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1972 - 2022

Society of Actuaries in Ireland

Data Analytics and Ethics

Dermot Marron (he/him)
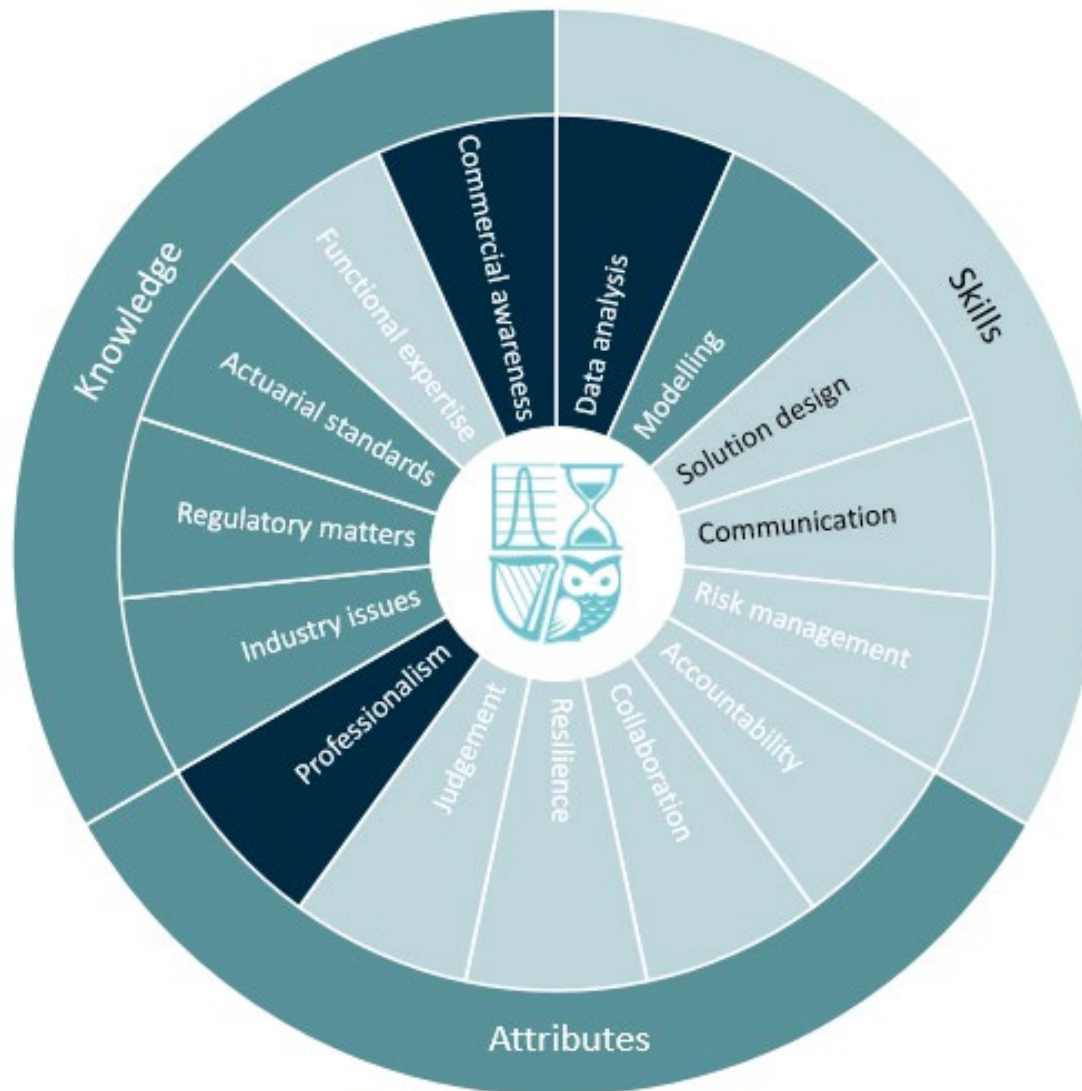Brendan Guckian (he/him)
Laura Rossi (she/her)

13.07.22

Disclaimer

The views expressed in this presentation are those of the presenter(s) and not necessarily those of the Society of Actuaries in Ireland or their employers.

Competency Wheel

Introduction

Brendan Guckian

(He/him)
Senior Manager.
Deloitte Ireland

Brendan leads the Actuarial Modelling Centre in Ireland, which includes the centre of excellence for actuarial modelling, data warehousing and business intelligence.

Dermot Marron

(He/him)
Head of Actuarial.
Allied Risk Management

Dermot heads up Allied Risk's actuarial department with a diverse range of clients including insurance and reinsurance companies, captives and MGAs. He is a member of the Society of Actuaries in Ireland's Diversity & Inclusion Committee and previously spent 3 years on EIOPA's Solvency II Internal Model Committee.

