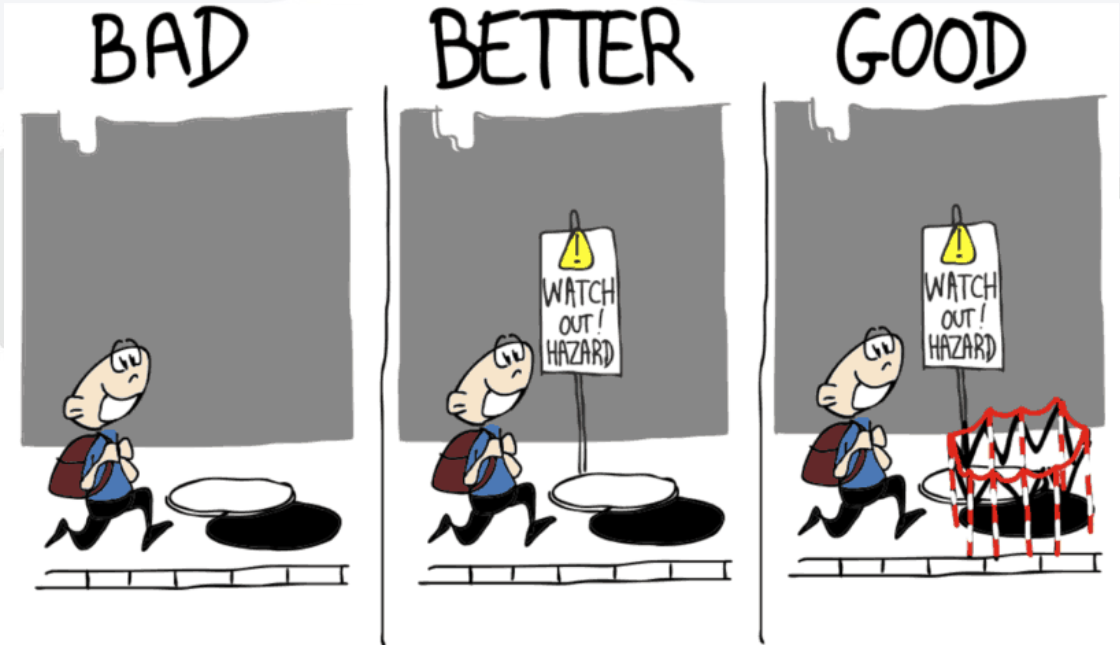
Notice and consent approaches

- **Data minimisation** in context of big data – "personal data shall be […] adequate, relevant and limited to what is necessary for the purposes for which they are processed"?

- **Purpose specification** in context of machine learning – require additional consent in case of purpose creep? (OECD Use-limitation Principle)

- **Automated decision-making**
  - **Notice** of "automated decision-making, […] profiling, […] meaningful information about the logic involved, as well as the […] consequences" (GDPR Arts 13-15)
  - **Opt-in/out** – e.g., "right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her"? (GDPR Art 22)

- **Technologies of consent and personal data management**, e.g., India's Digital Locker



