Automation, Data Science and Actuary-Underwriter Collaboration

Jeremy Achin | Data Scientist & CEO| DataRobot

CAS In-Focus Seminar

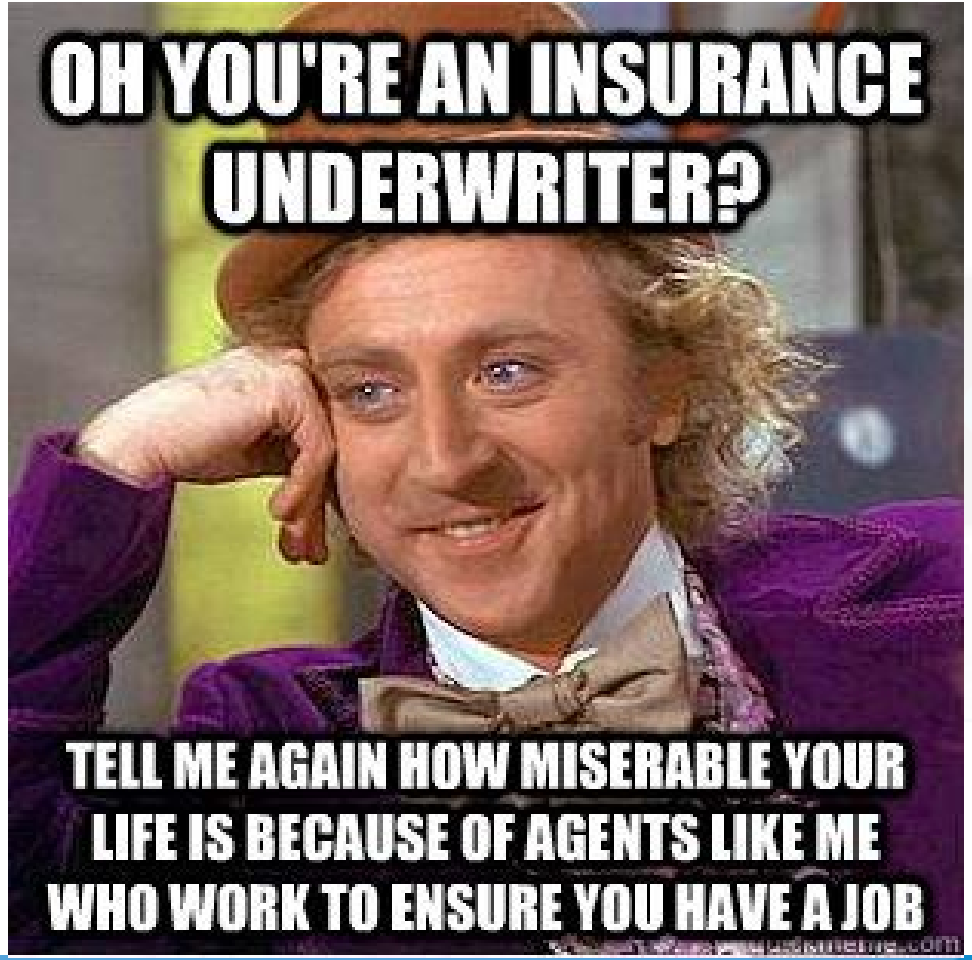
Expanding the Toolset – Underwriting Collaboration