Laura Rossi

(She/her)
Analyst.
Deloitte Ireland

Laura is an analyst in Deloitte Ireland having previously worked as a software consultant as well as helping develop 6 courses teaching on data research, ethics, visualization and communication.

Agenda

1. Introduction

2. Regulations and Guidance

3. Data Analytics & Sources of Bias

4. Common Mistakes

5. Best Practices

6. Recommended Reading

Note: Case studies will be mentioned throughout

Recap on Potential Uses of Data Analytics in Insurance

Data Analytics touches nearly all area of actuarial work to some degree:

1. Insurance Pricing

2. Underwriting

3. Marketing of New Products

4. Personalised Customer Experience

5. Claims Settlement and Payment Automation

6. Identification of Fraud

7. Persistency – Prediction of Future Lapses

8. Reserving

9. Assumption Setting Across the Business

10. Others

Data Analytics Gone Wrong

"AI Camera Ruins Soccer Game For Fans After Mistaking Referee's Bald Head For Ball"

Aim of this Talk

> *Ethics is knowing the difference between what you have the right to do and what is right to do.*
>
> **-Potter Stewart (who retired from the Supreme Court Justice of the United States in 1981)**

- This presentation aims to provoke thought as to what is ethical, with a focus on pricing, as opposed to providing all the answers.

- It will provide an overview of some key legislation/guidance, identify potential sources of bias in data analytics as well as suggested best practice to follow.

- What is ethical is not always clear cut and there is not always a one size fits all answer.

- Intermittently we will also try give examples of data analytics going wrong and right.

Thought Experiment

The Daily News

Black People to pay more for Motor Insurance

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries , but also the leap into electronic

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Thought Experiment

The Daily News

Poor People to pay more for Motor Insurance

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Not a Thought Experiment

Irish Times 23 February 1999

Ballsbridge address and BMW could cut your car insurance

By Siobhán Creaton

YOUNG drivers with expensive cars will enjoy cheaper motor insurance from the Hibernian group this year, but "burdened borrowers" and drivers living in Tallaght can expect to pay more.

Hibernian's chief executive, Mr Adrian Daly, explained that the policy is part of the company's efforts to weed out the "unprofitable" element of its motor insurance book.

For motorists, the strategy means that those deemed to be in the most profitable group could enjoy a discount of up to 10 per cent on their annual motor insurance premium. But those out of favour could be in for a rise of up to 25 per cent, he said.

Not a Thought Experiment

Irish Times 24 February 1999

Hibernian steps back after row

By Siobhán Creaton

THE Hibernian Group has hastily retreated from comments made on how it assesses the premiums it charges motorists.

At a briefing on its annual results on Tuesday, company executives indicated that it would use new factors to assess which type of motorist should benefit from lower premiums and which should be increased, including an individual's lifestyle, finances and address.

Last night, however, the company, stated that it does not seek, nor does it intend to seek, information regarding any individual's personal financial circumstances. It also states that it does not discriminate against customers living in particular areas, such as Tallaght.

US Auto Insurance

- [Credit-based insurance scores](#)
- Very powerful predictor of risk
- Used since 1990s
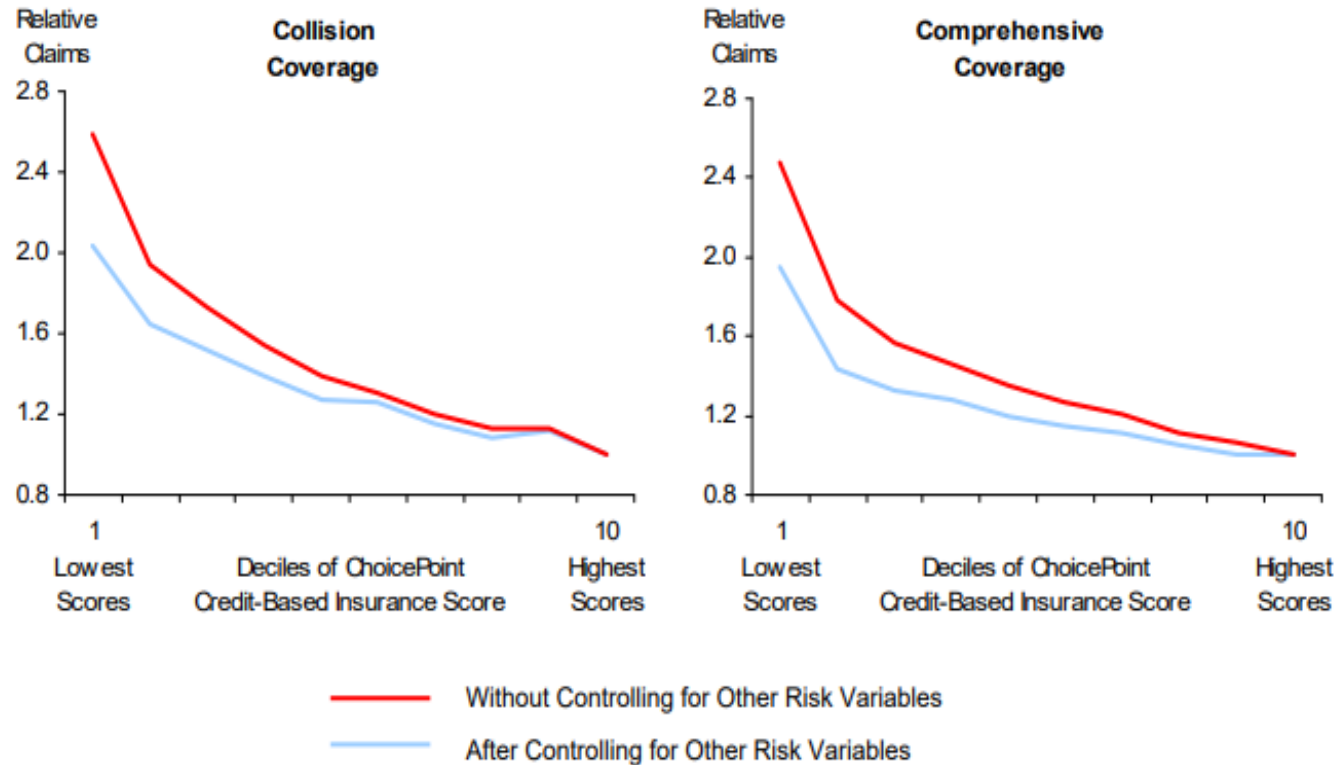
US Auto Insurance

