

Artificial Intelligence in Health Care

Reducing Administrative Burden

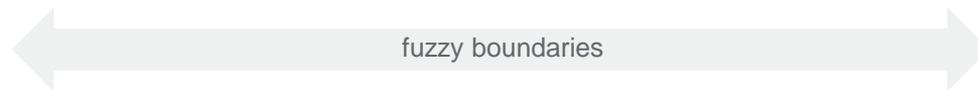
Paul Bleicher, MD, PhD, CEO

November 30, 2017



Types of Machine Learning and AI

A range of solutions developed over decades



Rules-based Decision Making



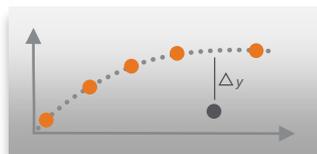
activity 2

Boolean Data
(yes or no)

Health care examples:

- Grouping claims into episodes of care
- Identifying gaps in care
- Identifying fraud

Statistical Reasoning



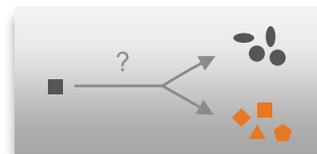
simple regression

Numerical Data
allowing for curve fitting

Health care examples:

- Estimating costs to serve a population
- Predicting medical spending for members

Machine Learning



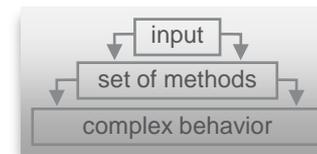
classification tasks

Arbitrary Data
that needs to be abstracted
into numbers

Health care examples:

- Identifying patients at risk for readmission
- Identifying patients who are at risk for using the ED inappropriately
- Determining prior authorization for medications

Artificial Intelligence



dynamic adaptation to novelty

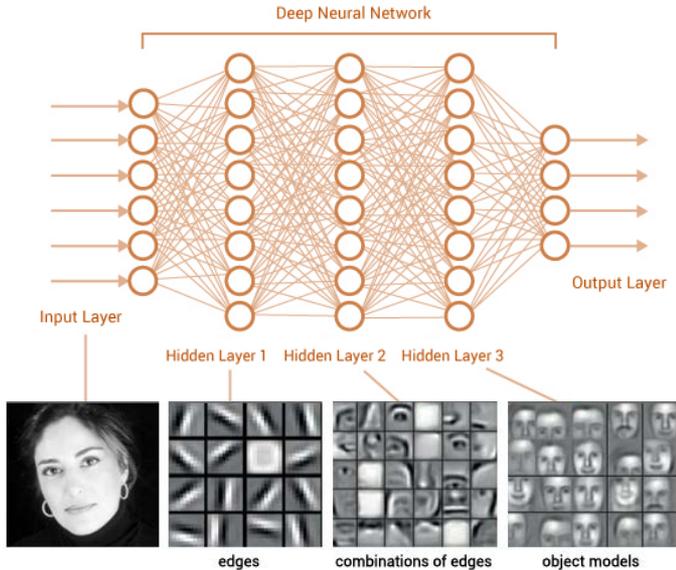
Arbitrary Data
autonomous selection of best
methodology when presented
with arbitrary data

Health care examples:

- Recommend "best fit" provider for a member
- Making diagnosis from patient symptoms, physical exam and laboratory values

Deep Learning

A type of Machine Learning transforming AI today



Deep Learning Neural Networks (DLNNs) are enabled by:

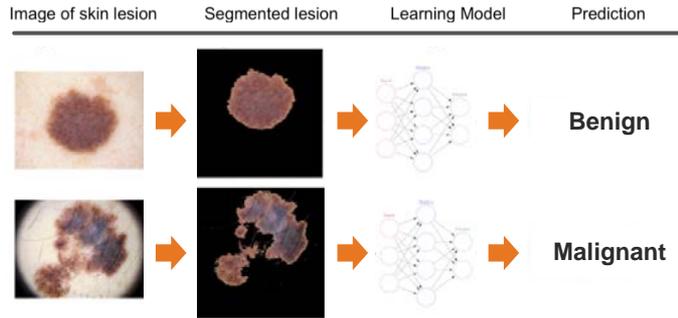
- Massive amounts of labeled data
- Hardware advances (GPUs for gaming)
- Image and text data

Deep Learning is driving most of the recent breakthroughs in AI in other industries:

- Face recognition
- Self-driving cars
- Language translation (Google)
- Credit card fraud detection (FICO Falcon)
- Terrorism flight risk

Deep Learning in Health Care

Recent publications indicate promising opportunity



Kalouche S. Vision-Based Classification of Skin Cancer Using Deep Learning. Stanford University.

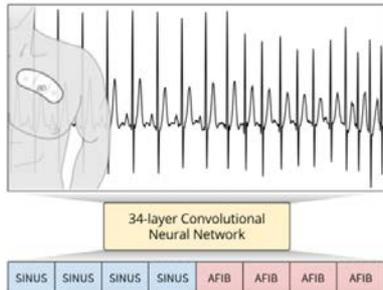


Figure 1. Our trained convolutional neural network correctly detecting the sinus rhythm (SINUS) and Atrial Fibrillation (AFIB) from this ECG recorded with a single-lead wearable heart monitor

Rajpurkar P, Hannun A, et al. Cardiologist-Level Arrhythmia Detection with Convolutional Neural Networks, arXiv:1707.01836v1 [cs.CV] 6 Jul 2017.