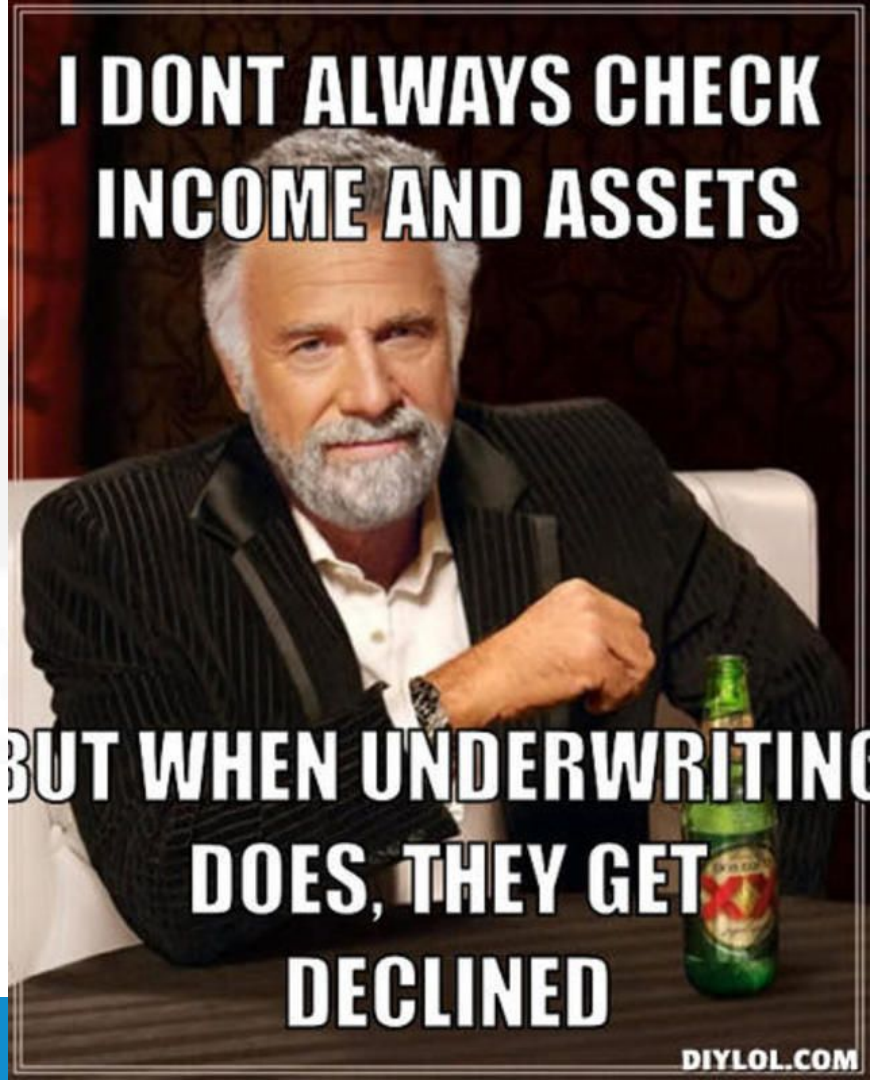
Boston, MA, October 22 – 23, 2015

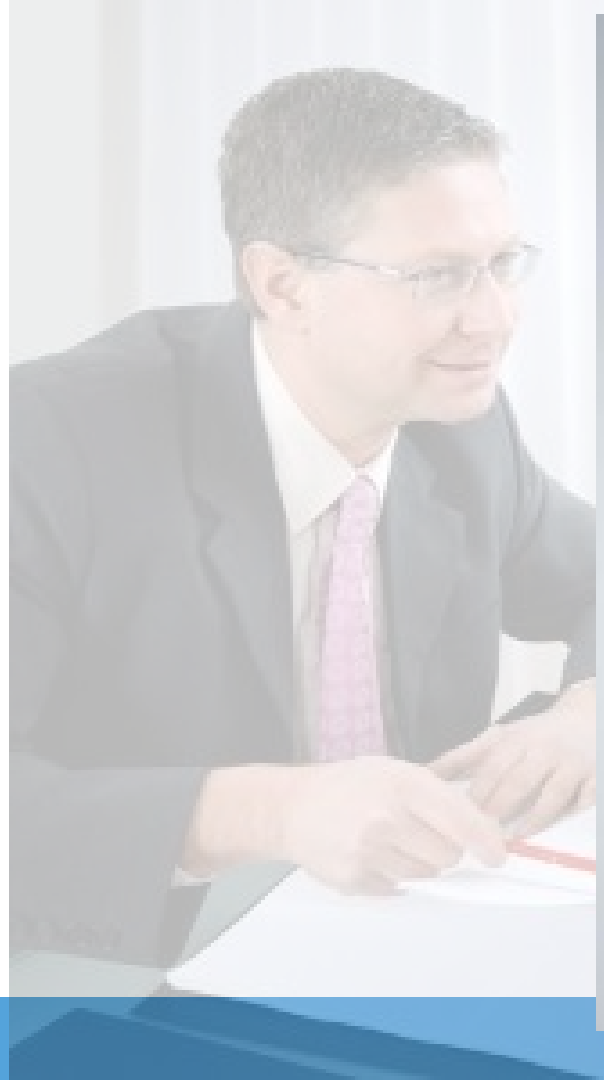
Today's Talk

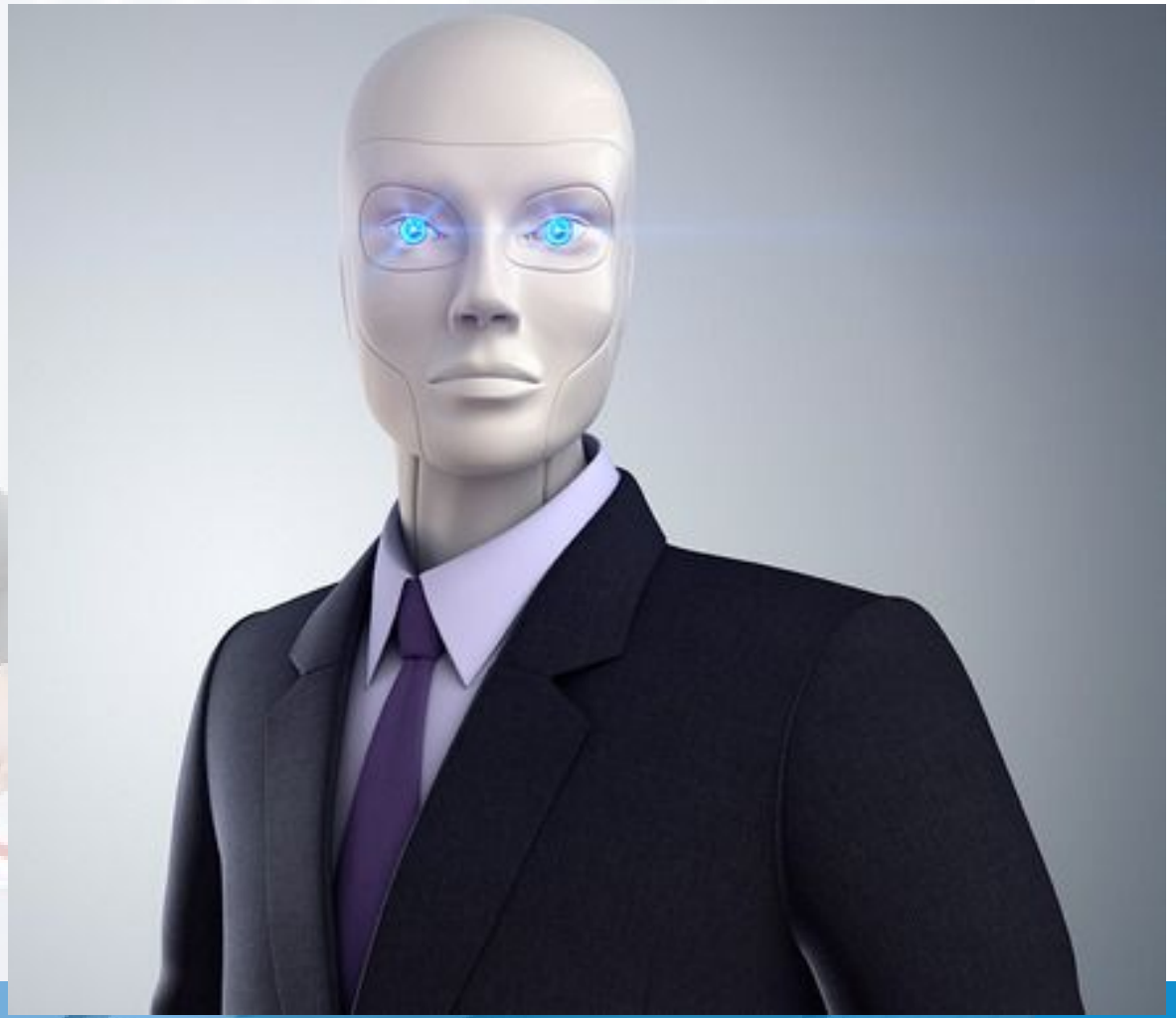
1. The Elephant in the Room
2. Why data science (now)?
3. Data Science Roles for Actuaries and Underwriters
4. Call to Action (Embracing Reality)

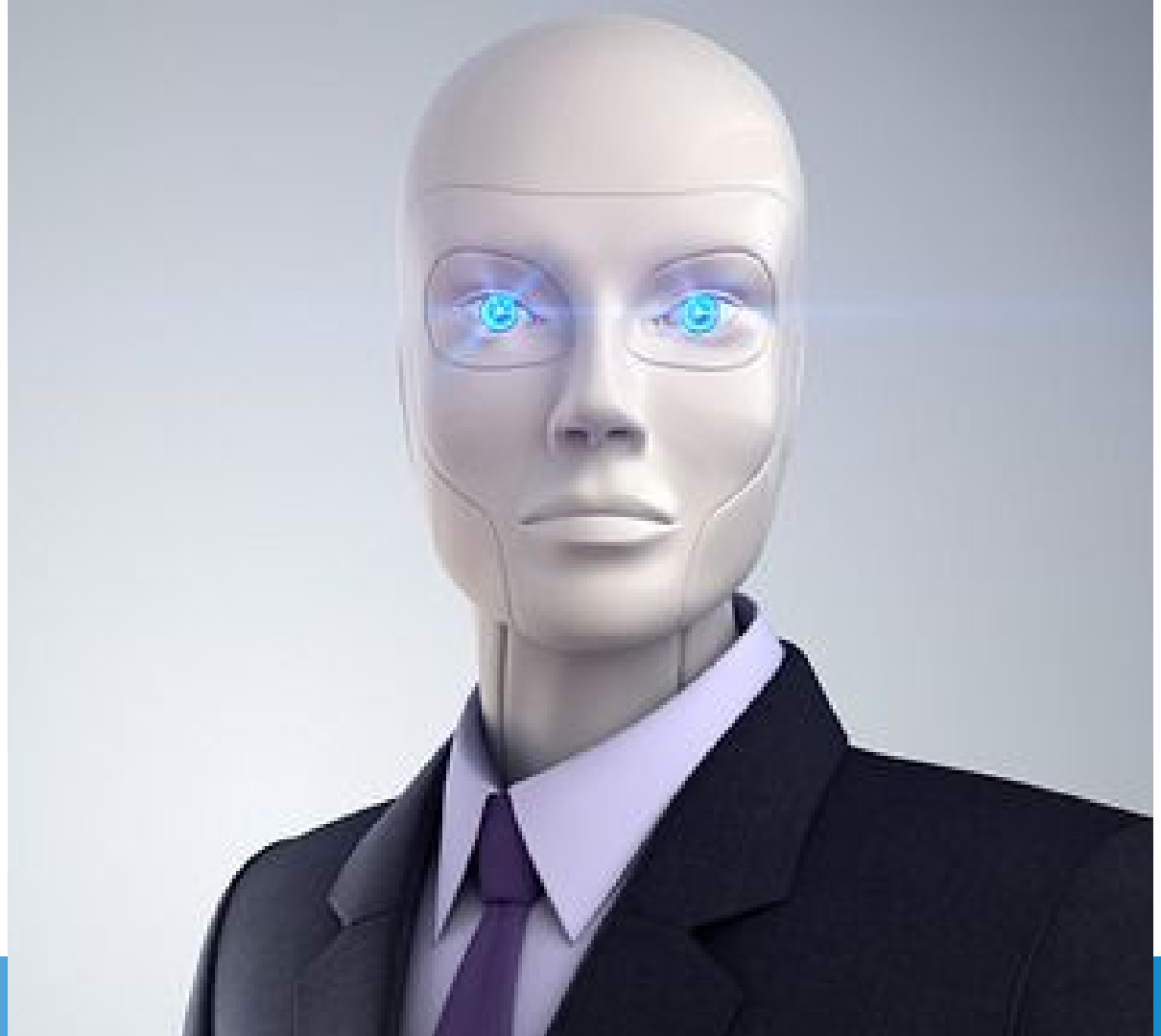
The Elephant in the Room


OH YOU'RE AN INSURANCE UNDERWRITER?
TELL ME AGAIN HOW MISERABLE YOUR LIFE IS BECAUSE OF AGENTS LIKE ME WHO WORK TO ENSURE YOU HAVE A JOB


