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SOA Predictive Analytics Seminar – Malaysia

26 Aug. 2019 | Kuala Lumper, Malaysia

Session 1

AI / Machine learning on Actuarial Science

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AI and Machine learning on Actuarial Science

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August 2019, Malaysia

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Machine learning on insurance pricing and risk management

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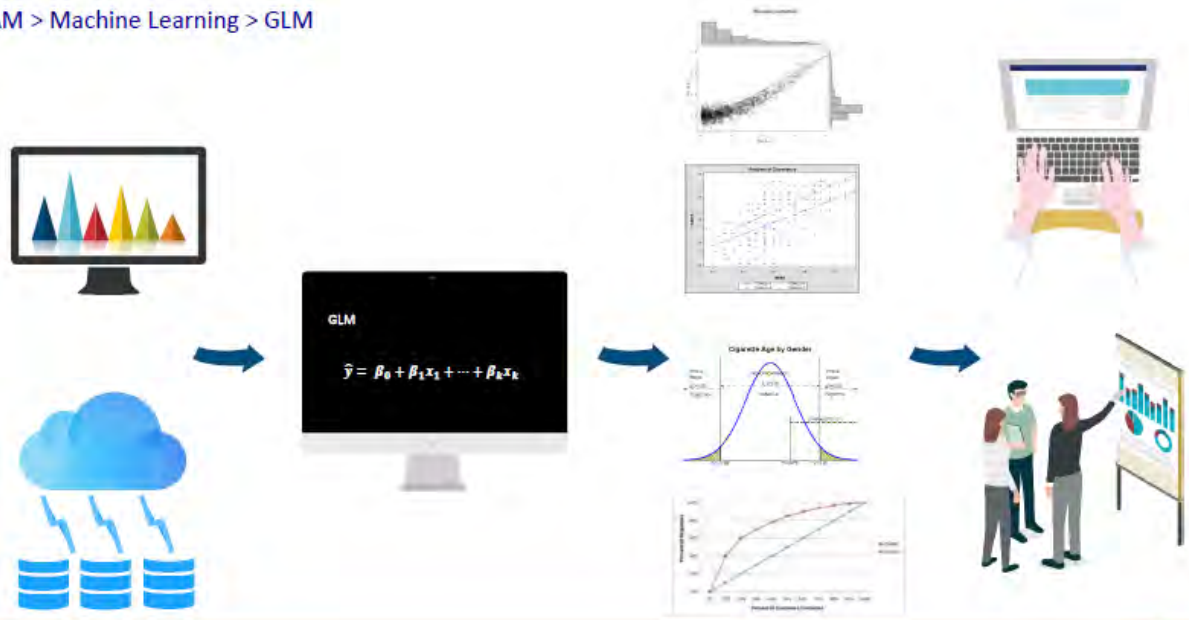
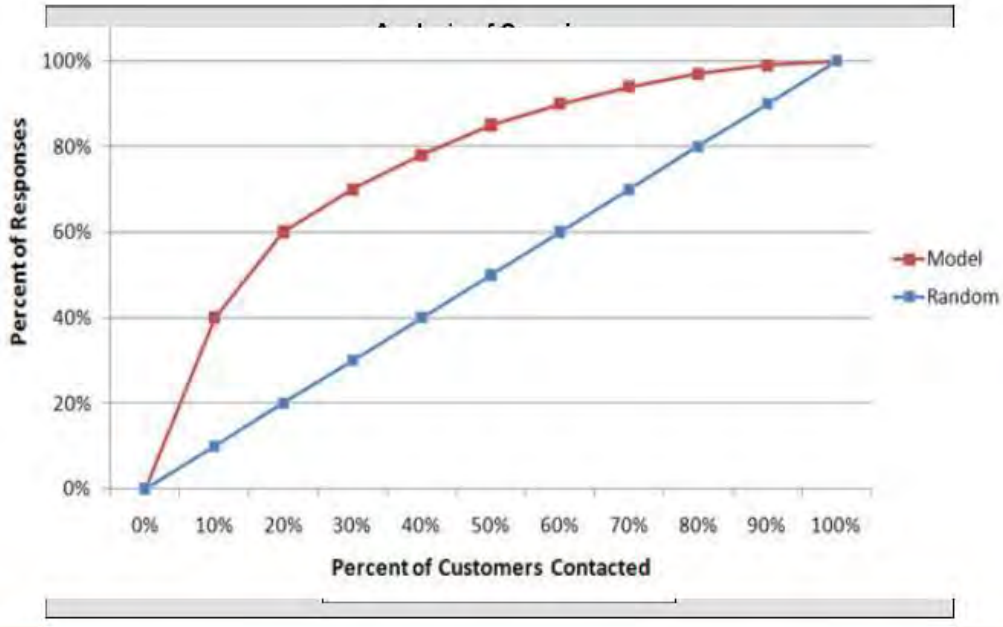
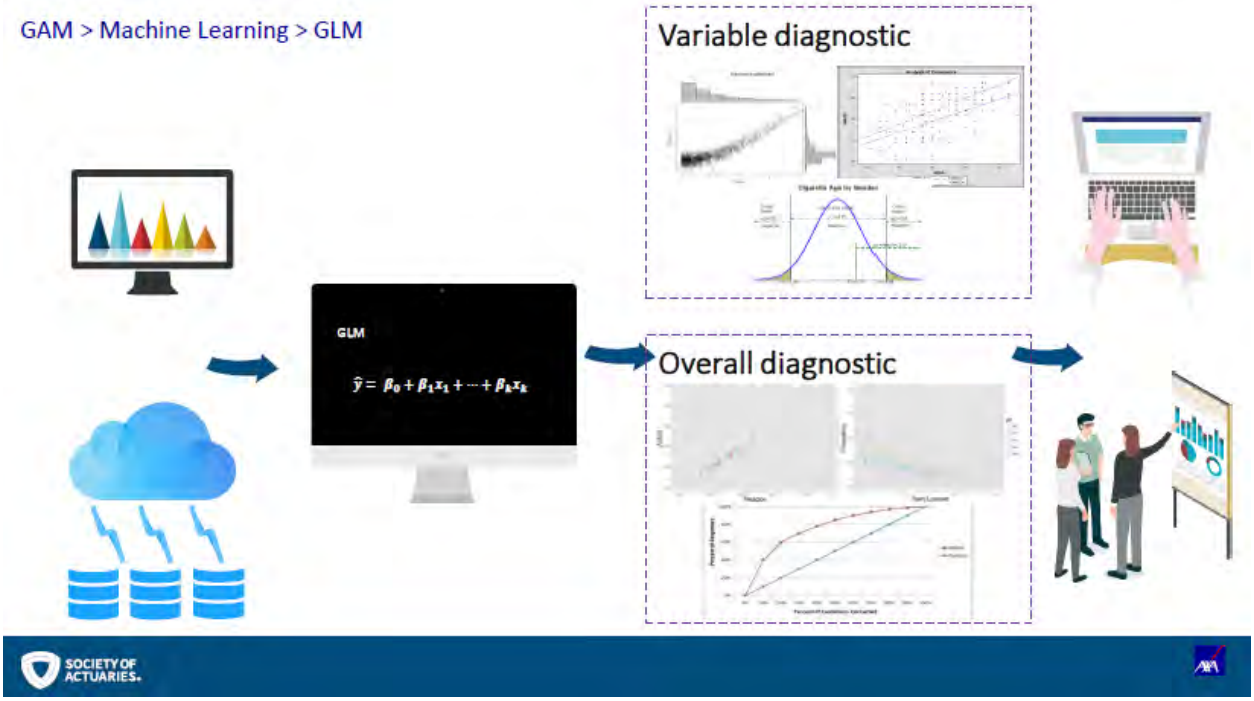
GAM > Machine Learning > GLM






