Emerging Technology and Analytics for Underwriting

Implications for Underwriters and Actuaries

Brian Fannin, ACAS, CSPA, MAAA
Research Actuary
Casualty Actuarial Society

Michael Elliott, MBA, CPCU, ARM, AIAF
Senior Director of Knowledge Resources
The Institutes

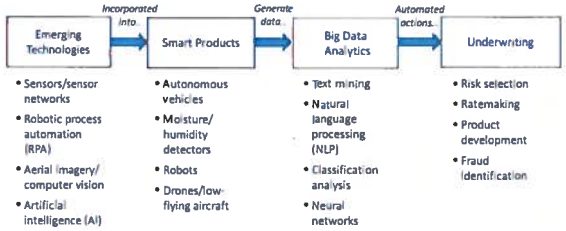
March 25, 2019

What we'll talk about

New technologies	New modeling techniques	Business model implications
• New products • New data for old products	• Big data • Machine learning/deep learning	• Product development • Customer segmentation • Operations

New technology

Emerging technology and data ecosystem for underwriting



Possibility: dam failure

$56 billion economic damages

$10 billion silent cyber

http://www.aon.com/reinsurance/gimo/20181025-gimo-cyber

Actuality: Big events, big limits

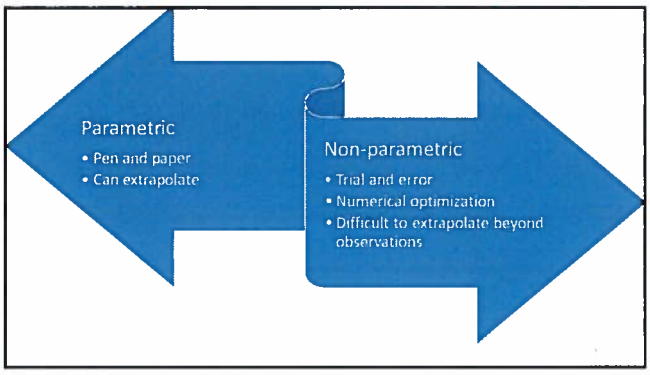
INSURANCE ASIA NEWS

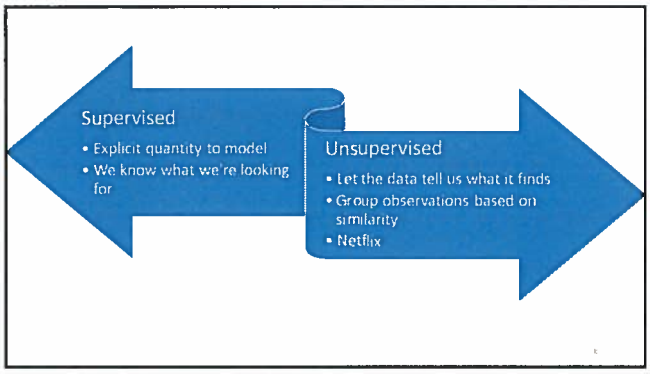
Singapore to establish US$1 billion cyber risk pool

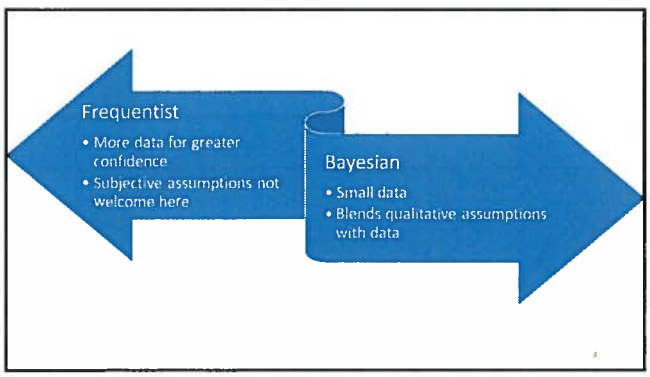
Merck's NotPetya insured loss could still be $2bn

Pharmaceutical giant Merck may [illegible] be responsible for $2bn of insured losses from the NotPetya virus in June 2017 making it by far the largest insured cyber loss in the sector's short history, according to the loss adjudication firm PCS today.