- African Americans, Hispanics over-represented at lower deciles

- Banned in some states, restricted in others

- FTC report shows no evidence of being a proxy for race, ethnicity

African Americans

Percent
30%
25%
20%
15%
10%
5%
0%

1 Lowest Scores — Deciles of FTC Credit-Based Insurance Scores — 10 Highest Scores

Hispanics

Percent
30%
25%
20%
15%
10%
5%
0%

1 Lowest Scores — Deciles of FTC Credit-Based Insurance Scores — 10 Highest Scores
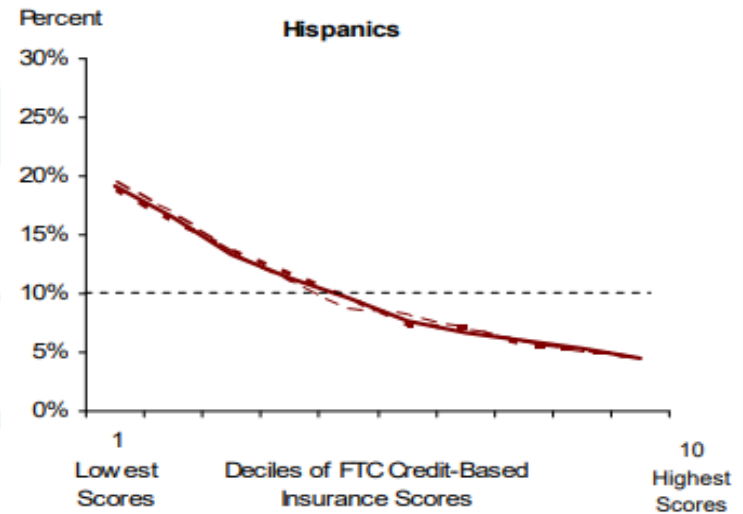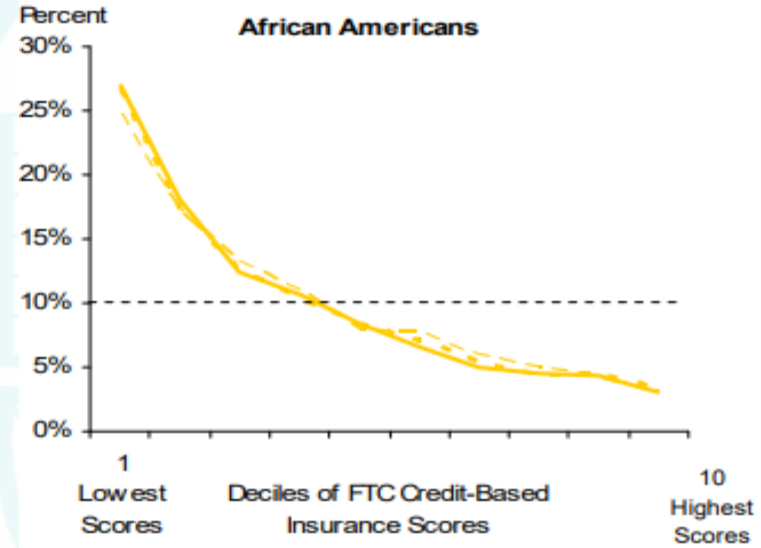
Irish Motor Insurance

