



Using Hadoop to Detect Fraud, Waste and Abuse in Healthcare Claims

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Background

- Chief Scientist, Payment Integrity, Optum
 - Responsible for identifying pre-payment FWA in Commercial, Medicare / Medicaid claims
- Sr. Fellow, Optum Labs, Cambridge
 - Experimented with machine learning applied to computer-aided medicine
- Other experience
 - Building fraud models, mostly around financial services...



Impediments to Health Care Analytics



Labeling claims reliably as frauds to leverage supervised methods



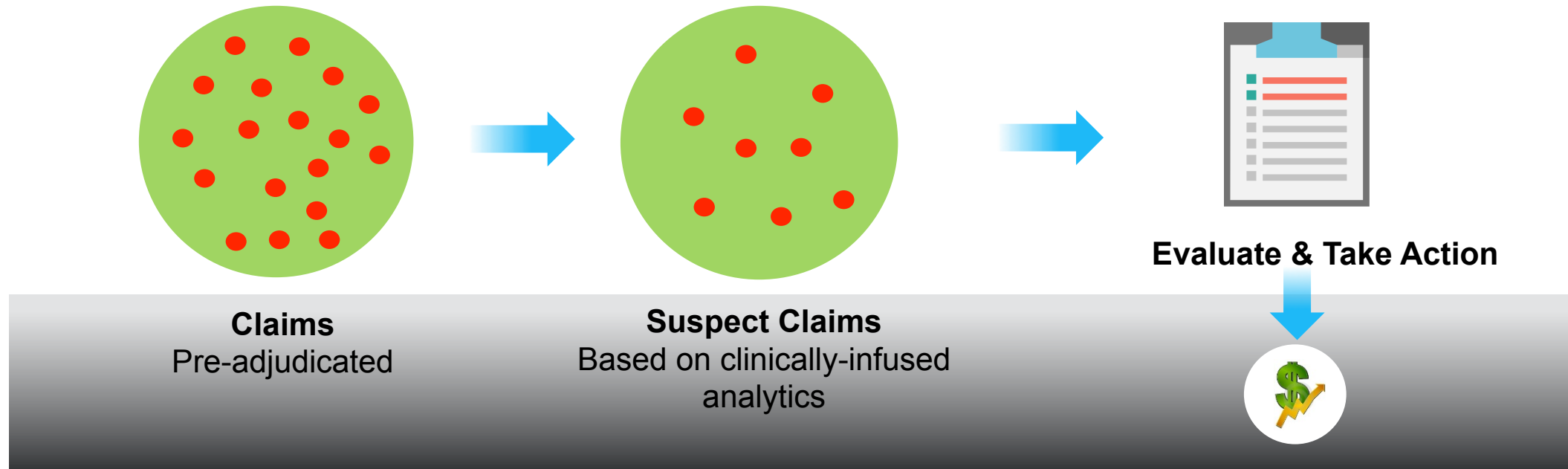
Accounting for complicated clinical treatment patterns in detection methods



Finding the balance between savings and network abrasion

Pre-Payment Workflow

constraint #1: time to make payment decision is fixed

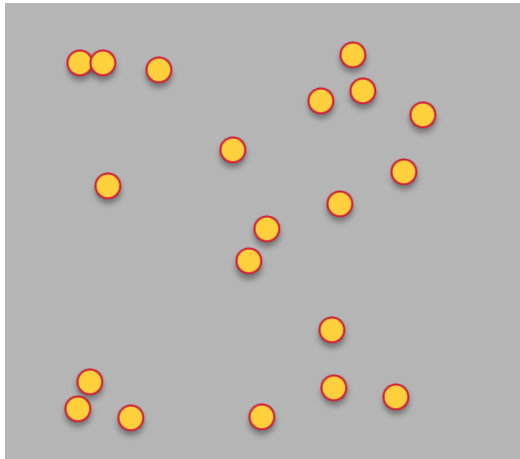


constraint #2: number of denied claims is limited by network disruption, operations



Rules vs. Models -> Optimization

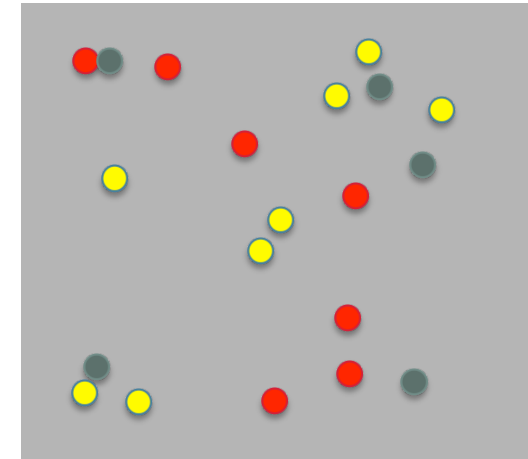
RULES



A rule treats all claims with equal suspicion, which yields a “bag of claims”