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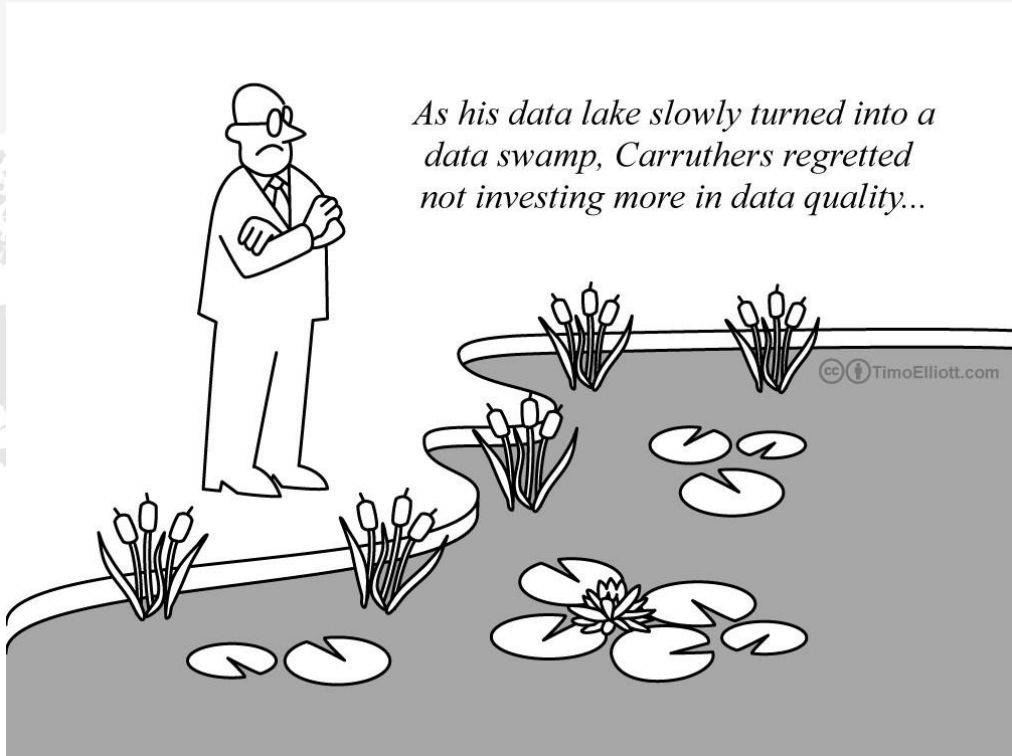
Accuracy

- **Accuracy risks**
  - Large volumes of structured and unstructured data inputs
  - Accumulated over time from multiple sources
  - Both the personal data and the ‘training data’

- **Responsibility for accuracy**
  - General data quality principles – e.g., Mexico’s data protection law requires data controllers to verify that personal data in their databases is correct and updated for the purposes for which it was gathered
  - Financial services laws – e.g., “credit reporting systems should have relevant, accurate, timely and sufficient data – including positive – collected on a systematic basis from all reliable, appropriate and available sources, and should retain this information for a sufficient amount of time.” WB General Principles for Credit Reporting (GPCR)
  - Blurring of distinction between formal credit reporting firms and big data players (e.g., Spokeo)



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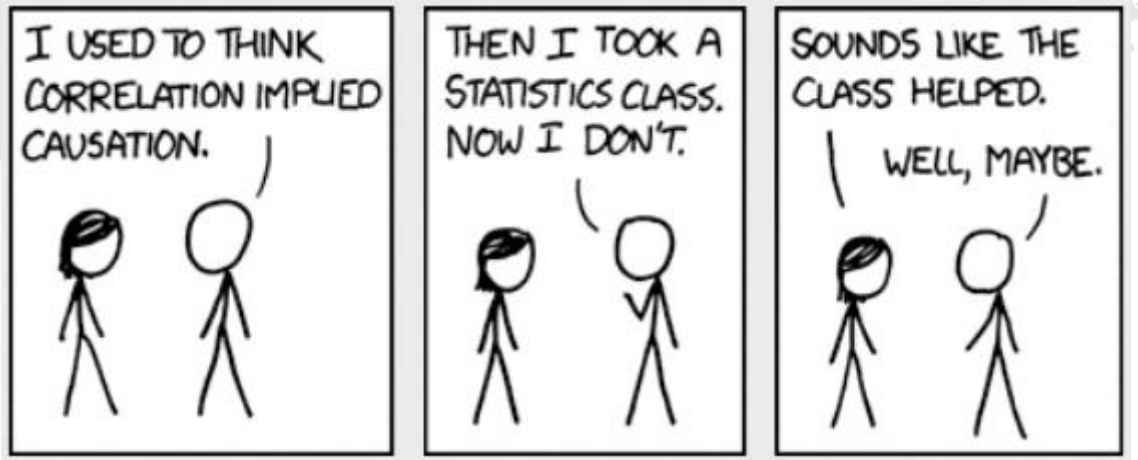
Bias and discriminatory treatment

- **Objectives:** Data should "not be used in an unfair discriminatory manner in relation to digital financial services (e.g., to discriminate against women in relation to access to credit or insurance)" (Principle 5 of the High Level Principles for Digital Financial Inclusion)

- **Proxies:** Non-sensitive data can be used to infer or be a proxy for sensitive data, blurring the distinction
  - Name → religion or place of birth → race
  - Medical purchases → health condition → eligibility for health insurance
  - Postcode → ethnic or racial group

- **Correlation ≠ causation**
  - Facebook's 2015 patent for loan application filtering based on average credit rating of an applicant's friends
  - 'Automating inequality'? 'Weapons of math destruction'?