Not so different?
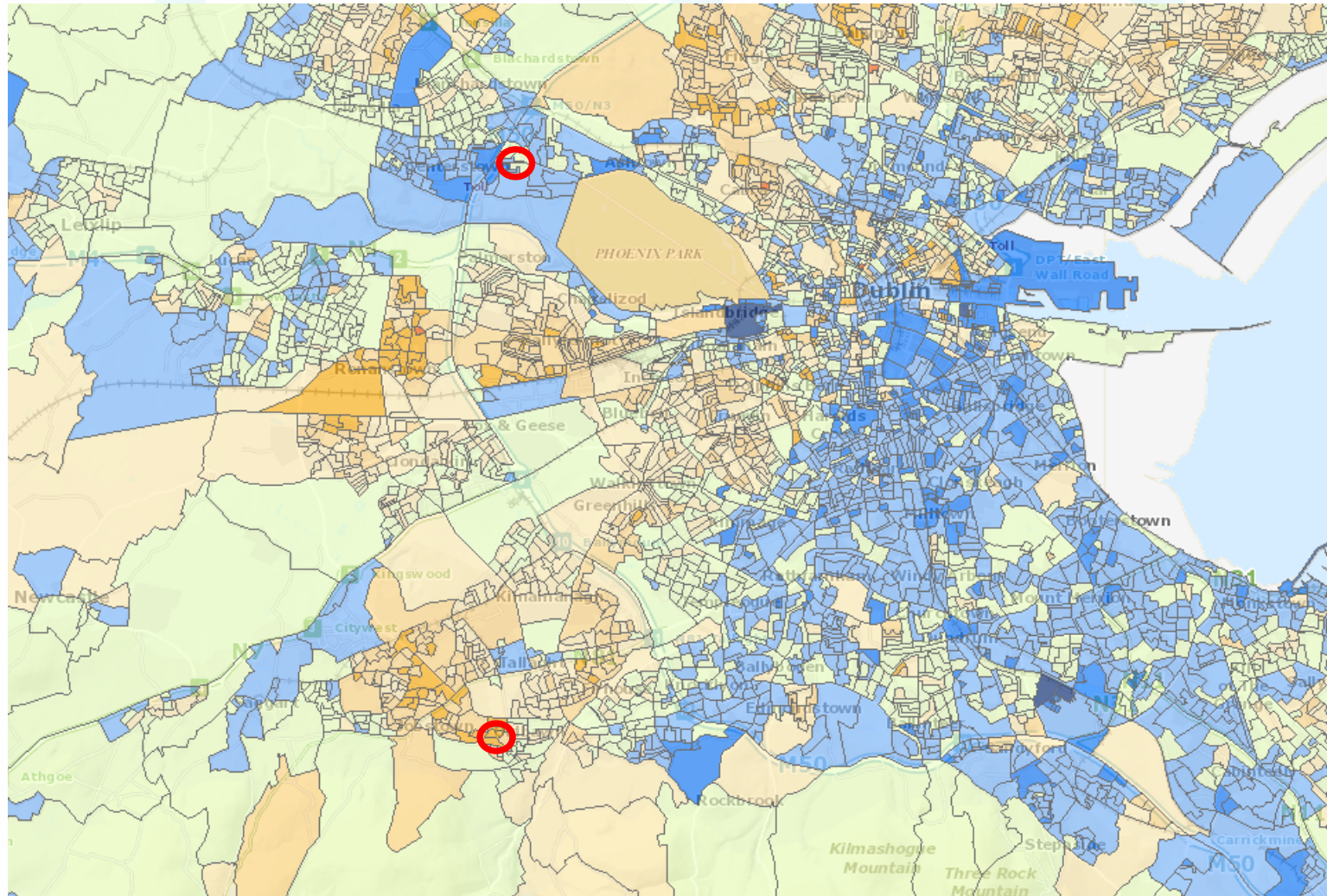
The Solution, Or Is There One?