I DONT ALWAYS CHECK INCOME AND ASSETS
BUT WHEN UNDERWRITING DOES, THEY GET DECLINED
DIYLOL.COM







Inevitability of Automation

The Economist, May 2015

Harvard Business Review, June 2015

Automation has been an integral part of our civilization

ERA ONE 19TH CENTURY

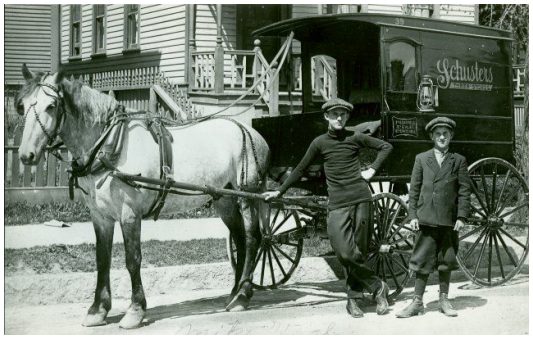
Machines take away the **dirty and dangerous**—industrial equipment, from looms to the cotton gin, relieves humans of onerous manual labor.

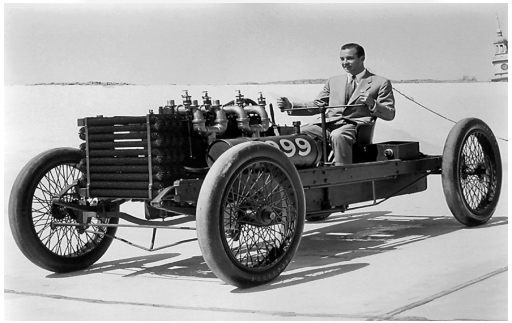
ERA TWO 20TH CENTURY

Machines take away the **dull**—automated interfaces, from airline kiosks to call centers, relieve humans of routine service transactions and clerical chores.

SOURCE THOMAS H. DAVENPORT AND JULIA KIRBY
FROM "BEYOND AUTOMATION," JUNE 2015

Let’s look at the auto industry …





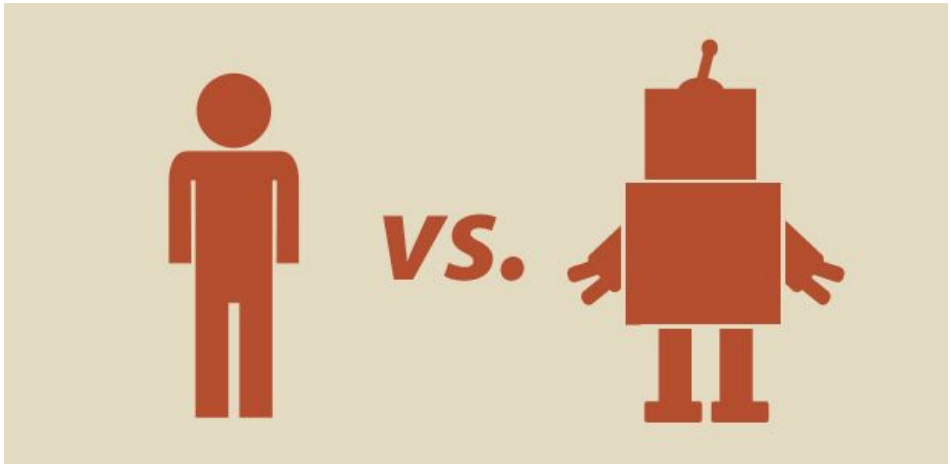
… it is not stopping here: Self-driving Cars

3rd Generation of Automation

Decision making with machines: Intelligent Systems

How may I help you, human?

Here comes automation. What are my options?



OR

HOW YOU ADD VALUE

1 STEP UP	You may be senior management material—you're better at considering the big picture than any computer is.
2 STEP ASIDE	You bring strengths to the table that aren't about purely rational, codifiable cognition.
3 STEP IN	You understand how software makes routine decisions, so you monitor and modify its function and outputs.
4 STEP NARROWLY	You specialize in something for which no computer program has yet been developed (although theoretically it could be).
5 STEP FORWARD	You build the next generation or application of smart machines—perhaps for a vendor of them.

SOURCE THOMAS H. DAVENPORT AND JULIA KIRBY
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Automation in Insurance

Prioritization: How to scan through millions of potential consumers to choose the right few

Inspection: How to select top 10% of your selected risk to manually review / inspect further

Pricing: Equating risk and price, avoiding adverse selection

Identifying fraud: Identifying claimants with highest likelihood of being fraud and review them manually

Estimation of Claims: Better management of claims and cash flow

… Enter Data Science

- Making better decisions
- Making faster decisions

… Why now?

Data is everywhere and data science generates value from data

"Data is an emerging asset class" – World Economic Forum

"90% of the data in the world today has been created in the last two years alone"

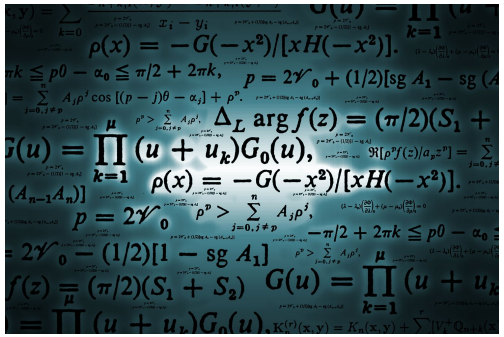
Absolutely insane amounts of computational power

Increasingly inexpensive and smart storage & computational environment

1982 Osborne PC weighs 100 times as much, has 500 times the volume, costs 10 times as much – with 1/100 of processing speed, 1/100000 memory of a typical 2010 smart phone.

Next generation tools, platforms, and approaches to data science

Traditional Approach



- Ivy league approach - only for the chosen ones
- Focused on activities - detached from outcomes
- Assumption based: model selection is based on modeler's understanding of the world?
- Development is costly and limited
- Heavy dependence on programming

Data Science Approach

open source programming

social network of coders

automated solutions

- Common man approach - for everyone
- Focused on business outcome
- Validation based: model selected if it predicts well in real world
- Development is crowd sourced, peer reviewed
- Automated solutions are taking care of programming

Why Data Science is a must for my organization?

- **Information asymmetry: whoever knows it first - wins (“better decisions”)**
  - **Your competitors** are investing heavily on data and data science - that will help them choose and retain the most valuable segment of customers.
  - **Your customers** are becoming more self-aware than ever before - and the most valuable ones will leave you - if not properly valued.
- **Operational efficiency drives profitable growth (“faster decision”)**
  - Data Science helps how you spend your marketing money, targeted underwriting and acquisition, prioritize and triage inspections, manage claims, detect frauds and even manage your workforce.