Special categories of personal data: "racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation" (GDPR, Art 4)



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Transparency and explanations

- Accountability begins with explanation of machine learning outputs and automated decisions
  - Explainability of ‘opaque’ machine learning ‘blackboxes’ (‘machine learning is the science of getting computers to act without being explicitly programmed’)?
  - How to deal with trade secrets and software copyright?

- Regulating for adequate explanations
  - Brazil’s Data Protection Act 2018: right to request review of automated decisions using personal data, including profile definition, personality evaluation, and clear and relevant information on the criteria and procedures used
  - Potential for using counterfactuals as an alternative?

- Documenting decisions (Future of Privacy Forum proposal)
  - How the model was chosen, with legal and technical analysis
  - Trade-offs between explainability and accuracy
  - Increases in complexity despite diminished explainability
  - Taking account of the materiality of the output

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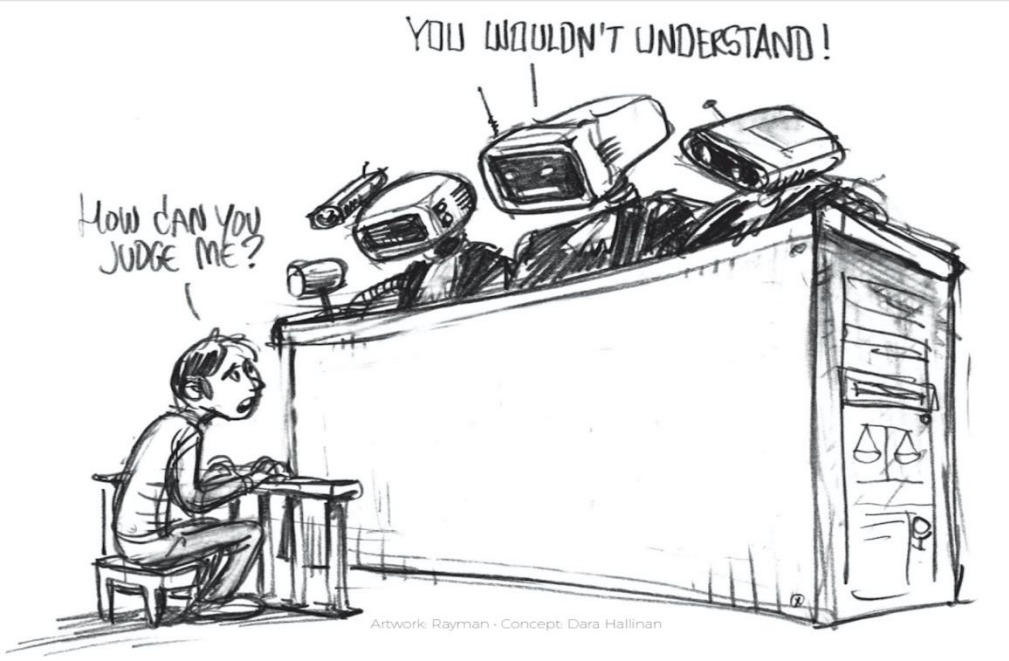
Although it is acknowledged this cannot be done currently, A/IS should be designed so that they always are able, when asked, to show the registered process which led to their actions to their human user, identify to the extent possible sources of uncertainty, and state any assumptions relied upon. IEEE 2018



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- **Standards for integrating privacy principles in the design** of artificial intelligence and machine learning models (Ann Cavoukian)

    1. Proactive not reactive, preventative not remedial, anticipating and preventing privacy-invasive events before they happen
    2. Privacy as default setting (opt-in rather than opt-out)
    3. Embed privacy into design, integral to the system without diminishing functionality, not 'bolted on'
    4. Win-win – stronger consumer trust + lower data breach risk
    5. End-to-end security – intake, storage and destruction of data
    6. Visibility and transparency, using policies and keeping records to enable internal monitoring and independent verification
    7. Respect user privacy, providing individuals access to information and the opportunity to contest and correct, complete and update data about them