Telematics: Risk factors - not proxies
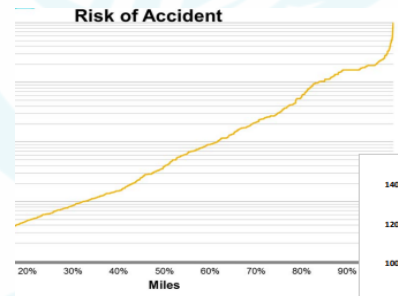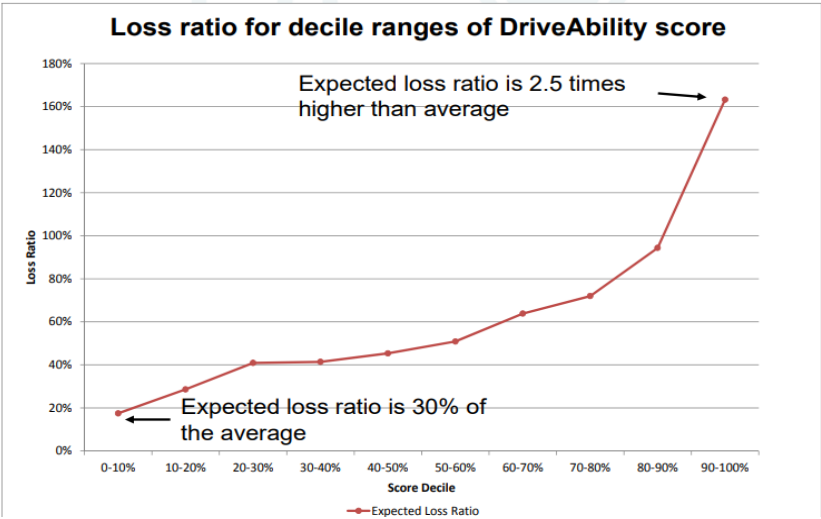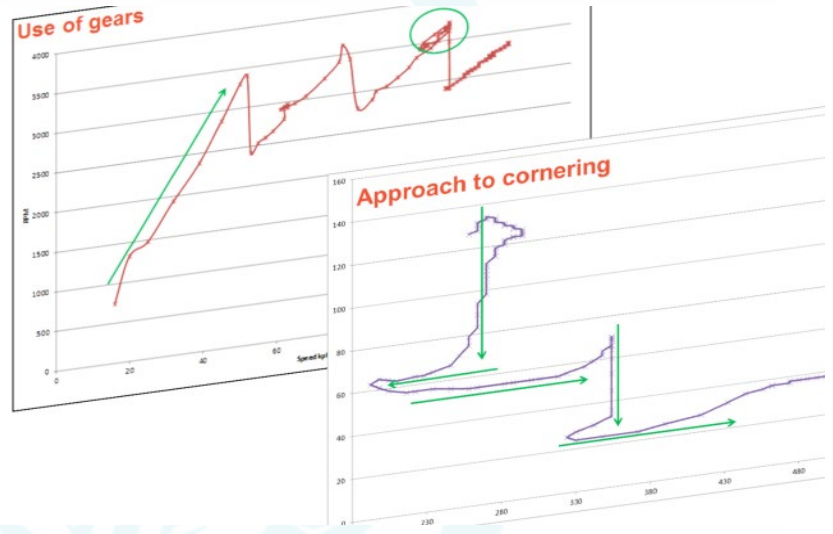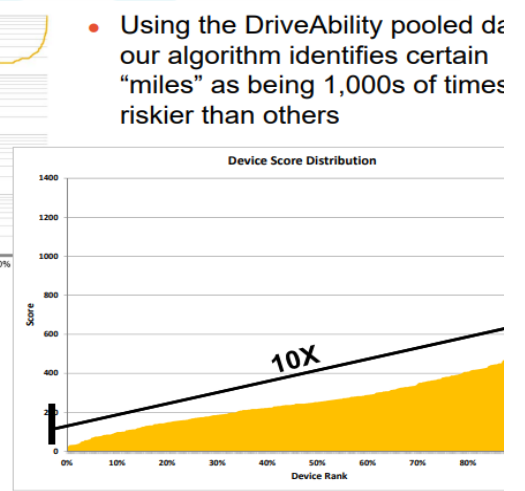
Regulations and Guidance

CHARTER OF FUNDAMENTAL RIGHTS OF THE EUROPEAN UNION

Article 21

Non-discrimination:

Grounds

Any discrimination based on any ground <u>such as</u> sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited.

Scope of application

Within the scope of application of the Treaty establishing the European Community and of the Treaty on European Union, and without prejudice to the special provisions of those Treaties, any discrimination on grounds of nationality shall be prohibited.

Equal Status Acts 2000-2018

REGULATION

The Equal Status Acts 2000-2018 prohibit discrimination in the provision of goods and services, accommodation and education.

EXEMPTIONS

Exemptions for provision of insurance on <u>all grounds</u> except for the gender ground

Article 5

Difference in treatment on any of the grounds, except for the gender ground, **in relation to the provision of annuities, pensions, insurance policies or any other matters related to the assessment of risk**, is permitted if the difference in treatment is effected by reference to:

⭐ **actuarial or statistical data**, or other relevant underwriting or commercial factors; <u>and</u>

⭐ is <u>**reasonable**</u> having regard to the data, or other relevant factors

AI Gone wrong

PRICE OF INSURANCE			
	Mo Smith	John Smith	Extra cost
Admiral (Leicester)	£2,252	£1,333	£919
Bell (London)	£1,572	£1,029	£543
M&S (Cardiff)	£3,182	£2,949	£233
Elephant (Manchester)	£2,173	1,956	£217
Diamond (Bradford)	£2,048	£1,843	£205

INVESTIGATION

Motors > News

MO COMPARE Motorists fork out £1,000 more to insure their cars if their name is Mohammed

Top firms such as Admiral and Marks & Spencers have been dragged into an insurance race row after giving far lower quotes for drivers with traditionally English names like John

Ben Leo

0:17, 22 Jan 2018 | Updated: 9:29, 22 Jan 2018

GDPR

G D P R

Article 22

Automated individual decision-making, including profiling

1.The data subject shall have **the 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.