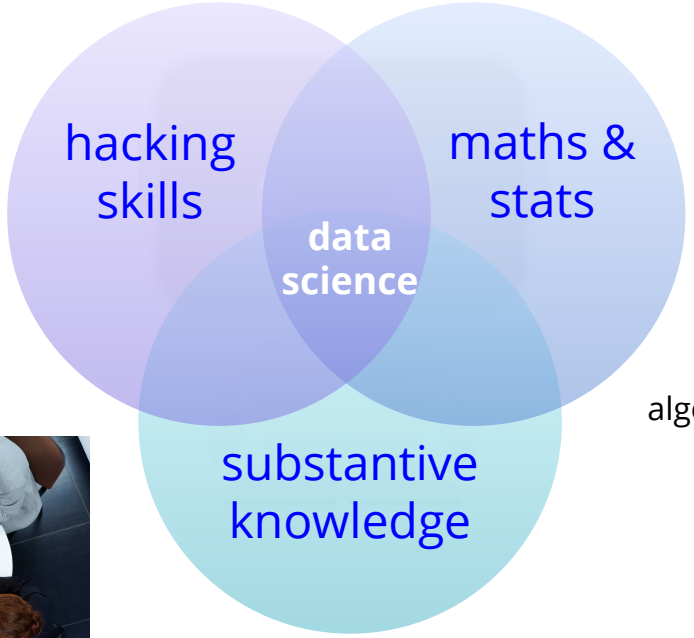
Why Now?

- More Data
- More Computational Power
- Better (more accessible) Tools
- Your competitors are doing it and your customers expect it!

A Guide to Finding Data Scientists for Your Company

Data Scientist Defined

programming & data manipulation

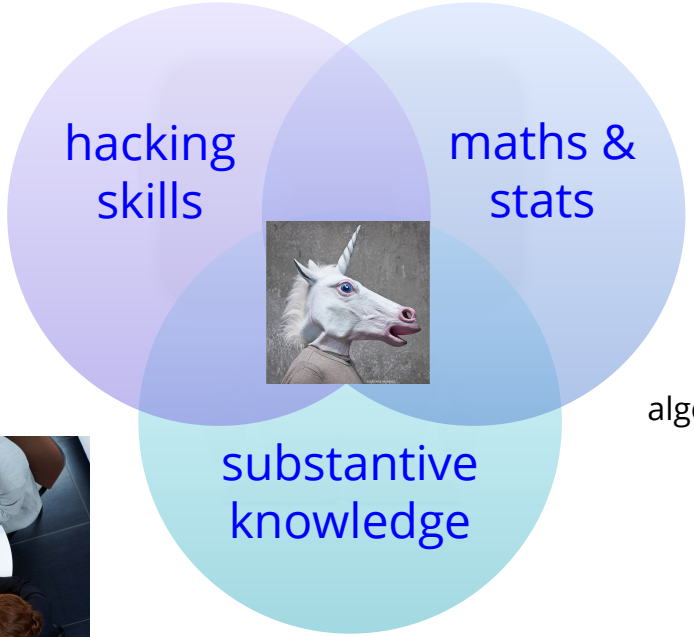


understanding of algorithms and validation framework

business knowledge + company data

Data Scientists are Rare

programming & data manipulation



understanding of algorithms and validation framework

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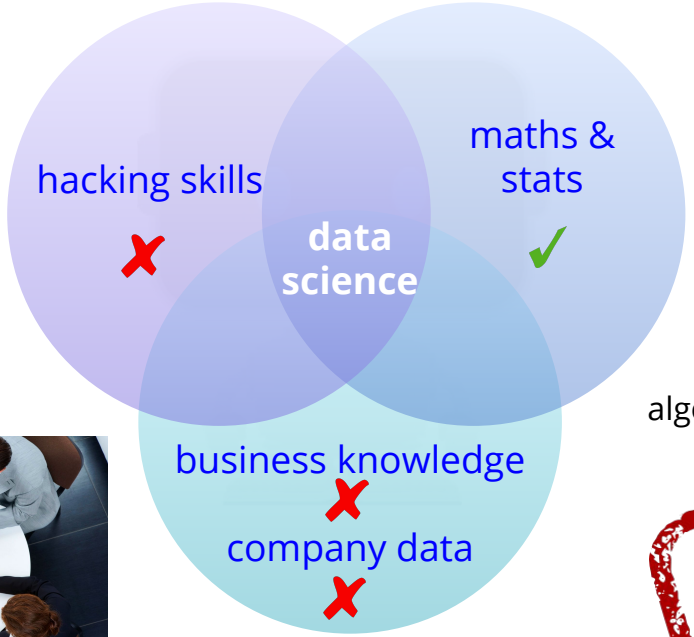
“Unicorns are Lame” *-quote by: nobody ever.*

Hiring Real Unicorns is Expensive! $$$$$$$$$$$

Also, Many People Pretending to be Unicorns.

Can traditional *statisticians* take this role?

programming & data manipulation



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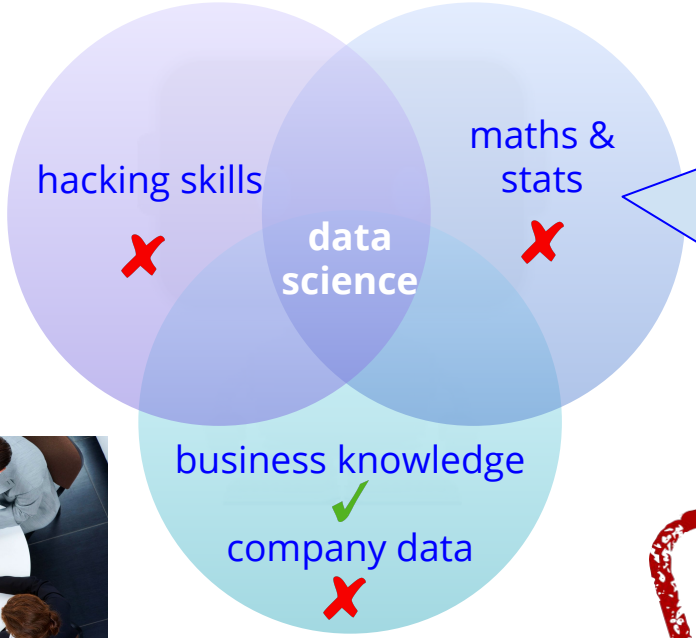
MEDIUM POTENTIAL

Can *MBA / business graduates* take this role?

programming & data manipulation

business knowledge + company data

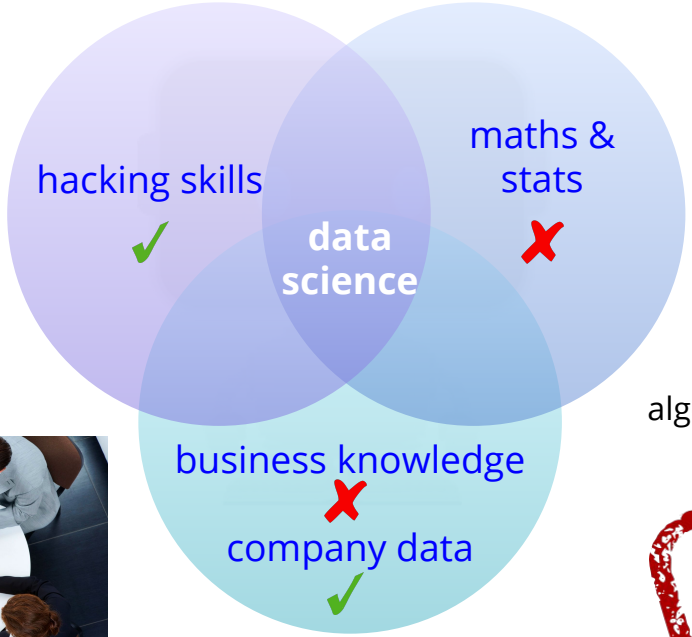


95% of all MBA's think they have above average Math and Stats skills among their peers.