GAM > Machine Learning > GLM
Variable diagnostic
GLM
$\hat{y} = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k$
Overall diagnostic
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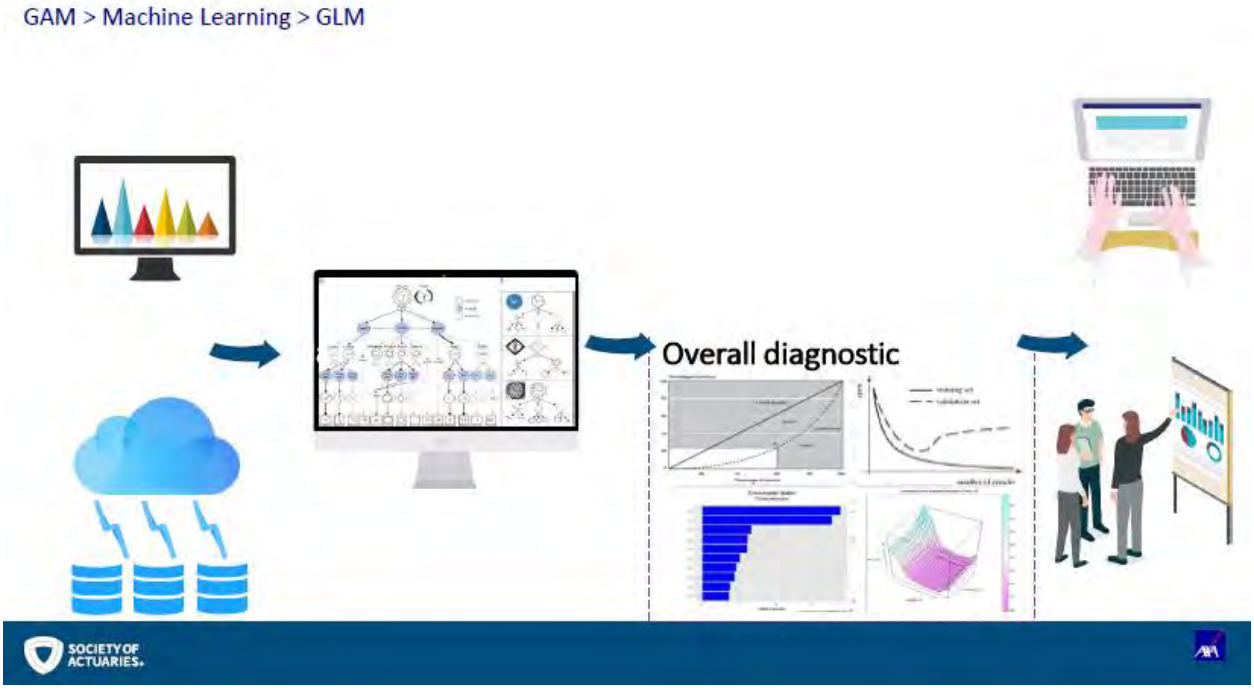
GAM > Machine Learning > GLM
Overall diagnostic
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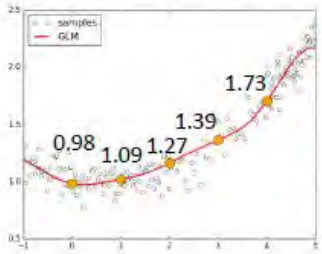
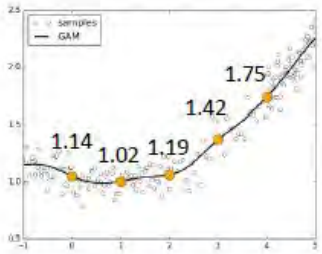
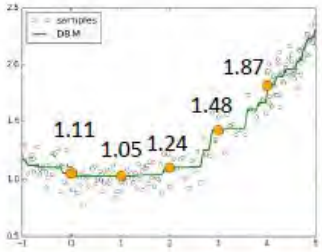
Rate table of GLM vs GAM vs DBM