2.Paragraph 1 shall not apply if the decision:

(a) is necessary for entering into, or performance of, a contract between the data subject and a data controller;

(b) is authorised by Union or Member State law to which the controller is subject and which also lays down suitable measures to safeguard the data subject's rights and freedoms and legitimate interests; or

(c) is based on the data subject's explicit consent.

GDPR

Articles 13-15

"the controller shall provide the data subject with the following information: …
…the existence of automated decision-making, including profiling…and… **meaningful information about the logic involved**, as well as the significance and the envisaged consequences of such processing for the data subject.

Recital 63

"That right should not adversely affect the rights or freedoms of others, **including trade secrets or intellectual property** … However, **the result of those considerations should not be a refusal to provide all information to the data subject**…."

Article 12

[Communication should be provided in a] "concise, **transparent, intelligible and easily accessible form**, using clear and plain language"

GDPR

What does this mean?

The [EDPB Guidelines on automated decision-making](#) highlight that this does not necessarily require a complex explanation of the algorithms used, or disclosure of the full algorithm, but it should be sufficiently comprehensive for the individual to understand the reasons for the decision.

Example

An insurance company uses an automated decision-making process to set motor insurance premiums based on monitoring customers' driving behaviour. To illustrate the significance and envisaged consequences of the processing it explains that dangerous driving may result in higher insurance payments and **provides an app comparing fictional drivers**, including one with dangerous driving habits such as fast acceleration and last-minute braking.
It uses **graphics** to give tips on how to improve these habits and consequently how to lower insurance premiums.

EIOPA´s Consultative Expert Group on Digital Ethics in insurance

"an ethical use of data and digital technologies implies a more extensive approach than merely complying with legal provisions and needs to take into consideration the provision of public good to society as part of the corporate social responsibility of firms."

EIOPA 6 AI Governance Principles:

- Principle of proportionality

- Principle of fairness and non-discrimination

- Principle of transparency and explainability

- Principle of Human Oversight

- Principle of data governance of record keeping

- Principle of Robustness and Performance

Data Analytics Gone Wrong

False facial recognition match leads to Black man's arrest

Medical chatbot suggests suicide

Tesla cars crash due to autopilot feature

Sources of Bias

Bias is a consequence of humanity.

All tools are biased in one way or another.

Then what *can* we do?

The goal is not to entirely avoid bias, but to:

- Understand it

- Understand its context

- Mitigate any negative effects

- Ensure fairness

Data Analytics Model Lifecycle
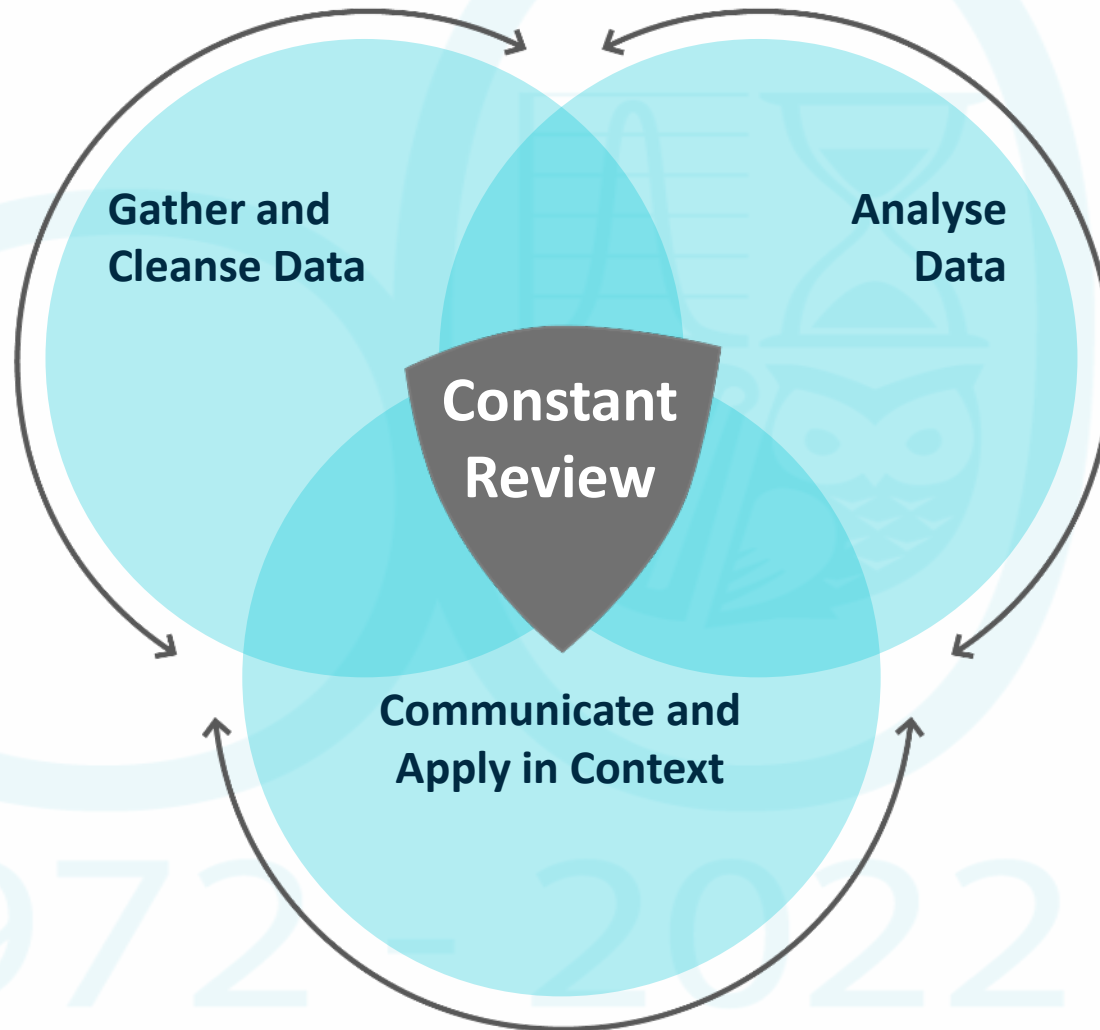
Sources of Bias