MEDIUM POTENTIAL

Can *IT data specialist* take this role?

programming & data manipulation



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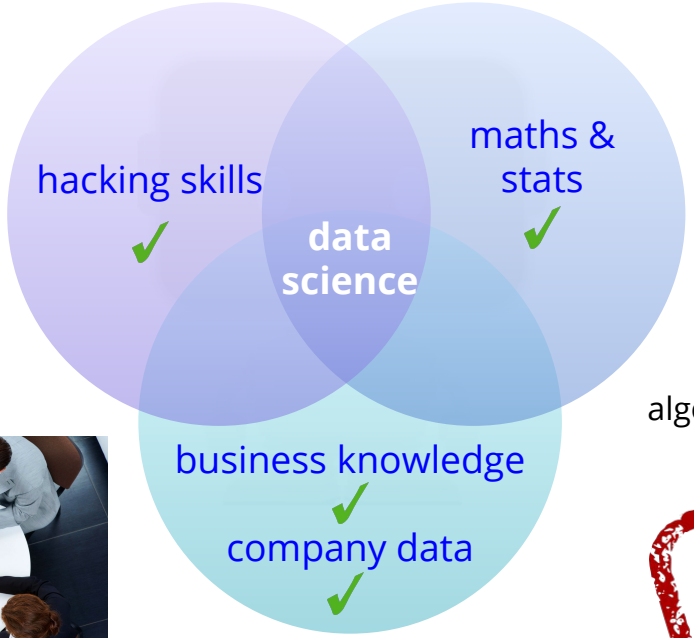
MEDIUM POTENTIAL

Can *a team of statistician + MBA + IT data specialist pull it off?*

programming & data manipulation



understanding of algorithms and validation framework

business knowledge + company data

HIGH POTENTIAL

Can *a team of statistician + MBA + IT data specialist* pull it off?

Orchestration is difficult …

… and it may turn out like this.

LOW POTENTIAL

Clearly difficult to find data scientists.

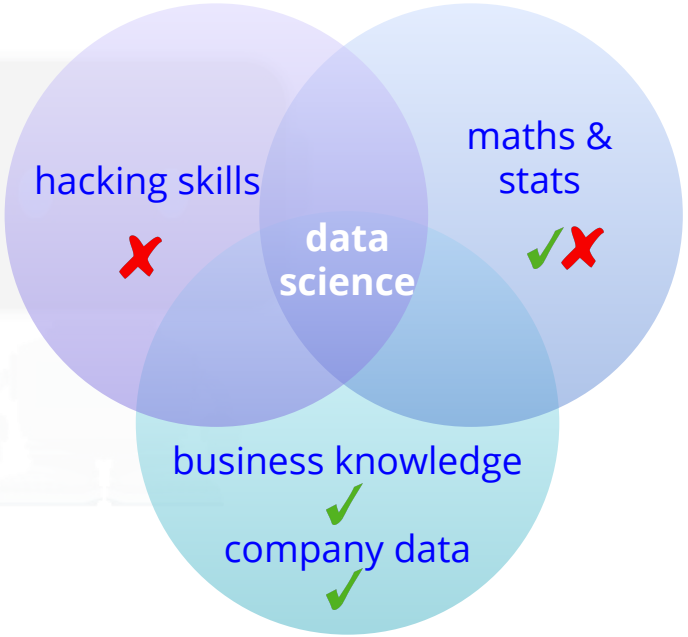
Is there hope?

Quiz: What profession has the following traits?

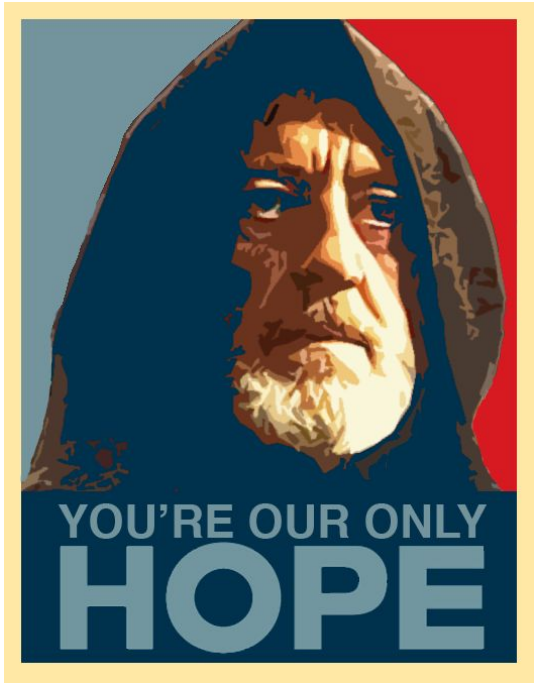
1. Math and Stats Background

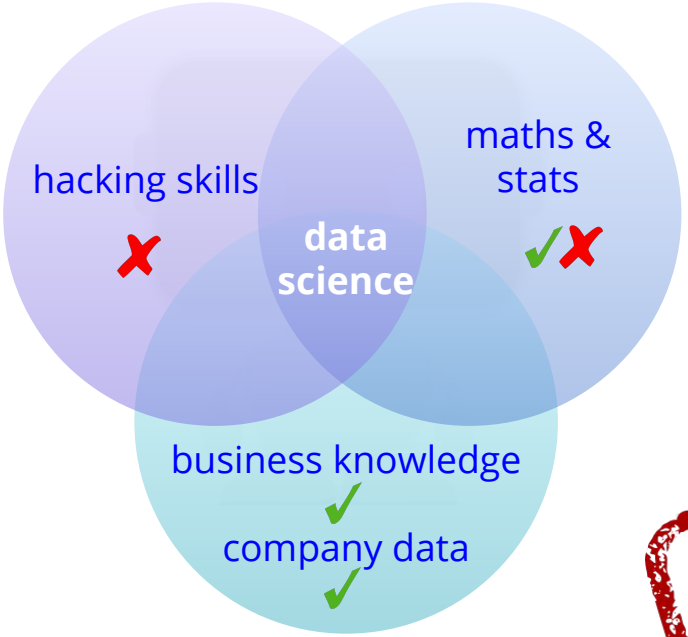
2. Deep Understanding of the Business

3. Familiar with Company Data



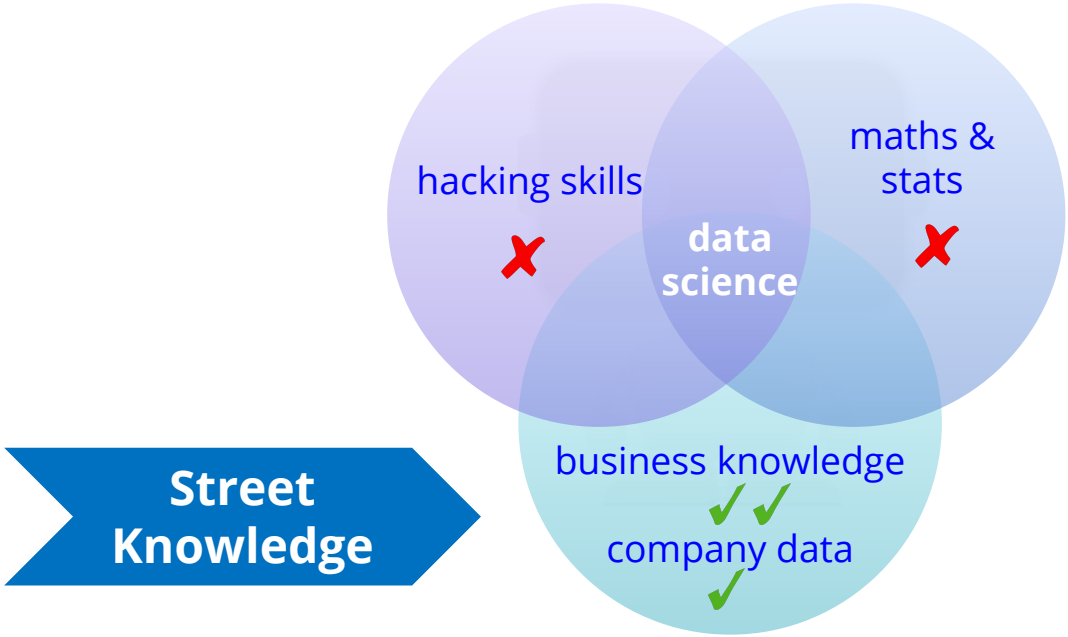
Actuaries!