Researchers have successfully reused trained neural networks

- A Deep Learning Neural Network (DLNN) trained to recognize cats and dogs can be repurposed to distinguish pathology in medical images

Recent work has shown promising results in image classification:

- Skin lesions
- Pathology images
- Retinal hemorrhage
- Signal processing – EEG, ECG data

But work continues to make results more interpretable

- Classifiers today are best suited to scan data for skilled professionals

Administrative Processes

Well-suited for Deep Learning

KEY INGREDIENTS OF ADMINISTRATIVE WORKFLOWS



Complex manual review process

TYPES OF DATA

MANUAL PROCESS

DECISIONS

Many administrative processes for claims rely on analyzing text data

- Charts
- Notes
- Comments

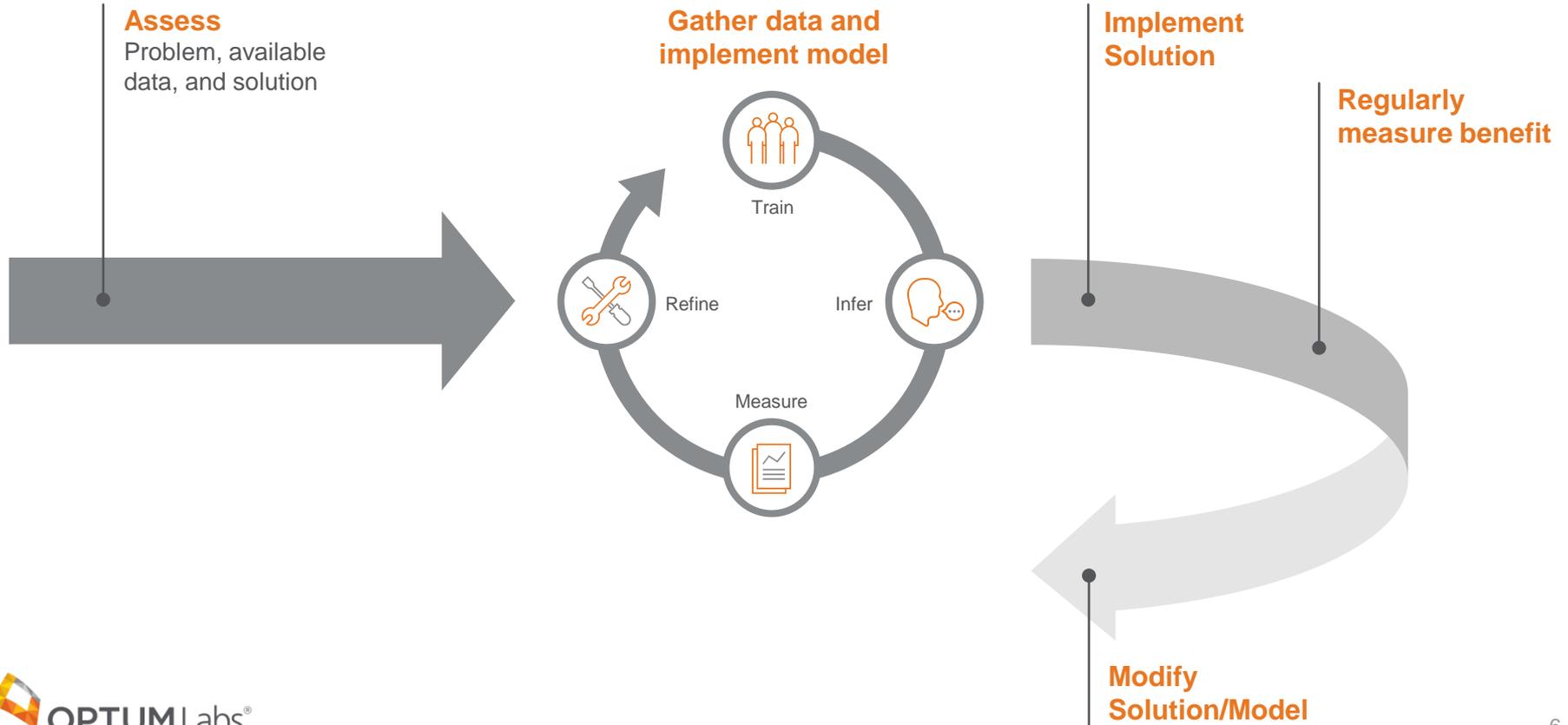
Often, sequences of events are critical to determine an outcome

- Groups of claims
- A progression of care

The results of these decisions are well-suited to train a neural network

Deep Learning

The model is not the solution



Applying Deep Learning Neural Networks(DLNNs)

Use cases underway



Avoidable ED visits	Use labeled ED visits and EHR data /claims data to predict patients at risk for these visits	Proactively reach out to priority patients to educate them about alternative care options	Audit/monitor outcomes of patients contacted to identify appropriate ED visits
Unnecessary medical claim reviews	Use labeled claims data to predict claims that should be automatically paid	Change claims review process to include automated approvals and review claims flagged for review	<ul style="list-style-type: none">• Audit/monitor false positives• Evaluate policy change
Untimely prior authorizations	Use historical prior authorization data to predict which requests should be automatically approved	Change prior authorization process to include automated approvals and requests requiring review	<ul style="list-style-type: none">• Audit/monitor false positives• Evaluate policy change