Data

Data is the fuel our model runs on. Its impact begins even before we collect it: through what constitutes relevant data, how we plan to collect and record it, when and who will collect it, etc. Even after collection, what we do to that data will impact our results.

Model

If the model is a hammer, every problem will look like a nail.

Models are purpose-built and necessarily include assumptions about the world. These need to be understood and assessed continuously.

Application

Applying a model to a situation carries with it decisions about applicability and about our goals. Is the model appropriate for the activity we're carrying out? Will it lead to unforeseen consequences? These are not one-time decisions.
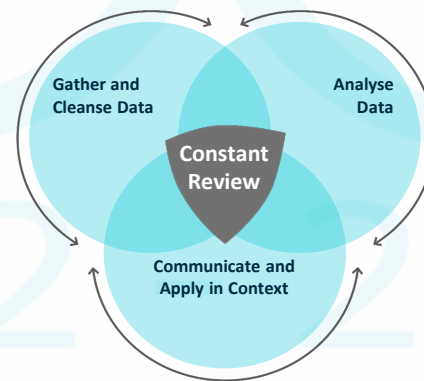
Sources of Bias

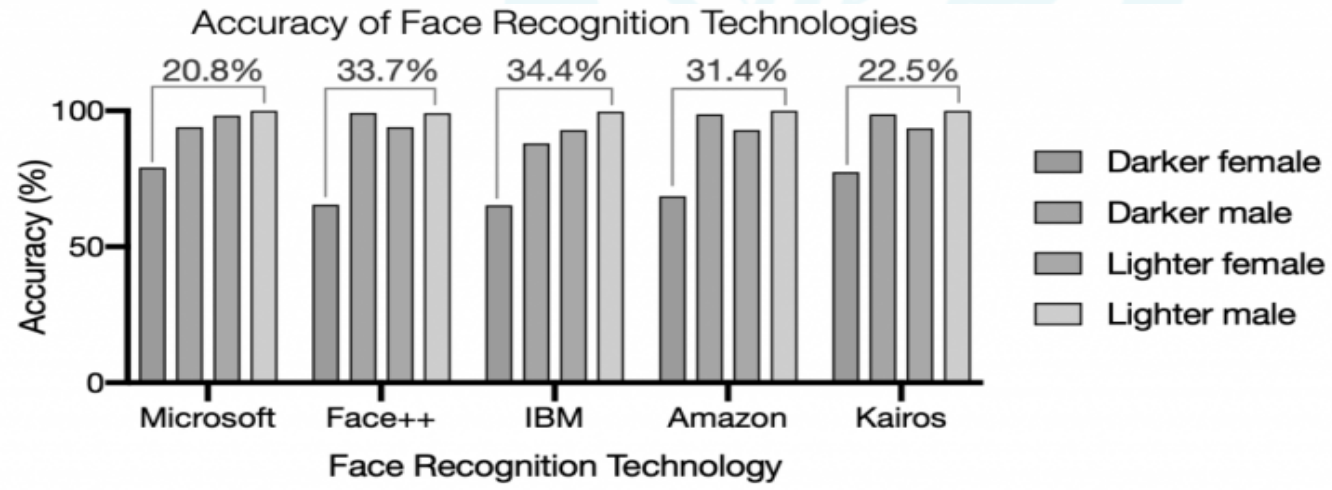| Data	
	Non Representative Samples
	Outliers
	Overfitting
	Incomplete Data
	Self-selection

Sources of Bias

Model

- Parameter selection
- Model selection
- Assumptions
- Group Attribution
- Over-reliance on past data
- Black box

Accuracy of Face Recognition Technologies

Source: Racial Discrimination in Face Recognition Technology - Science in the News (harvard.edu)

Sources of Bias

Application

- Application bias
- Goal bias
- Confirmation bias
- Reporting bias
- Communication

#TheWrongTool

Source: Using the Wrong Tool for the Job?