High
POTENTIAL

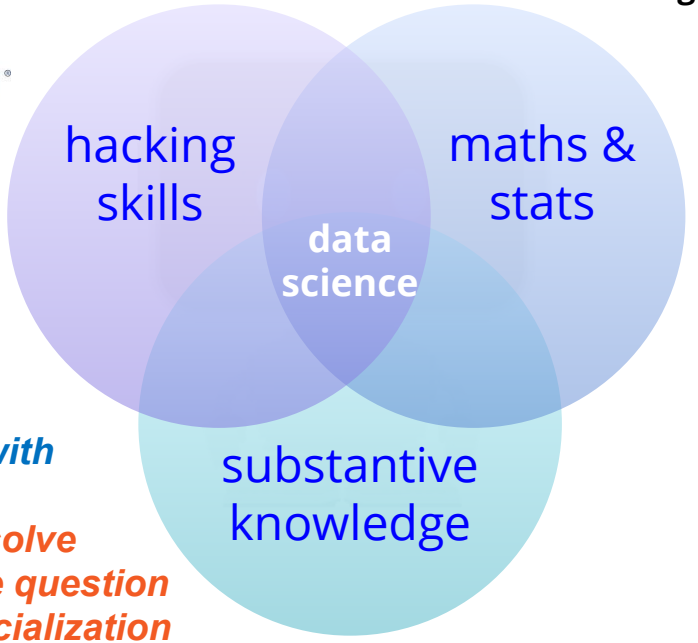
… What about **Underwriters?**



Modern Tools and Collaboration Fill in The Gaps

programming & data manipulation

let machines do the coding...



business knowledge
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- off-the-shelf algorithms from open source.
- working knowledge is sufficient.

Actuaries collaborate with Underwriters:

- ***Right question to solve***
- ***Right data to answer the question***
- ***Experimentation and socialization***

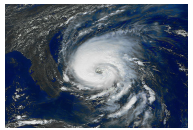
How actuaries and underwriters can collaborate to maximize the value of data science and automation?

Insurance product spectrum: Big-data to No-data problem

emerging risk:
no data, cold start

large risk:
small, highly heterogeneous data

commercial underwriting:
statistical benchmark, anchoring → UW adjustments



property (home) insurance:
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personal auto:
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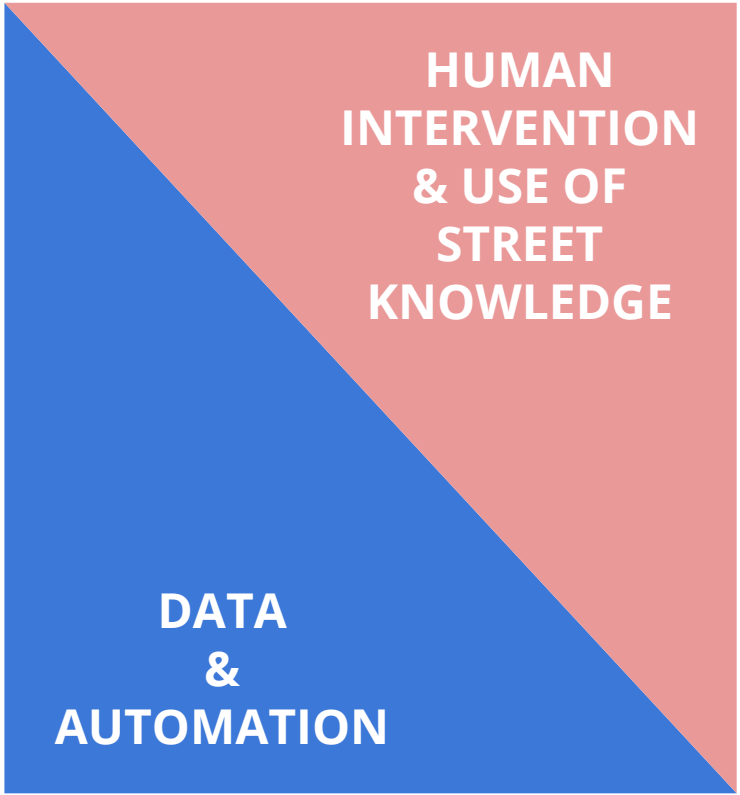
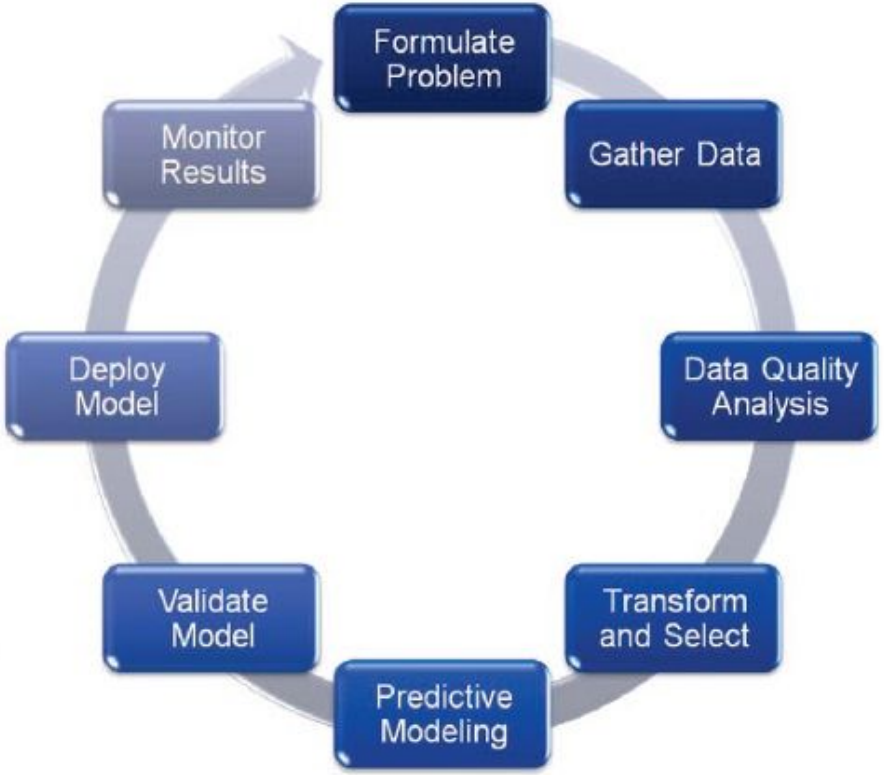


Why collaboration is essential?

- No-data problem
- Large-data problem
- Street knowledge augments statistical models

Underwriters are essential for a successful data science project



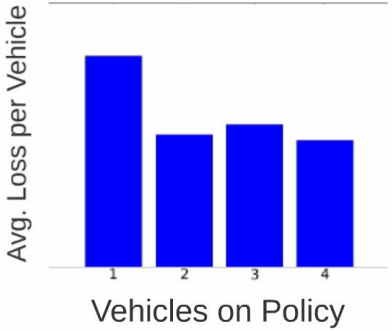
Real Life Example

Single Car Policy

vs.