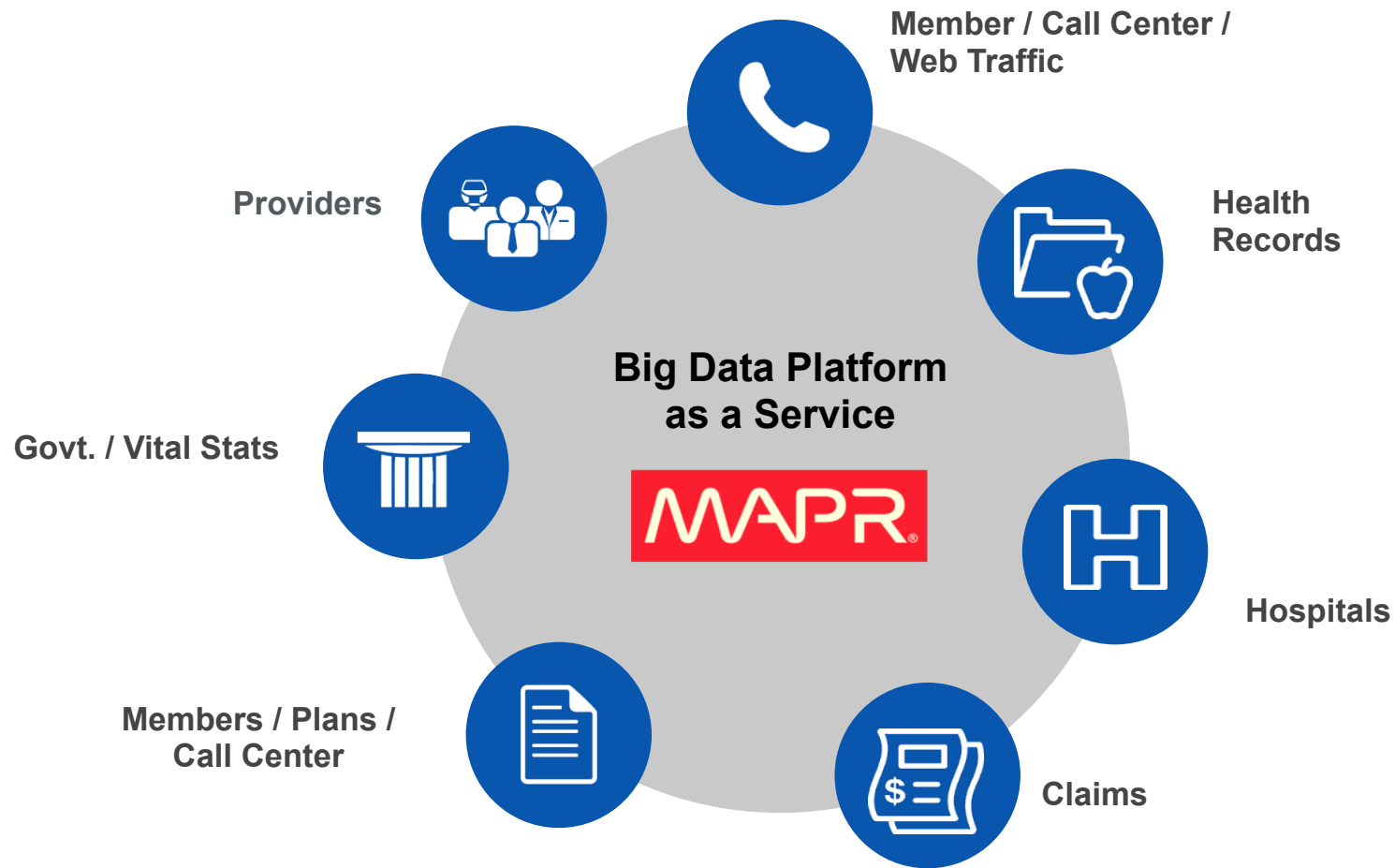
“Given a limit of **N** claims, which **N** should we choose?”