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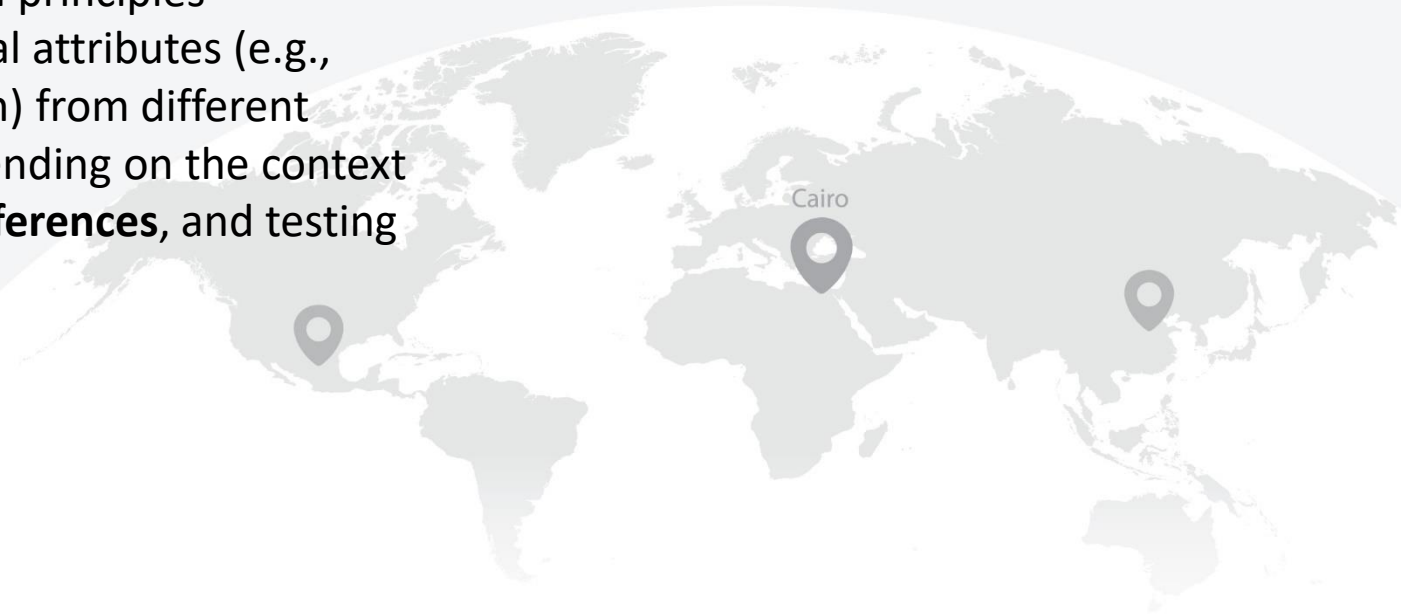
Ethical standards for artificial intelligence computer programming to which the community of developers may refer

Developing standards for acceptable inferential analytics

- **assessment of output data and decisions** of machine learning models against privacy and antidiscrimination principles
- **privacy acceptability of inferences** of personal attributes (e.g., political opinions, sexual orientation or health) from different sources of data (e.g., internet browsing) depending on the context
- standards for establishing the **reliability of inferences**, and testing inferences before and after deployment



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Standards for explanations of automated decisions

- relevance of data used to inferences drawn by the system
- relevance of such inferences for the type of automated decision
- accuracy and statistical reliability of the data and methods used
- encouraging developers of scoring models to share with consumers (and if required, regulators) the key attributes used in a model, and their relative weighting, and ensuring that documentation and audit trails are provided in case of legal process
- examining the potential for using counterfactuals to inform the consumer how, with different input attributes, they might obtain different decisions from the automated decision-making system

Best practices in processes for allowing consumers to obtain human intervention

Principles for harmonisation of accountability

- procedures for contesting automated decisions
- standards for establishing prima facie harm
- frameworks for assessing liability