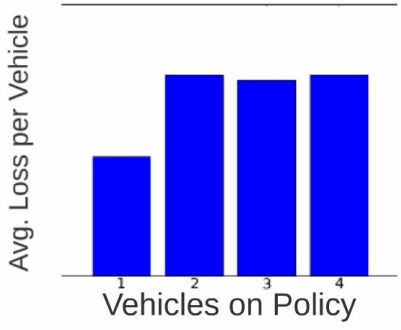
Mulit-Car Policy

What we expect



Prior Knowledge and intuition tells us that single car policies are more risky than multi-car policies

What data says



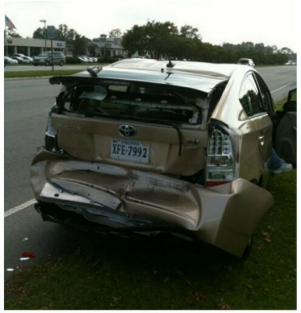
...but data tells a different story

Real world example cont...

Original Cars on Policy = 1

vs

Cars on Policy = 2

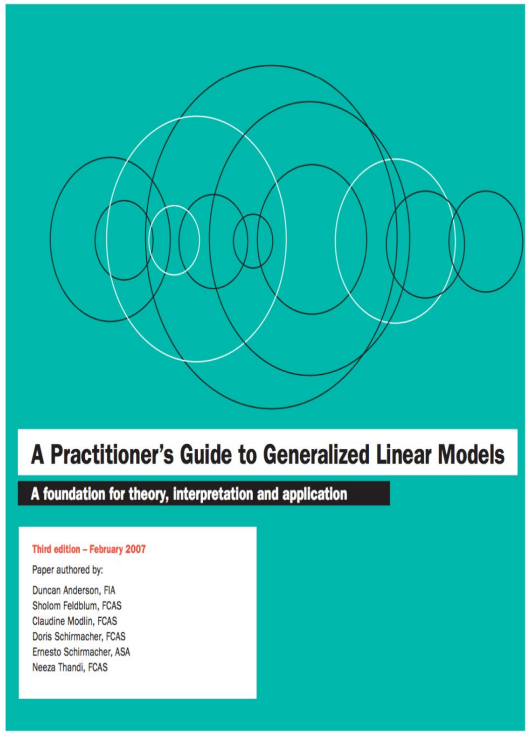


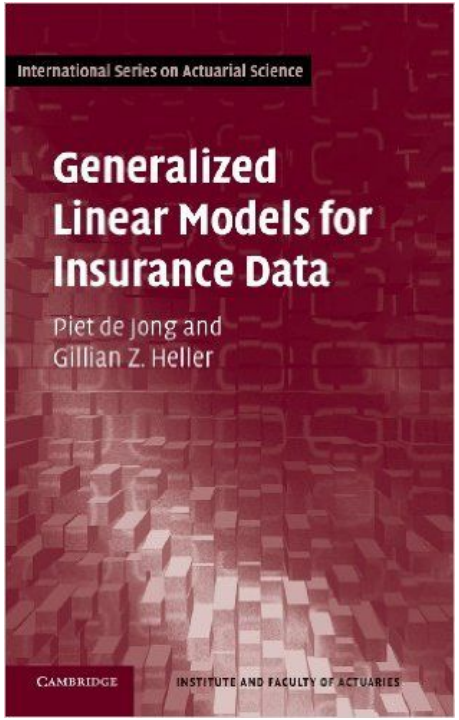
How do we learn data science and drive automation?

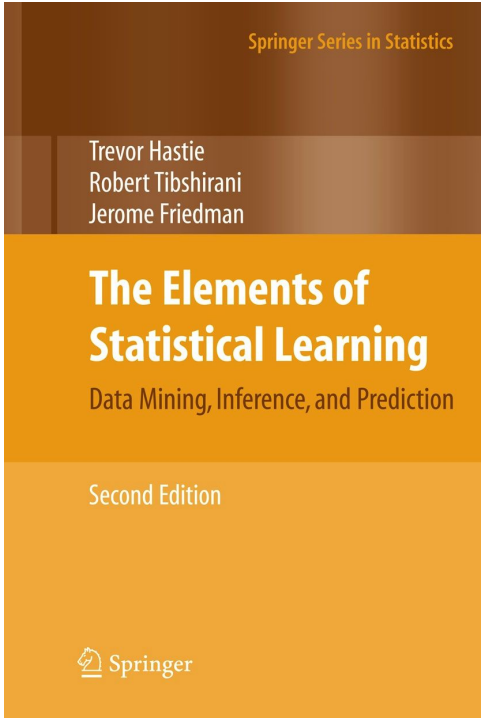
Where should you focus?

Activity	Tool/ Platform/ Source	Learning Focus
Data manipulation & General programming	R, python, tamr, Paxata	- data manipulation - key statistical packages - key visualization packages
Visualizations	Qlik, tableau	- visualize data by drag & drop - productize your solution
Automated Modeling, Machine Learning	rapidminer, sas, DataRobot	- defining the right question - interpreting results - running experiments using the automated platform

There is still value in gaining a deeper understanding. Great resources for learning about data science:







Learning data science: useful hands on courses (there are many more out there!)

Machine Learning by Andrew Ng (Coursera):
https://www.coursera.org/learn/machine-learning

python

https://www.udacity.com/course/intro-to-computer-science--cs101

R {swirl}

https://www.coursera.org/course/rprog

Takeaways

Call to Action: Take the Unicorn by the Horn

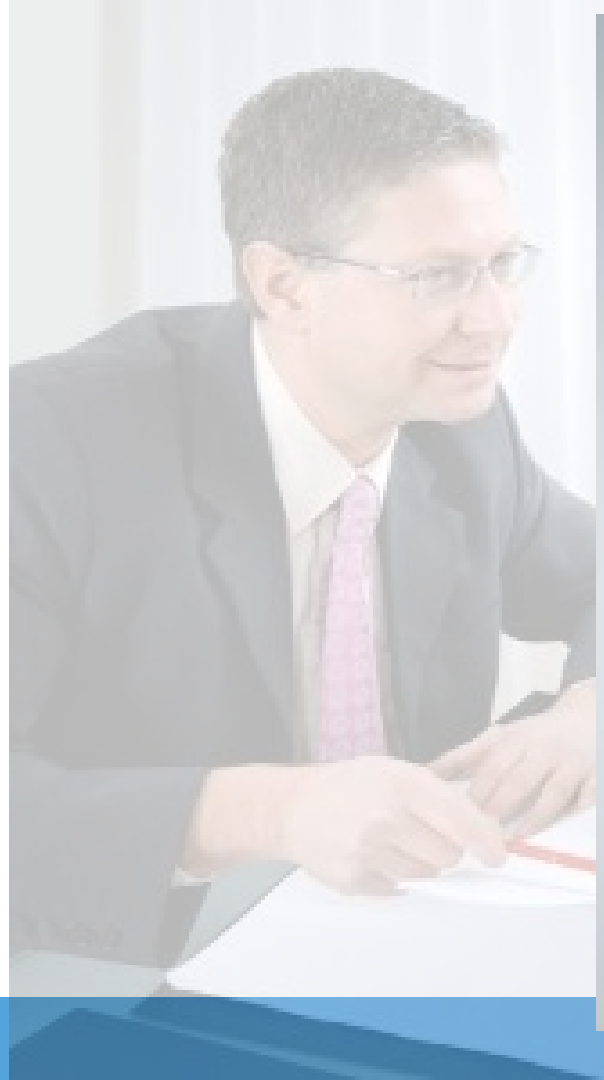
Who	*Takeaways*
Actuarial Students and junior Underwriters	- learn data science skills. Learning by doing is best. - take active part in the learning community
Managers	- learn enough data science to manage actuarial data scientists - encourage actuarial students and junior UWs to learn basic data science
Exam Committee (CAS, CPCU)	- include data science learning objectives in exam curriculum - encourage hands-on learning