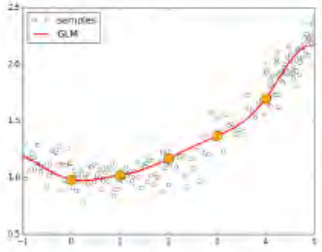


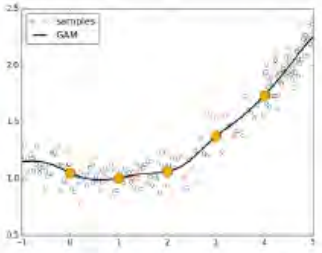


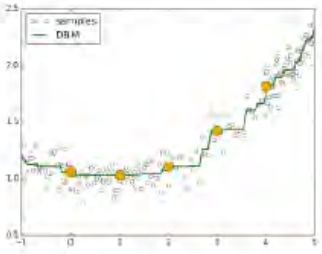
Differential Table for Variable

Level	Differentials		
	GLM	GAM	DBM
0			
1			
2			
3			
4			

Rate table of GLM vs GAM vs DBM







Differential Table for Variable

Level	Differentials		
	GLM	GAM	DBM
0	0.98	1.14	1.11
1	1.09	1.02	1.05
2	1.27	1.19	1.24
3	1.39	1.42	1.48
4	1.73	1.75	1.87