MODEL



Scoring models yield continuous output, which can be used to maximize return

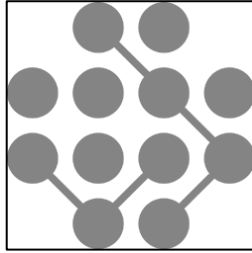
Hadoop Data Lake



Integration of multiple data silos across business units into central location



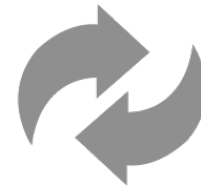
FWA Analytics in a Data Lake



Pursue innovation: Evaluate and Exploit game-changing technologies

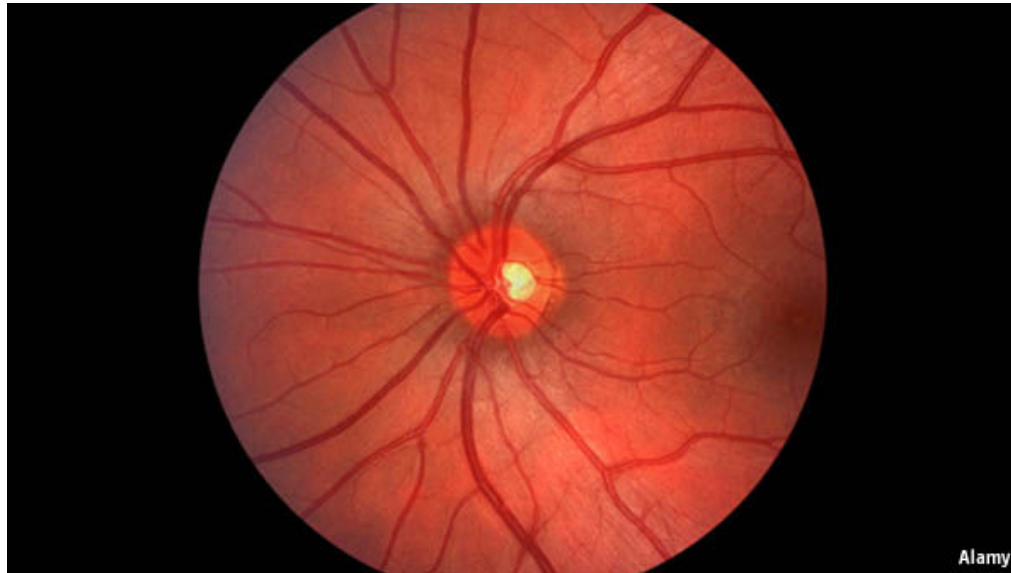


Develop and operate **multiple predictive models**



Faster insight extraction—scientist has direct access to new data sources of varying structure

Example: Exploiting Unstructured Data



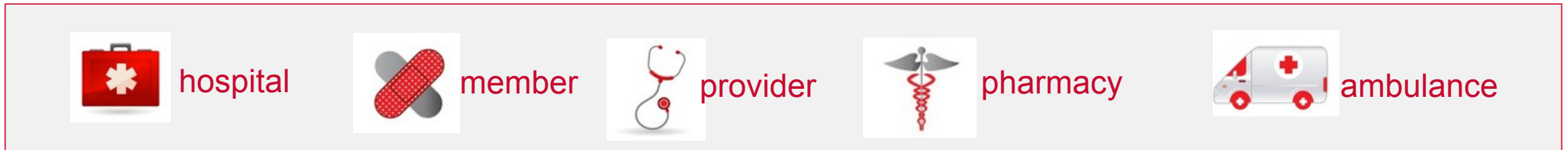
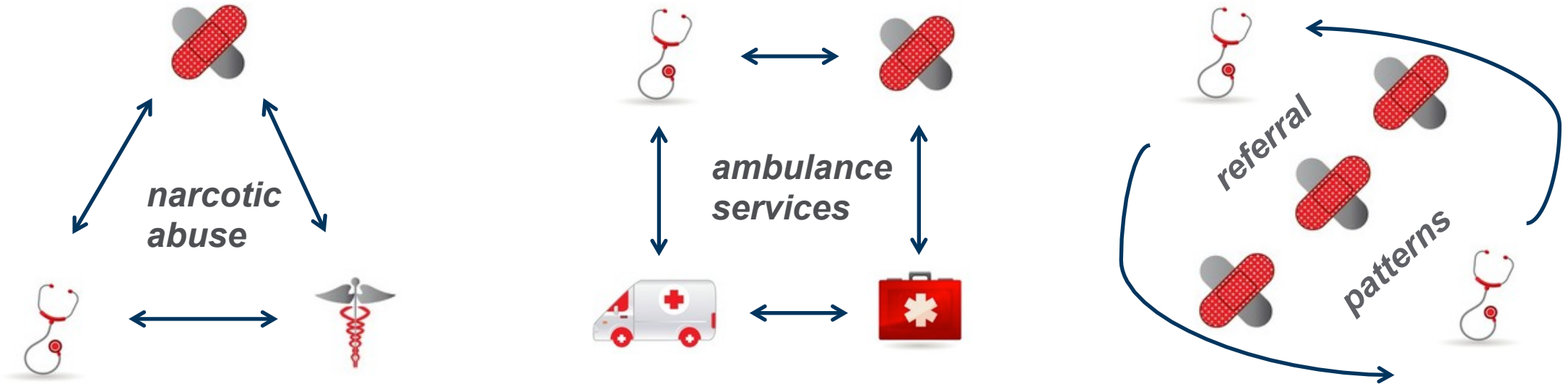
Diabetic Retinopathy:

- Challenging to diagnose from image (84% consensus)
- Crowd-sourced to Kaggle
- Deep-learning and convolutional NN used to classify image data
- Winning model showed 85% accuracy rate

<http://www.economist.com/news/science-and-technology/21664943-computers-can-recognise-complication-diabetes-can-lead-blindness-now> - Sep 19, 2015



Example: Exploiting Graphs



Final Thoughts

- From Healthcare Customer:
 - \$22:1 return on investment in Hadoop from FWA alone
 - FWA success leads to extended influence (clinical outcomes)
- Getting started
 - Finding a promising use case with tangible value
 - Case optimization
 - New Data sources
 - New Methods – deep learning, graph, etc.
 - Build additional use cases on success



Q&A

Engage with us!

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