New modeling techniques

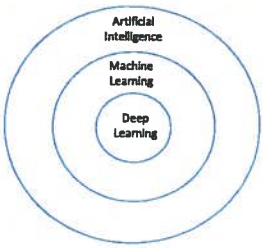

Parametric
• Pen and paper
• Can extrapolate
Non-parametric
• Trial and error
• Numerical optimization
• Difficult to extrapolate beyond observations


Supervised
• Explicit quantity to model
• We know what we're looking for
Unsupervised
• Let the data tell us what it finds
• Group observations based on similarity
• Netflix

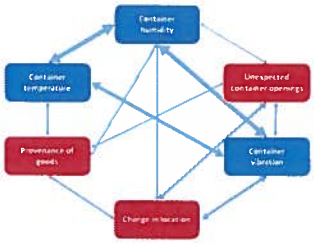

Frequentist
• More data for greater confidence
• Subjective assumptions not welcome here
Bayesian
• Small data
• Blends qualitative assumptions with data

Artificial intelligence (AI)

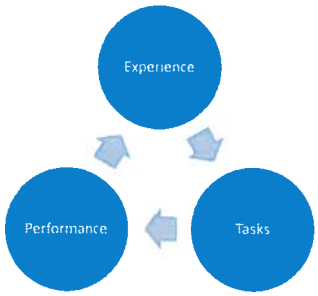
- The ability of machines to simulate human intelligence
- Key technologies underlying AI are machine learning and deep learning
- Employed in bots, autonomous vehicles, smart home products, and many other applications



Machine learning



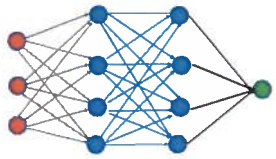
What is Machine Learning?



"A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P if its performance at tasks in T, as measured by P, improves with experience E."

-Arthur Samuel & Tom Mitchell

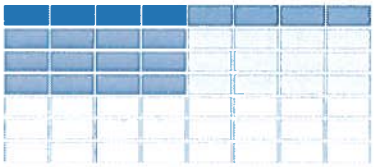
Neural networks



Input layer | Hidden layers | Output layer

Just what is "big" anyway?

Long → More observations made



Wide → More attributes observed

Bigger is always better … isn't it?

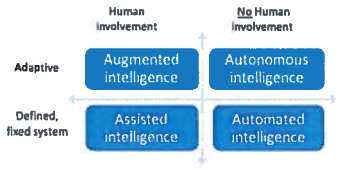
Better

- Reduction of estimator variance
  From: Longer data
  Means: Lower capital costs
- Additional explanatory variables
  From: Wider data
  Means: Enhanced customer segmentation

Slow down

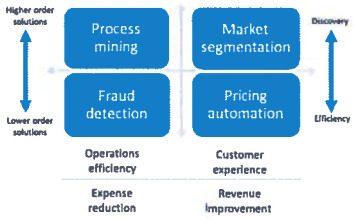
- Increased chance of capturing noise
- Even legitimate effects may not be permanent
- Chase short-term trends
- Self-defeating? Drivers manage credit score, not safe driving

Four types of AI



Source: PwC

AI applications



Reference: Deloitte

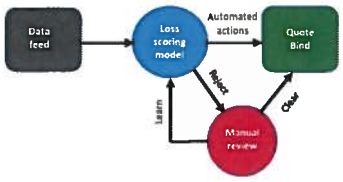
Underwriting support system based on AI

Underwriting support system

- AI processes questionnaires
- Automated call for MVRs
- Rx analyzer
- Occupation analyzer
- Signature locator

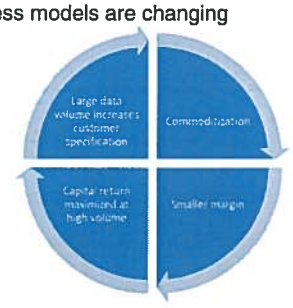
Reference: RGA Reinsurance

Semi-automated underwriting model based on AI



Business model implications

Insurers' business models are changing



Insurers' products are changing

Regulatory issues

- Casualty Actuarial and Statistical Task Force (CASTF) report on predictive models
  - Focuses on GLMs
  - Regulatory review best practices
- Risk pooling concerns
- Unfair treatment, discrimination
- Data privacy
- Data sharing
- Moral hazard/adverse selection
- Access to, or exclusion from, insurance services

Educational programs

Certified Specialist in Predictive Analytics (CSPA)

- Property – Casualty Insurance Fundamentals
- Preparing and managing data and datasets
- Visualization
- Concepts, methods and tools used for statistical analyses, predictive modeling and data analytics
- Advanced tools using various multivariate regression techniques, statistical modeling, machine learning and practical applications

Associate in Insurance Data Analytics (AIDA)

- Internal/external data
- Supervised/unsupervised learning
- Machine learning/neural networks
- Generalized linear models
- Classification analysis
- Cluster analysis
- Training a model
- Cross validation
- Lift


Q
A