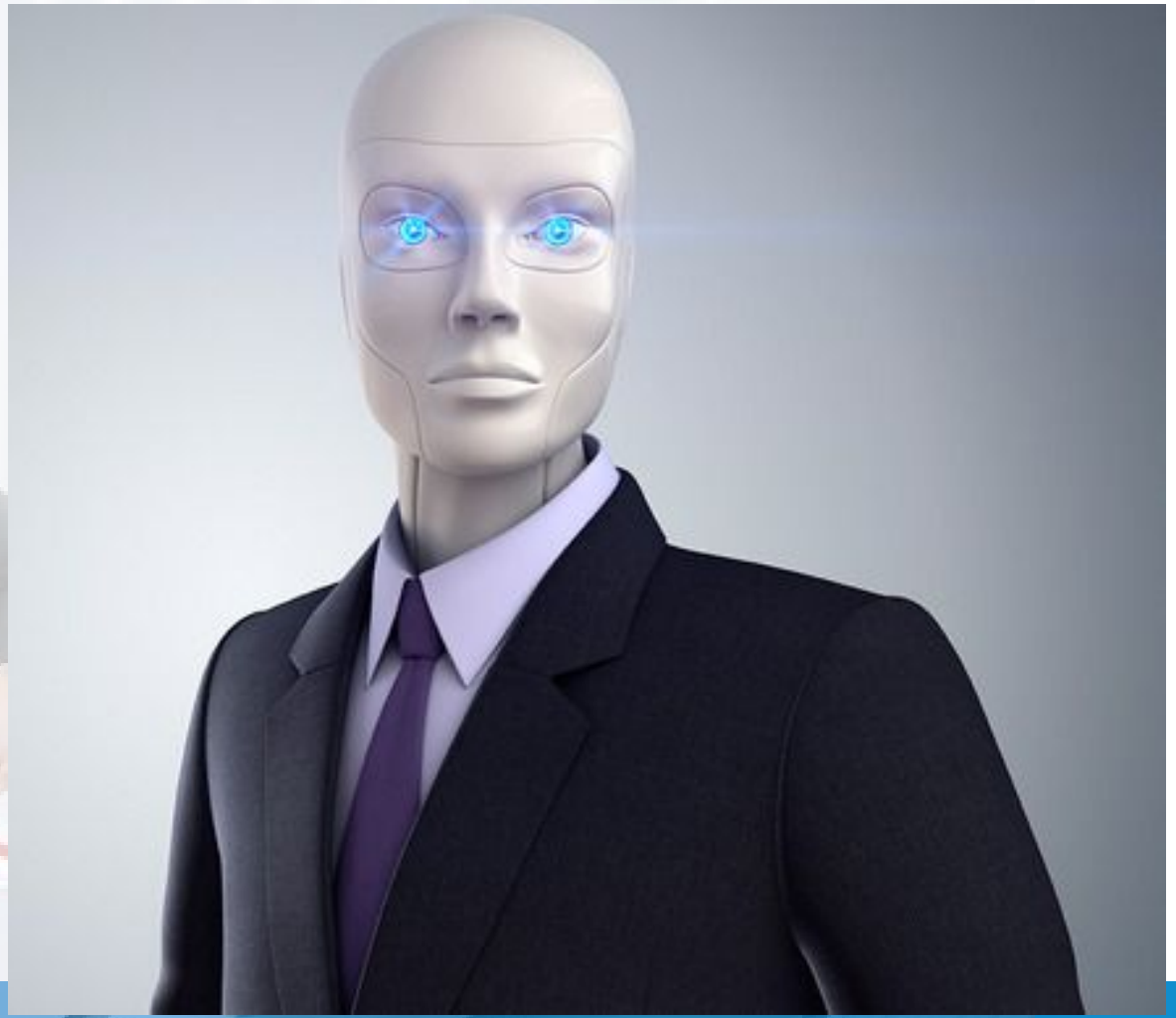
Suggestions

Actuaries should spend few months as an underwriter!

Underwriters should develop some basic data science skill sets and capabilities for using data science tools!

Embrace Reality





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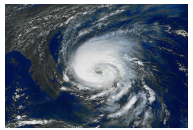

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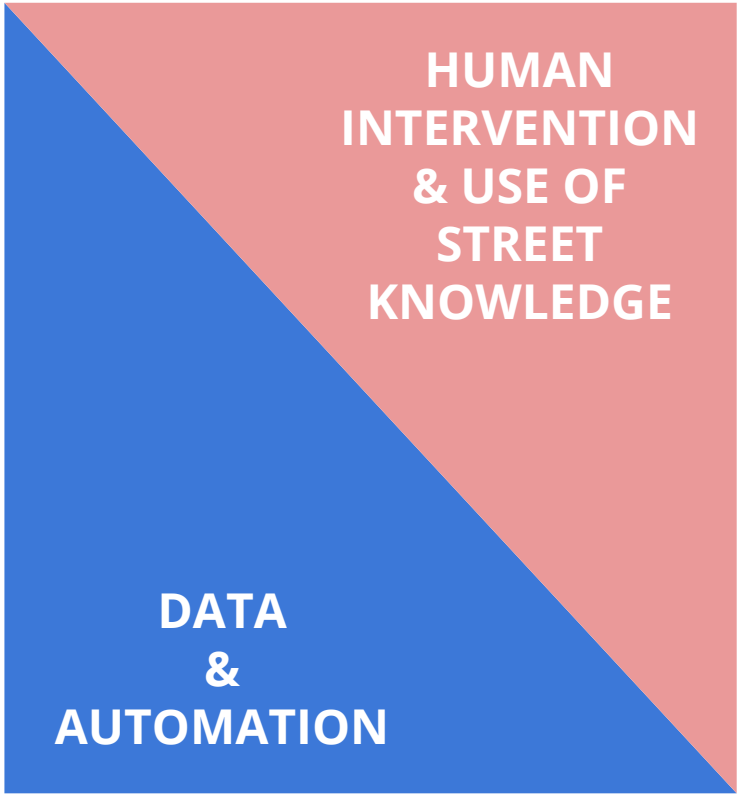
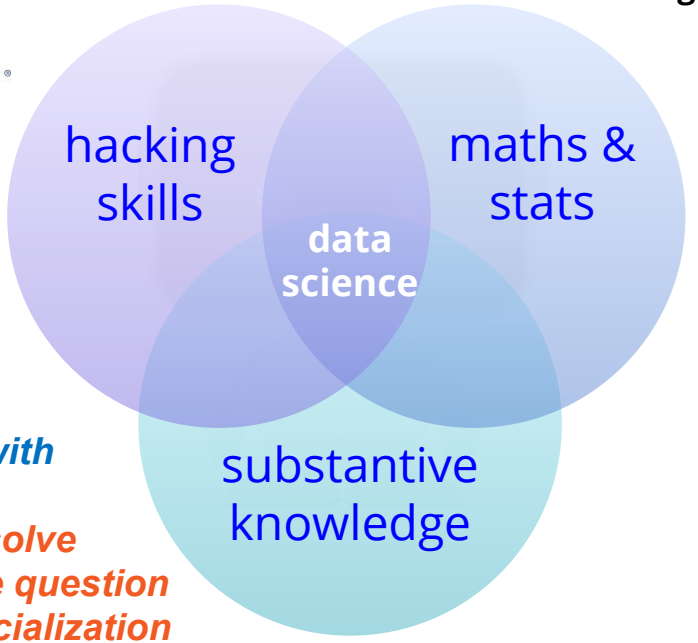


With Modern Tools, Data Science isn't that Hard

programming & data manipulation

let machines do the coding...



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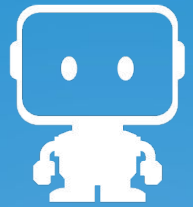
But don't forget the street knowledge!!!!!!



DataRobot

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