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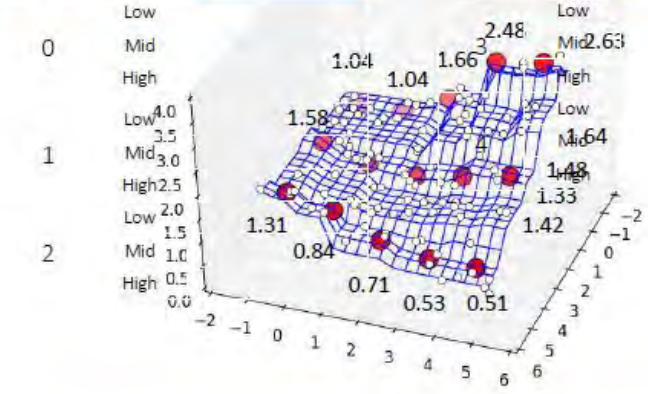
Rate table of GLM vs GAM vs DBM

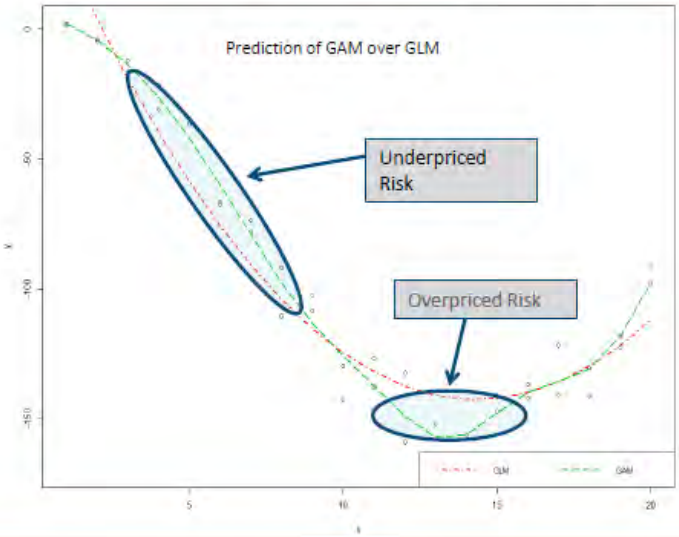
Differential Table for x_1 and x_2

Levels		Differentials
x_1	x_2	
0	Low	1.04
	Mid	1.04
	High	1.66
1	Low	1.58
	Mid	1.31
	High	0.84
2	Low	0.71
	Mid	0.53
	High	0.51

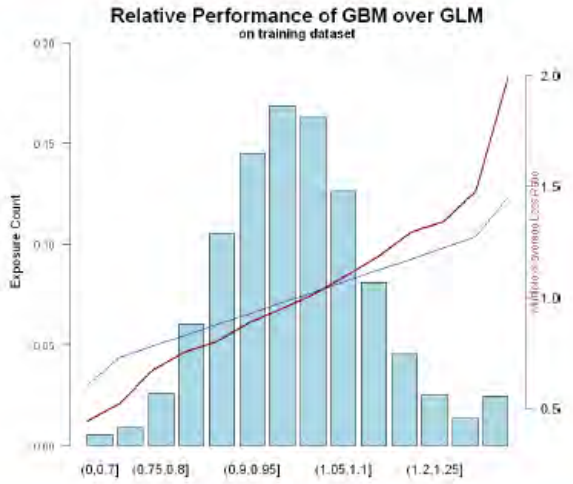
Levels		Differentials
x_1	x_2	
0	Low	2.48
	Mid	2.63
	High	1.64
1	Low	1.48
	Mid	1.33
	High	1.42
2	Low	
	Mid	
	High	