Data Analytics Gone Wrong

Google's flu fail shows the problem with big data

Amazon scraps secret AI recruiting tool that showed bias against women

How Target figured out a teen girl was pregnant before her father did

Common Mistakes

Data collection mistakes

- Lack of communication
- Leading Questions
- Insufficient anonymization
- Combining data sets
- Unnecessary data
- "Open source" data

Analysis mistakes

- Post-mortem analysis
- Data-driven hypotheses & data "dredging"
- Definition of success as "getting the result we wanted"
- Lack of review & supervision

Best Practices

Data	
	Data ownership is always the respondent's
	New purpose? New permission
	Intention matters
	Communicate

Analysis	
	Communicate
	Contextualize
	Review
	Report the "failures"

Data Analytics Success Stories

UPS Supply Chain – Optimising Delivery Routes

Shell's spare parts inventory management strategy

KironMed software to detect significant medical insurance fraud and protect sensitive healthcare data

Moneyball - Beane found undervalued, talented players by using baseball statistics to evaluate performance instead of relying on intuition

Data Analytics Success Stories in Insurance

South African company Santam achieved a 95% reduction in claims processing time through a claims management platform

Rimac Insurance in Peru now process claims 25 times faster on their customised insurance policies

Infinity Insurance in the US improved success rates in pursuing fraudulent claims from 50% up to 88% and claim investigation time was reduced by 95%

Ding Sun Bao software (create by Ant Financial) assesses car accident claims quicker than humans through uploaded pictures of the damaged car

Recommended Reading

Recommended Reading

- Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy, Cathy O'Neill

- Ethical Reasoning in Big Data - An Exploratory Analysis, Jeff Collmann and Sorin Adam Matei

- The Signal and the Noise: Why So Many Predictions Fail - but Some Don't, Nate Silver

- Hello World – How to be Human in the Age of the Machine, Hannah Fry

- Invisible Women: Exposing Data Bias in a World Designed for Men – Caroline Criado Perez
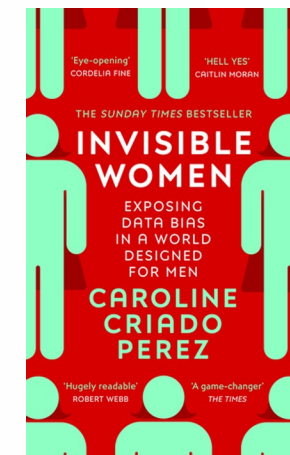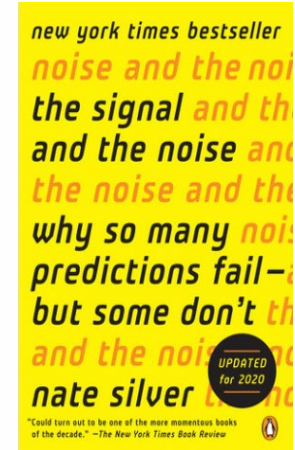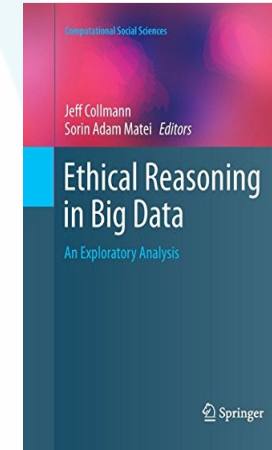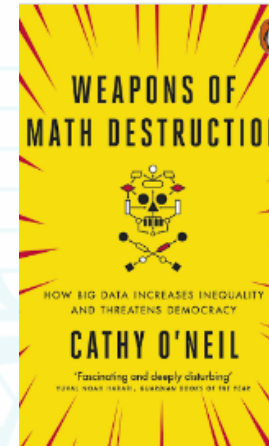
Conclusion

- Overall it is probably clear there is no clear ethical approach to pricing.
- Companies are constraint by the data they have available, the cost benefit of overinvesting in "accurate" solutions and guidance and regulations.
- Actuaries should be aware of bias and try to

  - Understand it

  - Understand its context

  - Mitigate any negative effects

  - Ensure fairness

- Constant review of models is important and output should be communicated clearly and contextualised for the user.

Wrap up / questions

Questions?