A simple illustration to precise loss cost estimation



Simulation Results – Double Lift Plot



Application of machine learning on risk management

Risk management as a constraint optimization

In reality, rate indication is only a part of rate change. Other considerations include:

- Price change capping to manage renewal and new business composition
- Regulatory concern
- System restriction
- **Risk management**

2 perspectives of risk management applies in rate change:

- Is the rate indication credible? Risk of bias and variance
- Capital allocation on high risk exposure in traditional sense

Insurability of modeling risk is likely to be an interesting topic in reinsurance

AI on insurance application

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OCR concept

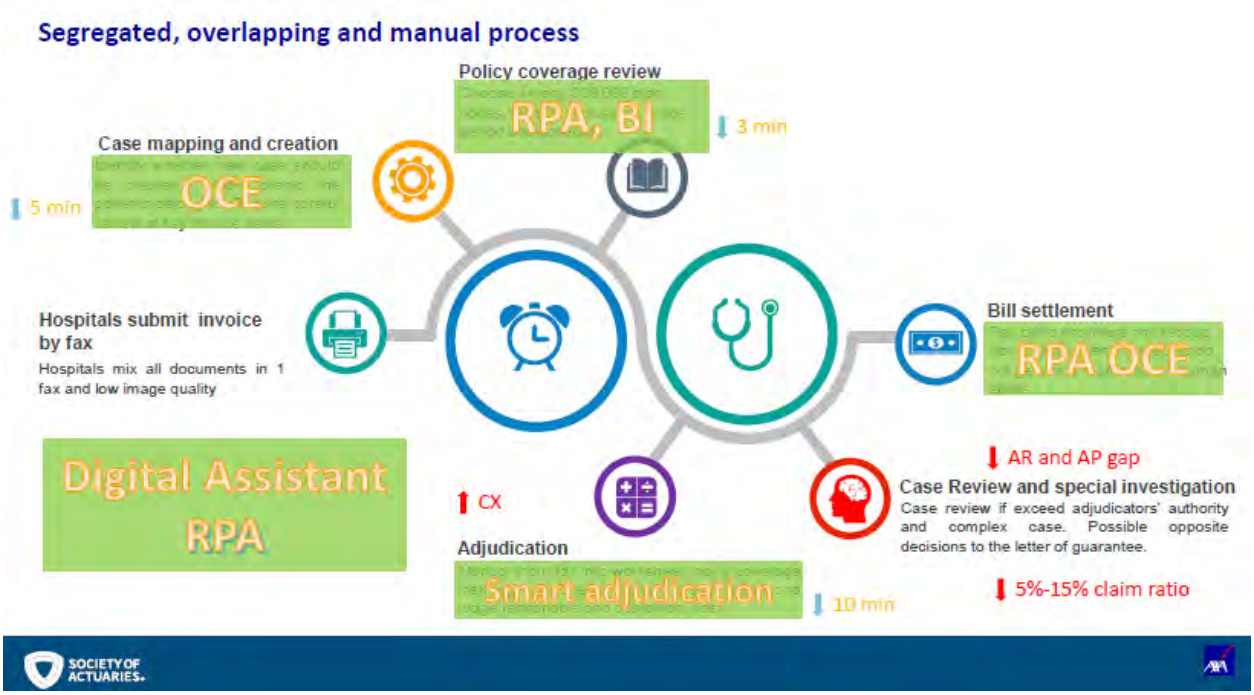
- Hospital/Clinic report
- Health portal
- OCR
- Automatic Founder and Adjustment
- Generated report in 5 mins

Segregated, overlapping and manual process

Core driver on non-scalable operation and claim leakage

Segregated, overlapping and manual process

Core driver on non-scalable operation and claim leakage


Segregated, overlapping and manual process
Policy coverage review
RPA, BI
3 min
Case mapping and creation
OCE
5 min
Hospitals submit invoice by fax
Hospitals mix all documents in 1 fax and low image quality
Digital Assistant RPA
Bill settlement
RPA OCE
AR and AP gap
Case Review and special investigation
Case review if exceed adjudicators' authority and complex case. Possible opposite decisions to the letter of guarantee.
5%-15% claim ratio
CX
Adjudication
Smart adjudication
10 min
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